Advanced Communications Function for VTAM

Program Product

Operation

Release 3

IBM

Preface

This book is a reference manual for system programmers who must provide operators with the detailed information needed to operate the Advanced Communications Function for VTAM (ACF/VTAM) program product.

ACF/VTAM can operate with the ACF Network Control Program (ACF/NCP/VS) Release 2, Release 2.1, or Release 3. This publication uses the term *NCP* to refer to all of these supported releases of ACF/NCP/VS, unless reference to a specific release is made. Any reference to ACF/NCP/VS Release 2 applies to both ACF/NCP/VS Release 2 and ACF/NCP/VS Release 2.1, unless otherwise stated.

Some of the functions available in ACF/VTAM Release 3 (such as multiple routes between subareas) cannot be used unless ACF/NCP/VS Release 3 is installed. Likewise, if the Multisystem Networking Facility is installed, some of the functions available in ACF/VTAM Release 3 cannot be used as they apply to other host subarea nodes unless ACF/VTAM Release 3 or ACF/TCAM Version 2 Release 3 is installed in such other host subarea nodes. Refer to *ACF/VTAM Planning and Installation Reference* for more information on these functional limitations.

The description of ACF/VTAM operation in this manual assumes a network consisting of ACF/VTAM Release 3, ACF/NCP/VS Release 3, and ACF/TCAM Version 2 Release 3 nodes. Special considerations that apply to ACF/VTAM operation in a network containing other supported nodes are supplied as *migration considerations* at the end of each section, as appropriate.

In this manual, the Virtual Storage Extended (VSE) operating system, comprising the DOS/VSE system control programming (SCP) and the VSE/Advanced Functions program product, is referred to as the VSE system.

How to Use This Manual

This manual provides an introduction to operating ACF/VTAM (Chapter 1), provides information for developing operating procedures for an ACF/VTAM network (Chapter 2), provides information for developing backup and recovery procedures for an ACF/VTAM network (Chapter 3), describes the syntax of ACF/VTAM operator commands (Chapter 4), and provides examples of output from ACF/VTAM DISPLAY commands (Appendix A).

In Chapter 4, the commands and their descriptions appear in alphabetical order by command name and principal modifier. (For example, VARY is considered a class of commands, and VARY ACT is considered a specific command.) The description of each command includes a summary of the command's function, the command format, a list of the resource types for which each operand is allowed (if applicable), and a description of each operand.

To make the best use of this manual, you should be familiar with the operation of the host operating system (OS/VS1, OS/VS2 [MVS], or VSE). In addition, you should have the necessary background knowledge about ACF/VTAM as provided in the prerequisite publications listed below.

Prerequisite Publications

Advanced Communications Function for VTAM General Information: Concepts,
GC27-0463

This publication provides an overview of ACF/VTAM. It is directed primarily
to data processing managers and system programmers who might install or
maintain a data communication system that uses ACF/VTAM.

Advanced Communications Function for VTAM Planning and Installation
Reference, SC27-0584

This publication provides information needed to plan an ACF/VTAM
installation, to include ACF/VTAM in a VSE or OS/VS operating system, and
to define an ACF/VTAM domain.

Related Publications

ACF/VTAM Publications

As shown in Figure P-1, this book is part of a library of ACF/VTAM
publications. The following paragraphs provide a brief description of each
ACF/VTAM publication, except for the prerequisite publications previously
described. The order of these descriptions corresponds to the order in which
the publications are shown in Figure P-1.

Advanced Communications Function for VTAM Program Summary, GC27-0457

This publication provides a summary of ACF/VTAM Release 2 and 3 facilities.
It also provides a brief description of the operating environment in which
ACF/VTAM is expected to run and information about the availability of the
ACF/VTAM program product.

Advanced Communications Function for VTAM General Information:
Introduction, GC27-0462

This publication provides an overview of ACF/VTAM Release 2 and 3
facilities, hardware and software requirements, and other information needed to
evaluate the applicability of the ACF/VTAM program product to an
installation.

Advanced Communications Function for VTAM Programming, SC27-0449

This publication explains how to write an ACF/VTAM application program,
including application programming facilities and macro instructions. It also
provides information on writing program operator and communication network
management (CNM) application programs.

Advanced Communications Function for VTAM Reference Summary,
SX27-0008

This publication contains a summary of ACF/VTAM operator commands, a
summary of the ACF/VTAM macro instructions, various macro error return
codes, and a summary of certain SNA information.

Evaluation and Education

ACF/VTAM Program Summary, GC27-0457	*ACF/VTAM General Information: Introduction,* GC27-0462	*ACF/VTAM General Information: Concepts,* GC27-0463

Installing ACF/VTAM

ACF/VTAM Planning and Installation Reference, SC27-0584 (OS/VS and VSE)

Writing ACF/VTAM Application Programs

ACF/VTAM General Information: Concepts, GC27-0463

ACF/VTAM Programming, SC27-0449

ACF/VTAM Reference Summary, SX27-0008 (OS/VS and VSE)

Operating ACF/VTAM

ACF/VTAM Operation, SC27-0466

ACF/VTAM Messages and Codes, SC27-0470 (OS/VS and VSE)

Detecting, Diagnosing, and Fixing Problems

ACF/VTAM Diagnosis Guide, SY38-3029 (OS/VS) SY38-3020 (VSE)

ACF/VTAM Diagnosis Reference, LY38-3027 (OS/VS) LY38-3022 (VSE)

ACF/VTAM Data Areas, LY38-3030 (OS/VS) LY38-3026 (VSE)

ACF/VTAM Logic: Multisystem Networking Facility, LY38-3023

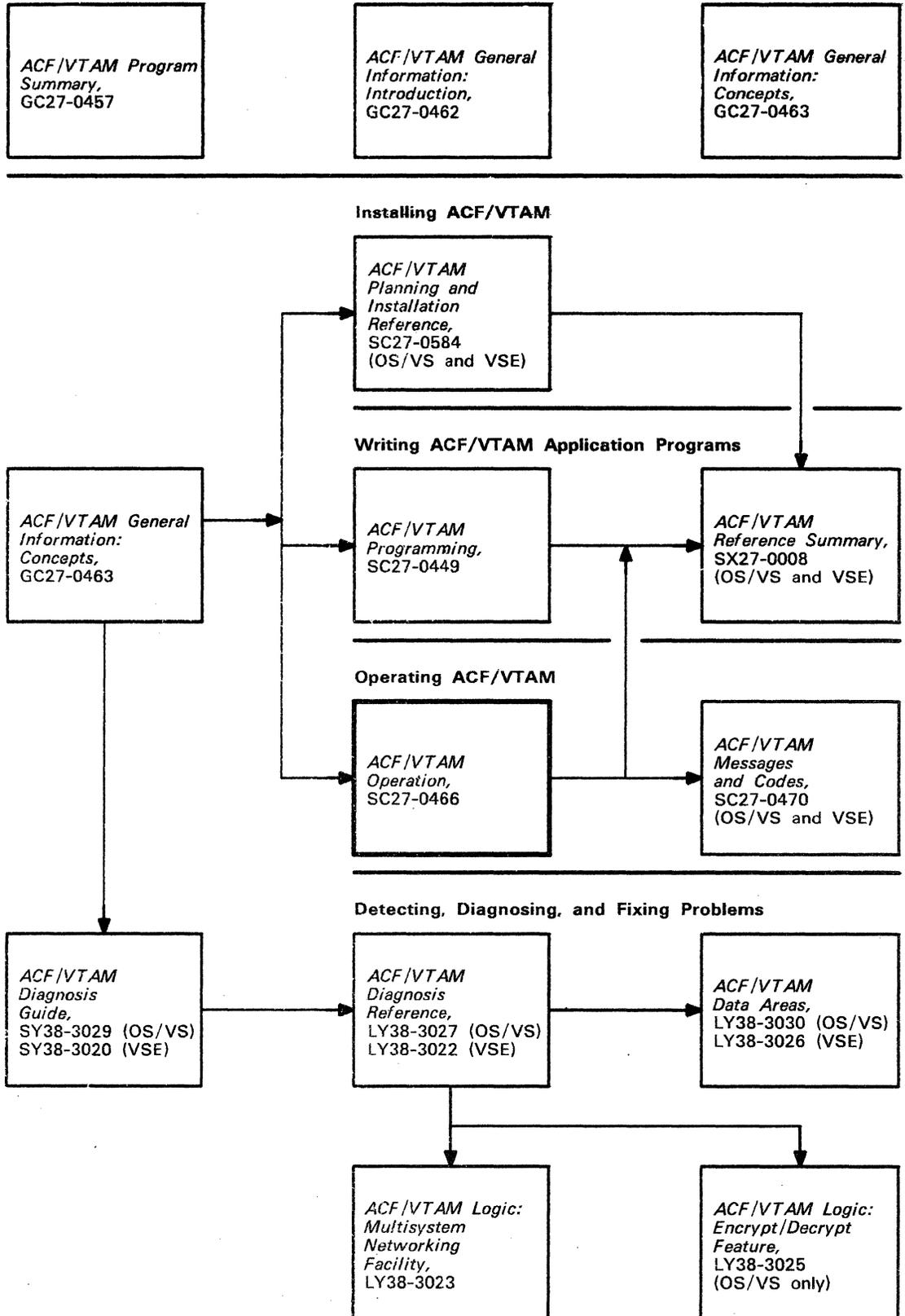*ACF/VTAM Logic: Encrypt/Decrypt Feature,* LY38-3025 (OS/VS only)

Figure P-1. ACF/VTAM Release 3 Publications

Advanced Communications Function for VTAM Messages and Codes,
SC27-0470

This publication is a reference manual for ACF/VTAM messages and the
related routing codes, descriptor codes, and suppression levels.

Advanced Communications Function for VTAM Diagnosis Guide, SY38-3029
(OS/VS), SY38-3020 (VSE)

This publication describes procedures and service aids used to isolate and
describe ACF/VTAM problems.

Advanced Communications Function for VTAM Diagnosis Reference,
LY38-3027 (OS/VS), LY38-3022 (VSE)

This publication describes the logic of ACF/VTAM and can be used for
reference when debugging ACF/VTAM.

Advanced Communications Function for VTAM Data Areas, LY38-3030
(OS/VS), LY38-3026 (VSE)

This publication contains diagrams and information about data areas and control
blocks used by ACF/VTAM.

*Advanced Communications Function for VTAM Logic: Multisystem Networking
Facility,* LY38-3023

This publication describes the logic of the ACF/VTAM Multisystem
Networking Facility and can be used for reference when debugging an
ACF/VTAM system that has this facility installed.

Advanced Communications Function for VTAM Logic: Encrypt/Decrypt Feature,
LY38-3025

This publication describes the logic of the ACF/VTAM Encrypt/Decrypt
Feature and can be used for reference when debugging an ACF/VTAM system
that has this feature installed.

Systems Network Architecture (SNA) Publications

The following publications will provide ACF/VTAM users with useful
background information about Systems Network Architecture (SNA).

Systems Network Architecture Concepts and Products, GC30-3072 (when
available)

This publication introduces the IBM Systems Network Architecture to
individuals who need to acquaint themselves with its benefits, its concepts, and
the IBM products that are designed for use in SNA networks. This is the basic
publication about SNA for managers, system designers, and others involved in
making decisions about planning or implementing SNA networks.

Systems Network Architecture Technical Overview, GC30-3073 (when available)

This publication presents detailed information on the structure and functions of SNA for the designers, installers, programmers, and administrators of SNA networks.

ACF/NCP/VS Publications

The following publications contain information on NCP installation and generation, as well as information on loading and dumping an NCP and printing NCP dumps.

ACF/NCP/VS Release 3 Publications

ACF/NCP/VS Network Control Program and System Support Programs Installation, SC30-3154

ACF/NCP/VS Network Control Program and System Support Programs Utilities, SC30-3158

ACF/NCP/VS Release 2 Publications

ACF/NCP/VS Installation, SC30-3142

ACF/NCP/VS Utilities, SC30-3143

Operating System Publications

The following publications contain information about operating the VSE, OS/VS1 and OS/VS2 (MVS) operating systems, including starting and canceling programs that use ACF/VTAM under these operating systems.

VSE/Advanced Functions: Operating Procedures, SC33-6097

Operator's Library: OS/VS1 Reference, GC38-0110

Operator's Library: OS/VS2 Reference (JES2), GC38-0210

Operator's Library: OS/VS2 Reference (JES3), GC38-0226

The following publications contain information about the Generalized Trace Facility (GTF), which is needed to print ACF/VTAM trace data in OS/VS operating systems.

OS/VS1 Service Aids, GC28-0665

OS/VS2 System Programming Library: Service Aids, GC28-0674

Network Communications Control Facility (NCCF) Publication

The following publication contains information about the Network Communications Control Facility (NCCF), which can be used to assist in operating an ACF/VTAM network.

Network Communications Control Facility General Information, GC27-0429

Contents

Figures

Summary of Amendments (September 30, 1980) to SC27-0466-1 by Revision SC27-0466-2

Changed Documentation

This manual has been completely rewritten, with extensive changes to both the organization and the contents of the manual. Users of previous editions of this manual should review it in its entirety.

This edition applies only to ACF/VTAM Release 3. Users of ACF/VTAM Release 2 should use this manual only for planning migration to ACF/VTAM Release 3.

New Program Functions

New ACF/VTAM commands have been added and existing commands have been changed in both syntax and operational characteristics. Following is a list of the ACF/VTAM commands that are new or changed for ACF/VTAM Release 3, with a brief description of the new commands and a summary of the syntax changes of the changed commands.

- DISPLAY PATHTAB. The PATHTAB operand is now a positional parameter and must immediately follow the NET operand. The DISPLAY ROUTE command is intended to be a replacement for the DISPLAY PATHTAB command, but DISPLAY PATHTAB is still available.

- DISPLAY ROUTE. This command is new for ACF/VTAM Release 3. It displays the status of routes between subarea nodes, and optionally tests such routes.

- DISPLAY STATIONS. This command is new for ACF/VTAM Release 3. It displays the status of link stations.

- DISPLAY U. This command is for OS/VS2 (MVS) only and is new for ACF/VTAM Release 3. It displays information about TSO users.

- HALT. This command is changed for ACF/VTAM Release 3: the syntax of the CDLINK operand has been improved.

- MODIFY DUMP. This command is changed for ACF/VTAM Release 3: there is a new DUMPSTA operand to control the dumping of an NCP.

- MODIFY IOPD. This command is new for ACF/VTAM Release 3. It controls the interval of operator notification for pending ACF/VTAM operations.

- MODIFY MSGMOD. This command is new for ACF/VTAM Release 3. It causes identification of the issuing module to be included in ACF/VTAM operator messages.

- MODIFY TRACE and MODIFY NOTRACE. These commands are changed for ACF/VTAM Release 3:

  - There is a new EVERY operand for TYPE=BUF and TYPE=IO to extend the scope of the command.

  - There is a new TG operand for NCP transmission group trace.

- There is a new TSO operand (OS/VS2 [MVS] only) for TSO trace.
- There are new internal trace options.

- VARY ACQ. This command is changed for ACF/VTAM Release 3: the REP operand is now obsolete. If it is specified, it is ignored.
- VARY ACT. This command is changed for ACF/VTAM Release 3:

  - The COLD operand is now obsolete. If it is specified, it is ignored and the default value for the SCOPE operand is used. (This is fully compatible with the COLD function available in previous releases of ACF/VTAM.)
  - The syntax of the RNAME operand has been changed. Also, this operand and the U operand are no longer mutually exclusive.
  - The RNAME operand is no longer meaningful for an activation of a link station and is not allowed, except for a specific migration case.
  - There are new DUMPSTA, LOADSTA, and LOAD operands to control the dumping and loading of an NCP.

- VARY INACT. This command is changed for ACF/VTAM Release 3: the syntax of the CDLINK operand has been improved.

There are new CDRSCTI, IOINT, MSGMOD, SONLIM, and USSTAB start options.

There are also changes to ACF/VTAM operating procedures:

- Path definitions are now required in a network that has more than one subarea.
- There are changes to the procedures for activating, deactivating, acquiring, and releasing NCPs to account for the expanded connection abilities of NCPs.
- The options for dumping and reloading NCPs during error recovery procedures are enhanced to provide control with respect to the multiple connections now possible with an NCP.
- The DISPLAY command output has been enhanced to include information on new ACF/VTAM Release 3 functions.
- Existing ACF/VTAM messages have been changed and new messages have been created to include information on new ACF/VTAM Release 3 functions.
- Inactive NCPs can appear in ACF/VTAM display output if they have been contacted through active adjacent link stations.
- Certain types of failure or error recovery situations can affect the operation of the VARY TERM command.
- The reprentations of communication controller channel attachments have been formalized into cross-subarea links and link stations, analogous to SDLC links and link stations. While the VARY ACT command is not allowed for channel links and link stations, the VARY INACT command is allowed.

- The VARY ACT and VARY INACT commands are now allowed for any cross-subarea SDLC links and link stations.

- Cross-subarea links and link stations in a node adjacent to an NCP node being activated can be automatically activated as part of that NCP activation. Deactivation of such links and link stations can also be automatic.

Chapter 1. Introduction

The ease with which ACF/VTAM can be operated depends in part on the decisions made when defining the ACF/VTAM domain and on the operating procedures developed by the user. This book is intended as a source of information necessary to develop operating procedures for an ACF/VTAM domain, and as a reference manual for ACF/VTAM operator commands when operating an ACF/VTAM domain.

In this manual, the person who defines an ACF/VTAM domain and develops the operating procedures for it is called a *system programmer*, and the person who receives ACF/VTAM messages and enters ACF/VTAM operator commands is called an *ACF/VTAM operator* or, for brevity, just *operator*. In a multiple-domain network, the operators in the various domains are referred to as *domain operators*.

Controlling an ACF/VTAM Domain

Both the system programmer and the ACF/VTAM operator control ACF/VTAM. The system programmer defines the ACF/VTAM domain and, in doing so, establishes the basic operating parameters of ACF/VTAM and the amount of information that ACF/VTAM must obtain from the operator. After ACF/VTAM is started, the operator can monitor the status of the domain (for example, determine whether a resource is active or inactive) and change the status as required. The system programmer should help the operator by defining the domain so as to make the best use of ACF/VTAM operating facilities for the installation configuration, and by providing detailed operating procedures for the domain.

The Role of the ACF/VTAM Operator

The ACF/VTAM operator interacts with the operating system and with ACF/VTAM to monitor and control network resources within the ACF/VTAM domain. Following the procedures devised by the system programmer, the operator participates in the operation of the domain by receiving and responding to ACF/VTAM messages, and by entering commands to change the way in which the domain is operating. ACF/VTAM operator tasks include:

- Starting and stopping ACF/VTAM

- Making channel-attached devices available to ACF/VTAM

- Establishing and modifying the configuration of the domain to control the use of programs, terminals, and other resources in the domain

- Monitoring domain activity by displaying the status of resources in the domain

- Using diagnostic aids (such as traces, link tests, and dumps) when necessary, to provide information for locating and fixing problems in the network

- Recovering from network failures by following appropriate backup procedures

The system programmer can define an ACF/VTAM domain to include the use of programs to assist the operator in running the domain. These can include *program operators* and *communication network management (CNM) application programs.* See "Controlling the ACF/VTAM Domain with the Help of Application Programs" in Chapter 2 for more information. In this manual, the term *ACF/VTAM operator* applies to both human operators and program operators.

The system programmer can simplify starting the ACF/VTAM domain by defining:

- Start procedures

- Start option lists

- Configuration lists

The use of the configuration restart facility can also be defined, to simplify restarting all or part of the domain.

The system programmer must provide the information needed by the operator to start and control ACF/VTAM. This information includes:

- Start options that the operator must enter (if any)

- The syntax of any operator commands modified by the use of USS tables

- The name and type of each domain resource; specifically, the names of:

    - Path definition sets to be activated by the operator

    - Application programs and their associated job names

    - Channel-attached non-SNA terminals

    - Channel-attached physical units and logical units

    - NCPs and their subordinate resources (such as lines, link stations, physical units, and logical units)

    - Physical units and logical units communicating over switched lines

- The names and subarea addresses of all subarea nodes, if there is more than the one subarea of the ACF/VTAM host, along with a map showing their interconnections, and one or more maps showing the explicit and virtual routes to each destination subarea

- If the system is to engage in cross-domain communication:

    - Maps of the network, including all other-domain subarea nodes through which this domain has routes

    - The names of resources in other domains with which this domain is to communicate

    - The names of cross-domain resource managers for those resources

    - Procedures for taking over and returning the resources of one or more NCPs in another domain, if the operator is to provide backup for other domains

- Guidance concerning:

  - Activating and deactivating parts of the domain

  - Monitoring domain resources

  - Establishing and terminating sessions with operator commands

  - Using ACF/VTAM trace facilities

  - Requesting NCP loads, dumps, and storage displays

  - Changing the configuration of a communication controller

  - Testing routes

  - Testing SDLC lines

  - Requesting detailed error information concerning SDLC lines

  - Requesting TOLTEP tests

  - Halting ACF/VTAM

Note: *The operating procedures supplied by the system programmer should not depend on internal ACF/VTAM execution sequences. That is, ACF/VTAM commands entered at nearly the same time can be processed in parallel and the order of processing of the commands should not be assumed to be the same as the order in which the commands are entered. In particular, if one command depends on the successful completion of another, the dependent command should not be entered until the successful completion of the first command is confirmed by an ACF/VTAM message.*

Connection of Subareas

Each ACF/VTAM domain is divided into *subareas*. A subarea is a host processor or a communication controller and the resources associated with it.

Subareas are joined by logical links called *transmission groups*. The system programmer can define up to eight transmission groups between NCP nodes, and one transmission group between a host node and an NCP node. A transmission group is composed of one or more *cross-subarea links*. Specifically, a transmission group can contain one channel link, or one or more SDLC links.

For every cross-subarea link in a subarea node, there is a *link station*, which is a named resource within a subarea node representing the attachment of another subarea node by the cross-subarea link.

For two NCPs connected by an SDLC communication line, a link and a link station are defined and named in each NCP. The link is defined using the LINE macro, and the link station is defined using the PU macro with PUTYPE=4 specified. For example, in Figure 1-1, the SDLC line between NCP1 and NCP2 is defined as LINK1 in NCP1 and as LINK2 in NCP2. Similarly, a link station is defined in each NCP:

> LINKSTA1, which is defined in NCP1 and represents the attachment of NCP2

> LINKSTA2, which is defined in NCP2 and represents the attachment of NCP1

For an NCP connected directly to a host processor channel, a channel link and a channel link station are dynamically defined by ACF/VTAM when the channel-attached NCP is activated. Channel links and link stations are named by ACF/VTAM, which creates the name by taking the channel device name for the communication controller and adding "-L" for the link name and "-S" for the link station name. For example, the channel device name 0C2 has the link name of 0C2-L and a link station name of 0C2-S.

A transmission group becomes active when any one of the link stations within the group becomes active, and a transmission group becomes inactive when the last link station within the group becomes inactive. Conversely, a link and its link station become part of a transmission group when the link station becomes active, and they are no longer part of a transmission group when the link station becomes inactive. If one of the links or link stations in a multi-link transmission group fails or is deactivated, session traffic continues on the remaining links in the group without loss of data.

A transmission group number can be defined for a link station, or the link station can be defined to use the transmission group number defined for the link station at the other end of the link. (Thus a specific transmission group number *must* be defined for at least one of the two sides of a cross-subarea link.) The transmission group number for a transmission group containing a channel link is not defined by the system programmer and is always 1.

Cross-subarea links and link stations must be active on both sides of an SDLC communication line before the subareas they connect can communicate with each other. Also, the link associated with a link station must be active before the link station itself can be activated. For example, in Figure 1-1, LINK1 must be active before LINKSTA1 can be activated.

The NCP has a optional facility called *SDLC monitor mode*, which enables an NCP to automatically activate its cross-subarea SDLC links and link stations without the aid of an SSCP. Monitor mode is required in some cases, such as for the activation of LINK2 and LINKSTA2 in Figure 1-1 (because the link and link station must be active to support the session that ACF/VTAM needs with NCP2 in order to activate NCP2, and ACF/VTAM cannot activate LINK2 and LINKSTA2 until NCP2 is activated). Monitor mode might be desirable in cases where it is not required. For example, it can be used to make cross-domain session traffic possible without waiting for each host in the network to activate the necessary links and link stations. However, such an optional use of monitor mode should not completely take the place of activation by ACF/VTAM, because activation by ACF/VTAM is required for error recovery procedures

```
┌─────────────────────────────────────────────────┐
│                 Host Processor                   │
│                 with ACF/VTAM                    │
│                                                  │
│                    0C2-L                         │
│              ┌──────────────────┐                │
│              │      0C2-S        │               │
│              └──────────────────┘                │
└─────────────────────────────────────────────────┘
                        │
                        │
         ┌──────────────────────────────┐
         │                              │
         │            NCP1              │
         │                              │
         │           LINK1              │
         │     ┌──────────────────┐     │
         │     │    LINKSTA1       │    │
         └─────└──────────────────┘─────┘
                        │
                        │
         ┌──────────────────────────────┐
         │     ┌──────────────────┐     │
         │     │    LINKSTA2       │    │
         │     └──────────────────┘     │
         │           LINK2              │
         │                              │
         │            NCP2              │
         │                              │
         └──────────────────────────────┘
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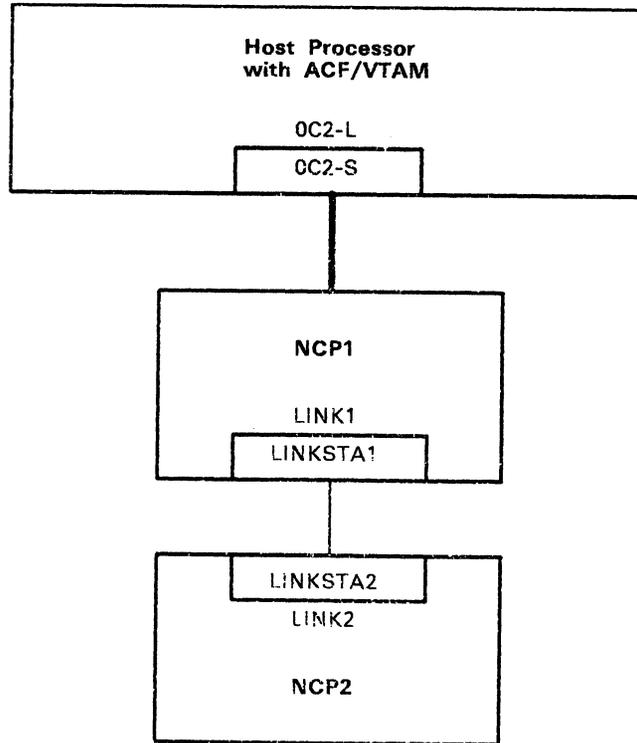
Figure 1-1. Example of Link Stations

and notification of link and link station failures to the ACF/VTAM operator. See *ACF/NCP/VS (NCP-SSP) Installation* and *ACF/VTAM Planning and Installation Reference* for more information.

Cross-subarea links and link stations can be activated in one of several ways, as listed in the next paragraph. The examples that follow refer to Figure 1-1. The initial conditions are that ACF/VTAM and NCP1 are active, and that LINK1, LINKSTA1, and NCP2 are all inactive. Also assume that SDLC monitor mode has been specified in NCP2 for LINK2.

As a result of a VARY ACT command, a link or link station can be activated:

> *Directly* by ACF/VTAM, as a result of a VARY ACT command naming the individual link or link station. An example of direct activation is when the ACF/VTAM operator enters separate commands to activate LINK1 and LINKSTA1.

> *Indirectly* by ACF/VTAM, as a result of a VARY ACT command naming another resource to which the link or link station is subordinate. An example of indirect activation is when the ACF/VTAM operator enters the command VARY NET,ACT,ID=NCP1, SCOPE=U. ACF/VTAM activates LINK1 and LINKSTA1 if the definition statements for NCP1 specified that LINK1 and LINKSTA1 are to be initially active. Another example is when the operator enters the command VARY NET,ACT,ID=NCP1,SCOPE=ALL. ACF/VTAM activates all of the resources within NCP1, including LINK1 and LINKSTA1.

Automatically by ACF/VTAM, as a result of a VARY ACT command naming an NCP adjacent to the link and link station. ACF/VTAM allows one channel link station and up to 13 SDLC link stations to be specified for automatic activation in an NCP definition or in the U and RNAME operands of the VARY ACT command for an NCP. An example of automatic activation is when the ACF/VTAM operator enters the command VARY NET,ACT,ID=NCP1,U=0C2. ACF/VTAM automatically activates the channel link 0C2-L and the channel link station 0C2-S. Similarly, if the operator enters the command VARY NET,ACT,ID=NCP2,RNAME= LINKSTA1, ACF/VTAM automatically activates the SDLC link LINK1 and the SDLC link station LINKSTA1.

By an NCP, using SDLC monitor mode. In the configuration shown in Figure 1-1, LINK2 must be defined to use SDLC monitor mode in order to allow ACF/VTAM to activate NCP2. NCP2 begins trying to activate LINK2 and LINKSTA2 as soon as NCP2 is loaded into its communication controller. When ACF/VTAM attempts to activate LINKSTA1 in NCP1, the monitor mode activation of LINKSTA2 completes along with the activation of LINKSTA1. ACF/VTAM is then able to communicate with NCP2 and activate it, if desired.

For each of the types of activation performed by ACF/VTAM, there is a similar type of deactivation. That is, link and link station deactivation can be direct, indirect, or automatic.

Any links or link stations that are automatically activated (and not also directly or indirectly activated) are automatically deactivated when they are no longer needed. In terms of the examples of automatic activation described above, LINK1 and LINKSTA1 are automatically deactivated when NCP2 is deactivated, and 0C2-L and 0C2-S are automatically deactivated when NCP1 is deactivated. Links or link stations that are directly or indirectly activated are never automatically deactivated and remain active until they are directly or indirectly deactivated with ACF/VTAM operator commands.

Channel links and link stations cannot be directly or indirectly activated; they can only be automatically activated. However, channel links and link stations can be displayed and deactivated with ACF/VTAM commands. If the channel device name for a channel-attached communication controller is not supplied in the NCP definition, it must be supplied with the U operand of the VARY ACT command in order to use the channel connection.

Migration Considerations: The SDLC monitor mode facility is not available in ACF/NCP/VS Release 2. In those configurations where SDLC monitor mode is required, ACF/NCP/VS Release 2 has a facility to allow activation of the NCP by ACF/VTAM. The use of this facility does not need to be specified in the definition of an ACF/NCP/VS Release 2.

Routes

Before a session can be established between two subareas, there must be a defined operative route connecting the subareas. The routes are defined in path definition sets. A route becomes operative when all of the physical elements (host nodes, NCP nodes, transmission groups) included in the route are active.

The operator should be aware that there are two logical levels of routes: explicit routes and virtual routes.

An *explicit route* is an ordered set of transmission groups connecting two subareas. There can be up to eight explicit routes between any two subareas.

A *virtual route* is a logical connection between two subareas. Each virtual route is assigned to an explicit route; more than one virtual route can be assigned to a given explicit route. A virtual route assumes the characteristics (such as the bandwidth and transmission rate) of the explicit route to which it is assigned.

For more information on defining connectivity and routes, see the *ACF/VTAM Planning and Installation Reference* manual.

Session Establishment

Session establishment is the process of making a logical connection between two logical units so they can communicate with each other. Although sessions are usually initiated by logical units, activation of the resources in the path for the session is normally the operator's responsibility and is handled by using ACF/VTAM operator commands.

The operator must ensure that the two logical units are active, along with any links, link stations, physical units, or NCPs in the path. For example, suppose a terminal user at a terminal named T1234 wants to have a session with an application program called PAYROLL. Before this session can be started, the ACF/VTAM operator must:

1. If T1234 and PAYROLL are not in the same subarea, ensure that a route is defined between their subareas (if not, activate the appropriate path definition set) and ensure that the links, link stations, and subarea nodes that make up the route are active.

2. Activate the application program major node that contains the application program PAYROLL, activate PAYROLL, and start the PAYROLL job.

3. Activate the major node that contains the logical unit definition for the terminal T1234. Ensure that the physical unit and logical unit for T1234 are active.

Identification of Major and Minor Nodes

Each major and minor node has a name assigned to it. For example, PAYROLL can be the name assigned to an ACF/VTAM application program, and T1234 can be the name assigned to one of the domain's device-type logical units (that is, a terminal). These names are assigned when the system programmer writes definition statements to define the logical units represented by the names PAYROLL and T1234. These statements contain control information and information about the characteristics of PAYROLL and T1234.

The statements are filed as members of the VTAMLST data set (for OS/VS) or books in the source statement library (for VSE systems). The names of the major nodes are the *names of the books or members*, and the names of the minor nodes are the *labels* (for example, PAYROLL and T1234) of the minor node definition statements in the books or members. Thus, when an ACF/VTAM operator command is entered that contains a reference to the name of a book or member that defines an application program major node, for example, ACF/VTAM uses the contents of that book or member to determine the characteristics of that application program major node.

To control the major and minor nodes in a communication path (through activation or deactivation), the operator needs to know not only the names of individual major and minor nodes, but also their place within the resource hierarchy. For example, if one knows that T1234 represents a logical unit attached over a communication line, one also knows that it is a minor node subordinate to physical unit and line minor nodes and to an NCP major node.

In this manual, the term *physical unit* includes BSC 3270 cluster controllers attached to an NCP by a line defined with the PU=YES option. The term *logical unit* includes BSC 3270 terminals attached to such cluster controllers.

Initial Configuration and Control

The system programmer can use ACF/VTAM start options for initial configuration and control. Lists of start options can be filed away for future use. The options stored in these lists are then retrieved and processed when ACF/VTAM is started. In addition, the ACF/VTAM operator might be required to enter changes or additions to the options at the system console. If so, the system programmer should give the operator guidance on which options to enter.

In OS/VS, the operator can enter start options on the START command or the system programmer can arrange to have ACF/VTAM prompt the ACF/VTAM operator for start options.

In VSE systems, the operator can enter start options only when prompted for them by ACF/VTAM, so if the operator is required to enter start options, the system programmer must have made arrangements for prompting. For more information, see the *ACF/VTAM Planning and Installation Reference* manual.

ACF/VTAM Commands

ACF/VTAM is started and controlled with these commands: EXEC (to start ACF/VTAM in VSE), START (to start ACF/VTAM in OS/VS), VARY, MODIFY, DISPLAY, and HALT. Incorrect commands are rejected by ACF/VTAM's command processor, and a message indicating the error is written to the ACF/VTAM operator.

The major use of the VARY command is to activate and deactivate major and minor nodes. Some other uses of the VARY command are to terminate LU-LU sessions, acquire and release NCP major nodes, and to dynamically reconfigure an NCP major node.

The major use of the MODIFY command is to change some of the operating parameters of ACF/VTAM. For example, the MODIFY command can be used to start or stop traces or change the level of ACF/VTAM message suppression.

To determine whether a minor node in an active major node is active or inactive, the ACF/VTAM operator can display its status by using a suitable DISPLAY command. If desired, the operator can also request in the same command a display of the names and status of certain other related minor nodes. For example, in the command to display the status of an application program, the names of other logical units that are currently in session with the application program can also be requested.

Finally, ACF/VTAM provides a HALT command. The HALT command closes down the entire domain by deactivating all of its major and minor nodes and then stopping ACF/VTAM.

In this manual these commands are referred to by a combination of the name of the major command (such as VARY) and the name of the principal operand used for a particular task. For example, the command used for activating a major node is referred to as a :q.VARY ACT command:eq. because the ACT operand of the VARY command is the principal operand for this task.

Multiple-Domain Networks

The optional Multisystem Networking Facility enables an ACF/VTAM domain to be part of a multiple-domain network. A multiple-domain network is a set of connected domains. Each domain is controlled by an ACF/VTAM, ACF/VTAME, or ACF/TCAM that has a cross-domain resource manager (CDRM). Before a logical unit in one domain can communicate with a logical unit in another domain, the CDRMs must be in session with each other.

In a multiple-domain network, coordination of domain operators in different domains is required to permit cross-domain operations; domain operators can monitor and control only their own domain. A program operator can communicate with a program operator in another domain to request control across domain boundaries. For example, the Network Communications Control Facility (NCCF) has facilities that allow communication with a program operator in another domain.

Chapter 2. Operating ACF/VTAM

This chapter describes the tasks involved in controlling an ACF/VTAM domain. It provides a general description of the kinds of tasks that operators perform, such as starting and halting ACF/VTAM, controlling ACF/VTAM resources, and monitoring the ACF/VTAM domain. These tasks are organized into roughly the same order in which an operator would perform them. The descriptions of some of the less frequently performed tasks, such as using diagnostic facilities and various miscellaneous ACF/VTAM facilities, are at the end of the chapter.

For each task, the description gives:

- A general idea of when and why the task is done
- The commands to be used for a given task
- Special considerations and potential problems, if any

Starting ACF/VTAM

Starting ACF/VTAM causes ACF/VTAM to be initialized. This can include the activation of some or all of the resources within the ACF/VTAM domain. It can also include selecting the optional ACF/VTAM facilities that are to be used.

General Procedures

The operator starts ACF/VTAM by:

1. Making available channel-attached devices needed at start time
2. Using the ACF/VTAM start procedure or entering the ACF/VTAM job control language statements
3. Entering ACF/VTAM start options, if necessary

Start Options

At the time ACF/VTAM is started, start options are provided by a predefined start option list that was generated by the system programmer, by the ACF/VTAM operator, or both. The conditions established by the start options go into effect when ACF/VTAM is started and remain in effect until altered by the operator or until ACF/VTAM is halted.

Using a predefined start option list simplifies the start procedure and reduces the chance that the wrong start options will be entered. ACF/VTAM automatically processes the start options in the default start option list (ATCSTR00) first. If this list is complete, and no changes or additions are needed, the operator need only enter the command to start ACF/VTAM. If changes are desired, the operator can provide them as described below:

- In OS/VS systems, the operator can enter start options as part of the START command. If no start options are entered with the START command, the operator is prompted for start options, unless the system

programmer has specified NOPROMPT in the ATCSTR00 list. If any of the options (from either a prestored list or the ones that the operator entered) are in error, the operator is prompted to enter correct start options, even if NOPROMPT is specified.

- In VSE systems, the operator can enter start options only if prompted or if any of the options from either a prestored list or the ones that the operator entered are in error. The system programmer indicates that the operator is to be prompted by not specifying NOPROMPT in the ATCSTR00 list.

To override some or all of the options specified in the ATCSTR00 list with those specified in another list, the operator can enter the LIST option for the prestored ATCSTRxx list that is to be used (where xx is the value specified for the LIST option). Any other options that the operator enters (in addition to the LIST option) are treated as changes or additions to the group of options that result after the processing of ATCSTR00 first, and then ATCSTRxx. That is, the options in ATCSTRxx override those in ATCSTR00, and the options specified by the operator override those in ATCSTRxx. If the LIST option is not one of the options entered, the options specified by the operator are treated as changes or additions to ATCSTR00.

To summarize, ACF/VTAM processes start options in the following order:

1. The ATCSTR00 options are processed.

2. If the operator has entered the LIST=xx option, ACF/VTAM processes the ATCSTRxx options.

3. If the operator enters other start options, ACF/VTAM processes those options.

4. If there are errors in any of the prestored options or in any of the options entered by the operator, the operator is prompted to reenter those that are in error (even if NOPROMPT was specified).

The specification last entered always overrides any previous specification if conflicting specifications exist for a particular option. For example, if ATCSTR00 contains the option TRACE,TYPE=IO,ID=VTAM, but the operator specifies NOTRACE,TYPE=IO, the trace is not started during initialization. Additionally, if the same option appears more than once in the same prestored list or in the same group of operator entries at the console, the value for the last option entered takes effect.

When all of the options have been accepted, ACF/VTAM begins processing them. Messages are displayed to tell the operator which nodes have been activated. Start processing continues until the message "VTAM INITIALIZATION COMPLETE" is received. Note that the initial activation of resources is independent of ACF/VTAM initialization (and the above message), so these activations will probably be continuing after this message is received. At this point, however, the ACF/VTAM operator command facilities are available to the operator and application programs can open their ACBs.

From this point on, the job of the ACF/VTAM operator is to control and monitor the domain according to the procedures defined by the system programmer.

Configuration Lists

The system programmer can greatly reduce the ACF/VTAM operator's start time workload by creating one or more configuration lists. These lists specify the major nodes and path definition sets that are to be activated when ACF/VTAM is started. Activating these resources with a configuration list eliminates the need for the operator to enter VARY ACT commands for them. The configuration list to be used when starting ACF/VTAM is specified with the CONFIG start option. For more information on creating and using configuration lists, see the *ACF/VTAM Planning and Installation Reference* manual.

OS/VS Considerations

The steps below outline additional considerations for starting ACF/VTAM in OS/VS systems. Specific start options and JCL must be supplied by the system programmer.

1. If the system programmer wants to use the resident ERP option with an alternate ERP list, the operator must respond to message IEA101A during operating system IPL by entering RERP=*xx*, where *xx* where *xx* represents the last two characters of the alternate ERP list's name. These two characters should be supplied by the system programmer. For more information on the resident ERP option, see the *ACF/VTAM Planning and Installation Reference* manual.

2. Use the OS/VS VARY command to make available the channel-attached devices needed at start time.

3. If the Encrypt/Decrypt Feature is to be used, activate the IBM Programmed Cryptographic Facility Program Product.

4. Use the START command to start ACF/VTAM.

Multiple Console Support in ACF/VTAM

ACF/VTAM commands can be entered and messages received by an operator at the system master console and at designated secondary consoles.

To enter ACF/VTAM commands at a secondary console, the console must be authorized to accept commands from Command Group 1 (System Control Group) and Command Group 2 (I/O Control Group). An ACF/VTAM command response goes to the console at which the command was entered. Depending on their contents, ACF/VTAM messages use routing codes 1, 2, 4, 6, 8, and 10. Therefore, a secondary console should be assigned routing codes based on the kinds of ACF/VTAM messages that are to be routed to that console. To determine the routing codes used by particular messages for OS/VS1 and OS/VS2 (MVS), see the *ACF/VTAM Messages and Codes* manual.

Command authorization and message routing can be changed using the OS/VS VARY command. The following command, for example, designates a secondary console at which any ACF/VTAM command can be entered and at which any ACF/VTAM message that has not been suppressed can be received:

VARY 01F,CONSOLE,AUTH=(SYS,IO)

The channel device name of the console is 01F. It is authorized to enter commands from Command Group 1 (SYS) and Command Group 2 (IO). This console will receive all messages that have not been suppressed.

Details about using the OS/VS VARY command to designate a secondary console are contained in the system operator's reference manuals for OS/VS1 and OS/VS2 (MVS).

VSE Considerations

The steps below outline additional considerations for starting ACF/VTAM in VSE systems. Specific partition assignments, JCL, and start options should be supplied by the system programmer.

1. Use the VSE system ADD command to make available the channel-attached devices needed at start time.

2. Use the START command to start the partition in which ACF/VTAM is to run.

3. Enter the JCL statements for starting ACF/VTAM, either from the system console or from a device to which SYSRDR has been assigned. The JCL can be entered as separate statements from an input device, or the statements can be filed in the procedure library and invoked by entering the EXEC command from the console or from a device to which SYSRDR has been assigned. See *VSE/AF Operating Procedures* for details on filing and using a procedure, and for specifying modifications to a prestored procedure. For JCL examples, see the *ACF/VTAM Planning and Installation Reference* manual.

4. Certain IBM-supplied programs can be attached as ACF/VTAM subtasks with the MODIFY ATTACH command.

Configuration Restart

Configuration restart is an optional facility that enables ACF/VTAM to maintain operator-modified status information about most ACF/VTAM resources. This information can be used when starting ACF/VTAM to automatically restore such checkpointed operator changes to some or all of the applicable resources in the domain. A major use of configuration restart is for backup and recovery. More information about configuration restart can be found in Chapter 3 of this book and in the *ACF/VTAM Planning and Installation Reference* manual.

Controlling the ACF/VTAM Domain With the Help of Application Programs

Special application programs can be used to assist the ACF/VTAM operator in running an ACF/VTAM domain. Such an application program is either a *program operator* or a *communication network management (CNM) application program*.

A program operator is an application program that is authorized to issue certain ACF/VTAM commands and receive ACF/VTAM messages. This facility can be used to:

- Enter ACF/VTAM commands (except for commands to start or halt ACF/VTAM) from a terminal in the domain.

- Monitor and control elements in the domain at program execution speed.

- Define specialized commands (for example, to display the status of the entire domain).

- Reformat responses to ACF/VTAM commands (such as to reformat the status display of the entire domain to fit on a 3270 display screen).

ACF/VTAM Programming has a detailed description of the macro instructions used to create a program operator. An IBM program product, the Network Communications Control Facility (NCCF), can be used as a program operator. For information on NCCF, see *Network Communications Control Facility General Information.*

A communication network management (CNM) application program can request and receive information that might be useful in managing an SNA network. The application program can communicate with certain physical units in the network to obtain status information. For more information on coding an application program that uses these facilities, as well as on what information can be obtained, see *ACF/VTAM Programming.* For information on ACF/VTAM definition requirements, see the *ACF/VTAM Planning and Installation Reference* manual. The NCCF program product can also be used as a communication network management application program.

ACF/VTAM Resource Hierarchy

One of the main jobs of the operator of an ACF/VTAM domain is to control the use of ACF/VTAM resources (application programs, terminals, communication lines, and so on). The primary means of control is by activation (to make them available for use) and deactivation (to make them unavailable).

The resources of an ACF/VTAM domain are organized into a resource hierarchy. This hierarchy determines the scope of effect of ACF/VTAM operator commands. Within each major node, the major node itself is at the top of the hierarchy, followed by logically subordinate resources down to individual logical units (such as application programs and terminals). For a fuller explanation of the ACF/VTAM resource hierarchy, see *ACF/VTAM Planning and Installation Reference.*

A resource cannot be activated unless all other resources above it in the hierarchy have been activated. For example, a logical unit cannot be activated unless the physical unit to which it is subordinate is already active. When a resource is activated, the resources below it in the hierarchy might be activated also, depending on the use of the SCOPE operand of the activation command, and on the definitions of the subordinate resources. (This is called indirect activation of the subordinate resources.) When a resource is deactivated, all of the resources below it in the hierarchy are also deactivated. (This is called indirect deactivation of the subordinate resources.)

While there is no logical hierarchy within the set of major nodes themselves or between resources in different major nodes, there is an obvious topological relationship among those major nodes representing subarea nodes in the network and those lines and link stations connecting them. Therefore, the activation of an NCP major node depends on having active the lines, link stations, and other subarea nodes that constitute the routes between ACF/VTAM and the NCP. Likewise, deactivation of an NCP major node or a line or link station within it could have an effect on those other subarea nodes for which the resource being deactivated constitutes a part of the path from ACF/VTAM.

Activating Resources

In most cases, resources are activated either as part of ACF/VTAM start processing or as the result of a VARY ACT command. Resources can also be activated as a result of the VARY ACQ command (described in Chapter 3), or the VARY DRDS command (see "Dynamic Reconfiguration of an NCP" in this chapter).

The CONFIG start option can be used to identify a list of the major nodes, path definition sets, and dynamic reconfiguration files that are to be activated by ACF/VTAM when it is started. Within the major nodes and dynamic reconfiguration files, any resources that are defined to be initially active are also activated.

To activate a major node after ACF/VTAM is started, enter a VARY ACT command with the ID operand specifying the name of the node to be activated. After a major node is active, any of its subordinate resources that are still inactive can be activated with VARY ACT commands. The system programmer can request the indirect activation of any minor node through explicitly-specified or default values of the ISTATUS operand in the resource's definition statement. This operand specifies that the resource is to be *initially active;* that is, it is to be activated when the resource to which it is subordinate is activated. When activating a resource with a VARY ACT or VARY ACQ commands, the SCOPE operand can be used to control the indirect activation of the subordinate resources.

As introduced in the discussion above, a resource can be activated either directly or indirectly by ACF/VTAM. *Direct* activation is when the operator enters a command to activate a particular resource, and *indirect* activation is when a resource is activated as a result of the activation of another resource to which it is subordinate. For example, the operator can directly activate a physical unit by entering a VARY ACT command that specifically names that physical unit, or the operator can indirectly activate the physical unit by entering a command to activate the line to which the physical unit is subordinate, provided that the operator specifies SCOPE=ALL or SCOPE=U on the VARY ACT command. (For SCOPE=U, the definition statement for the physical unit must specify that the physical unit is to be initially active.)

In addition, a VARY ACT command for a subarea node (that is, an NCP) can result in the *automatic* activation of cross-subarea links and link stations in adjacent subarea nodes (other NCPs or ACF/VTAM itself). For example, if the operator enters a command to activate an NCP, ACF/VTAM automatically activates the link stations in adjacent nodes that are known to be needed for the connection to the NCP being activated. ACF/VTAM can know this from the

channel device name or RNAME specification (or both) of either the NCP definition statement or the VARY ACT command.

Activating a node causes different actions by ACF/VTAM depending upon the node type. Sometimes activation involves sending commands to the node, but in some cases activation is just a logical operation to make the nodes available for subsequent operations (as in the case of switched physical unit minor nodes).

Order of Activation

All of the elements of a communication path between two session end points must be active before a session can be established. In domains with more than one subarea, or in multiple-domain networks, a path definition set must be activated before communication between subareas is attempted. Major nodes are activated, and then their minor nodes are activated to enable sessions to be established for carrying user message traffic.

While an activation command for a major node can be entered at any time after ACF/VTAM is initialized and before it is halted, the activation of subarea nodes (that is, NCP major nodes) and external CDRM minor nodes require fully operative explicit routes in order to proceed. If such routes are not available, the activations remain pending until the routes become available or until the operator deactivates the resources.

Before a minor node can be activated, the major node and all minor nodes to which it is subordinate must be activated.

If automatic logons to a controlling application program have been defined for any logical units, ensure that all of the necessary application program major nodes have been activated before activating (directly or indirectly) any of these logical units.

In a multiple-domain network, the host CDRM (the CDRM that represents the ACF/VTAM SSCP) must be active before any external CDRM is activated.

Deactivating Resources

The operator deactivates ACF/VTAM resources with a VARY INACT command. Resources can also be deactivated as a result of the VARY REL command (described in Chapter 3).

ACF/VTAM deactivates resources in the opposite order from activation. When ACF/VTAM receives a command to deactivate a resource, it first deactivates any resources subordinate to the named resource, moving from the bottom of the hierarchy upward, and then deactivates the named resource.

As with activation, a resource can be deactivated either directly or indirectly by ACF/VTAM. *Direct* deactivation is when the operator enters a command to deactivate a particular resource, and *indirect* deactivation is when a resource is deactivated as a result of the deactivation of another resource to which it is subordinate. For example, the operator can directly deactivate a physical unit by entering a VARY INACT command that specifically names that physical unit, or the operator can indirectly deactivate the physical unit by entering a command to deactivate the line (or any other resource) to which the physical unit is subordinate.

In addition, a VARY INACT command for a subarea node (that is, an NCP) can result in the *automatic* deactivation of cross-subarea links and link stations in adjacent subarea nodes (other NCPs or ACF/VTAM itself). For example, if the operator enters a command to deactivate an NCP, ACF/VTAM automatically deactivates any links and link stations that were automatically activated in adjacent nodes *provided* these adjacent links and link stations were not also directly or indirectly activated.

Besides the types of deactivation described previously, in which deactivation is classified by relations between types of resources according to their places in resource or topological hierarchies, there are other types of deactivation within a classification based on the "strength" of the VARY INACT command as specified by the operator. When entering a VARY INACT command, the operator can specify normal deactivation, immediate deactivation, forced deactivation, or forced reactivation.

Normal deactivation is the default for the VARY INACT command. When normal deactivation is requested, resources are not actually deactivated by ACF/VTAM until LU-to-LU sessions associated with the resources have been terminated. All queued requests for sessions involving the resources to be deactivated are discarded and the initiators are notified. No new requests for sessions with these resources are accepted. An application program in session with a logical unit to be deactivated is not notified of pending normal deactivations.

Immediate deactivation is specified with the I operand of the VARY INACT command. When immediate deactivation is requested, LU-to-LU sessions associated with the resources are effectively broken. All queued requests for sessions involving the resources to be deactivated are discarded and the initiators are notified. No new requests for sessions involving these resources are accepted. All input and output operations for active LU-to-LU sessions are immediately halted, with possible loss of data. If the deactivation is of a logical unit in session with an application program, the application program is notified of the deactivation. The application program must complete the session termination for the deactivation to be completed.

Immediate deactivation provides tight control over the domain; normal deactivation provides less stringent control, but allows for a more orderly deactivation. Normal and immediate deactivations are not completed until the proper SNA commands and responses are exchanged between the ACF/VTAM SSCP and the affected resources. If conditions in the domain prevent the sending of the proper commands or responses, normal and immediate deactivation might not be successful.

Forced deactivation is specified with the F operand of the VARY INACT command. When forced deactivation is requested, all of the actions described for immediate deactivation apply and, in addition, ACF/VTAM deactivates the resources internally, without waiting for responses to deactivation commands. An application program notified of the termination of a session with a deactivated logical unit *might* have to complete the session termination (depending on how the application program is coded) for the deactivation to be completed. Forced deactivation can be used when immediate and normal deactivation are not successful.

Forced deactivation does not apply to all types of resources. The description of
the VARY INACT command in Chapter 4 contains a table that lists the
resources to which forced deactivation applies. This table also indicates what
ACF/VTAM does if forced deactivation is requested for a resource to which it
does not apply.

Forced reactivation is specified with the R operand of the VARY INACT
command. When forced reactivation is requested, ACF/VTAM performs a
forced deactivation (except that for certain resource types it *does* wait for
command responses from the resource) and then attempts to reactivate the
resource. Forced reactivation of an NCP reactivates the SSCP-to-NCP session,
but has no effect on links and link stations in adjacent subarea nodes. (In this
case the forced reactivation command should be entered for the adjacent link or
link station if one of these resources is the source of the problem.)

Forced reactivation does not apply to all types of resources. The description of
the VARY INACT command in Chapter 4 contains a table that lists the
resources to which forced reactivation applies. This table also indicates what
ACF/VTAM does if forced reactivation is specified for a resource to which it
does not apply.

Order of Deactivation

Deactivation of certain ACF/VTAM resources requires more attention from the
operator than does their activation. The operator must be concerned about the
changing shape of the domain and the effects of NCP and cross-subarea link
and link station deactivations on the operation of the rest of the network. In
particular, the operator should be careful not to deactivate an NCP through
which other NCPs are attached to the network, or a link or link station that
provides the only connection between a subarea and the rest of the network.
For more information, see the following section on the special considerations for
links, link stations, and NCP major nodes.

Special Considerations for Controlling Each Resource Type

The following sections describe the operating considerations for each of the
major types of resources.

Path Definition Sets

In an ACF/VTAM domain that has more than one subarea and in a
multiple-domain network, ACF/VTAM must have a description of the routes
connecting the subareas. ACF/VTAM requires the activation of one or more
path definition sets in order to know how to route cross-subarea session traffic.

A route becomes defined (but not actually active) when a path definition set is
activated with a VARY ACT command. When necessary, the operator can
activate additional path definition sets to add or modify the route definitions.
The operator can define new routes or redefine inactive routes. Existing route
definitions not affected by a given path definition set activation are unmodified
and remain in effect. ACF/VTAM rejects any attempt to modify the definition
of any previously-defined route that is not in the "inactive" state.

A path definition set is not a major node and cannot be deactivated.

An explicit route becomes available for activation after it is defined by activation of a path definition set and when all of the physical elements (host nodes, NCP nodes, and transmission groups) included in the explicit route are active. A virtual route becomes available for activation after its corresponding explicit route is active. ACF/VTAM automatically activates explicit routes and virtual routes as they are required for sessions. ACF/VTAM selects a virtual route for a session based on a *class of service* list that is defined by the system programmer, as described in the *ACF/VTAM Planning and Installation Reference* manual. A virtual route remains active until all sessions assigned to it have ended, at which time it is automatically deactivated. Once active, an explicit route remains active as long as all the physical elements that make up the explicit route are active.

While operators do not activate or deactivate routes of either kind, they do activate and deactivate the physical elements that make up explicit routes. They do this by activating or deactivating the major and minor nodes that define the physical elements.

The DISPLAY ROUTE command can be used to display information about the explicit routes and virtual routes between the host subarea and a given destination subarea. This command can also be used to test whether one or more explicit routes to a given destination are operative (see "Route Verification" in Chapter 3).

Application Programs

Before an application program can use ACF/VTAM services, its application program minor node must be active and the job representing the application program must be started. The minor node can be activated directly with the VARY ACT command or indirectly through activation of its major node. The application program job is started like any other job in the system. After an application program minor node is activated, it is up to the application program to open its ACB and begin using ACF/VTAM services. The order in which the minor node is activated and the application job is started is not critical, but the minor node must be active when the application program attempts to open its ACB for ACF/VTAM.

To enable the ACF/VTAM application programs to handle automatic logon requests, all of the necessary application program major nodes must be activated before activating (directly or indirectly) any logical units with automatic logon specifications. The necessary application program major nodes are those that contain the application programs for which an automatic logon request can be generated.

If the operator cancels an application program, the operating system forces the application program's disconnection from ACF/VTAM. For the operator to be able to cancel an application program that is active to ACF/VTAM, the operator must be able to associate the application program's ACF/VTAM name with the application program's job name.

TSO/VTAM operators should never use the VARY INACT command to deactivate a TSO user address space application name while TSO/VTAM is operating.

Changing the Automatic Logon Specification for a Logical Unit

When defining the domain, the system programmer can specify that a device-type logical unit is to be automatically logged on to a particular application program whenever the logical unit is available for a session. Such an application program is called a controlling application for that logical unit. It is the responsibility of the application program to accept or reject the logon request. The ACF/VTAM operator can use the VARY LOGON command, or the LOGON operand of the VARY ACQ or VARY ACT commands, to change an existing automatic logon specification or to create an automatic logon specification where one does not exist.

Operator-initiated automatic logons apply to any device-type logical unit. Neither the logical unit nor the application program need be active when the operator command is entered. However, the major nodes for the logical unit and the application program must both be active.

An automatic logon specification remains in effect until another VARY LOGON, VARY ACQ,LOGON, or VARY ACT,LOGON command is entered for the logical unit, or until the major node containing the logical unit is deactivated. For a logical unit that is currently in session or queued for a session, the logical unit is logged onto the specified application program whenever these sessions end.

Channel-Attached SNA Devices

When activating a physical unit in a local SNA major node, the operator will need to supply the channel device name of the physical unit unless the system programmer supplies it in the PU definition statement. The operator can also specify the channel device name to override the value in the PU definition. To supply the channel device name, use the U operand of the VARY ACT command when activating the physical unit.

If ACF/VTAM needs the operator's assistance in creating a connection to a physical unit in a local SNA major node, ACF/VTAM displays the message IST680I (OS/VS) or 5G80I (VSE). This message indicates that a connection request was denied because the physical unit is offline. The connection request remains pending and the operator should either allow the connection request to complete by making the device available, or disallow the connection request by entering a VARY INOP command for the physical unit.

Channel-Attached Non-SNA Devices

The physical unit for a channel-attached non-SNA device is the ACF/VTAM physical unit (ISTPUS), which is always active while ACF/VTAM is running. Therefore, only the local non-SNA major node and its logical units (representing the channel-attached devices) need to be activated.

The channel device name cannot be specified when activating the logical unit for a non-SNA device; the channel device name must be specified in the ACF/VTAM definition statement for the device.

A local non-SNA major node should always be deactivated before taking its terminals offline.

There are two kinds of links in an ACF/VTAM domain: links between an NCP and its peripheral physical units, and cross-subarea links. There are no special considerations for activating the links between an NCP and its peripheral physical units. For cross-subarea links, however, there are various considerations, depending on whether they are channel links or SDLC links.

Channel links are named by ACF/VTAM, which creates the name by taking the channel device name for the communication controller and adding "-L" to the end. For example, the channel device name 0C2 has the link name of 0C2-L. Channel links can only be automatically activated; any VARY ACT command specifying a channel link is rejected. However, channel links can be deactivated directly, indirectly (by halting ACF/VTAM), or automatically.

Using a VARY ACT command to directly or indirectly activate an SDLC link makes the link active to ACF/VTAM and, within the NCP containing the link, makes ACF/VTAM's SSCP an owner of that link. For SDLC cross-subarea links, more than one SSCP can share ownership of a link if the link is activated by each SSCP. Such a link can also be active without SSCP ownership if it has been defined to use the SDLC monitor mode function in the NCP. As a result, a cross-subarea link can be capable of carrying session traffic without having been activated by ACF/VTAM.

The NCP deactivates a link and its subordinate link station when the last of the link's SSCP owners deactivates the link. When the last active link station in a transmission group is deactivated, any session traffic being carried by that transmission group is disrupted. Therefore, if the ACF/VTAM operator has not activated a cross-subarea link and ACF/VTAM is using that link's transmission group to carry session traffic, those sessions are disrupted if the link's owners all deactivate the link and there are no other active link stations in the transmission group. On the other hand, if the ACF/VTAM operator activates the link, ACF/VTAM shares in the ownership of the link and the link remains active, regardless of the link deactivation requests of other domain operators.

The same considerations apply when using the VARY INACT command to deactivate a link that is owned by ACF/VTAM. If ACF/VTAM is the sole owner of a link, and that link's link station is the only active link station in a transmission group, deactivating that link destroys any sessions using a route containing that transmission group, possibly including the SSCP's session with the NCP containing the link being deactivated. For this reason, care should be taken not to deactivate a cross-subarea link that could be supporting session traffic if its link station is the only link station in a transmission group and ACF/VTAM is sole owner of the link.

The operator and, optionally, the system programmer, can prevent the automatic deactivation of cross-subarea links in adjacent subarea nodes when an NCP is deactivated. The system programmer (using the initial status specification in the link definitions) and the operator (using individual VARY ACT commands or VARY ACT with the SCOPE operand) can ensure that the links in adjacent nodes have been directly or indirectly activated before the NCP is deactivated.

Deactivation of a cross-domain link also causes the deactivation of its subordinate link station.

Link Stations

As with cross-subarea links, there are both channel link stations and SDLC link stations. When a cross-subarea link station becomes active, ACF/VTAM issues a message to the operator indicating the name and subarea number of the adjacent subarea node with which contact has been established.

Channel links stations are named by ACF/VTAM, which creates the name by taking the channel device name for the communication controller and adding "-S" to the end. For example, the channel device name 0C2 has the link station name of 0C2-S. Channel link stations can only be automatically activated; any VARY ACT command specifying a channel link station is rejected. However, channel link stations can be deactivated directly, indirectly (by halting ACF/VTAM), or automatically.

Using a VARY ACT command to directly or indirectly activate an SDLC link station makes the link station active to ACF/VTAM and, within the NCP containing the link station, makes ACF/VTAM's SSCP an owner of that link station. For cross-subarea link stations, more than one SSCP can share ownership of a link station if the link station is activated by each SSCP. Such a link station can also be active without SSCP ownership if its link has been defined to use the SDLC monitor mode function in the NCP. As a result, a cross-subarea link station can be capable of supporting session traffic without having been activated by ACF/VTAM.

The NCP deactivates a link station (even if the associated link is currently carrying session traffic) when the last of the link station's SSCP owners deactivates the station. When the last active link station in a transmission group is deactivated, any session traffic being carried by that transmission group is disrupted. Therefore,, if the ACF/VTAM operator has not activated a cross-subarea link station and ACF/VTAM is using that link station's transmission group to support session traffic, those sessions are disrupted if the link station's owners all deactivate the link station and there are no other active link stations in the transmission group. On the other hand, if the ACF/VTAM operator activates the link station, ACF/VTAM shares in the ownership of the link station and the link station remains active, regardless of the link station deactivation requests of other domain operators.

The same considerations apply when using the VARY INACT command to deactivate a link station that is owned by ACF/VTAM. If ACF/VTAM is the sole owner of a link station, and that link station is the only active link station in a transmission group, deactivating that link station destroys any sessions using a route containing that transmission group, possibly including the SSCP's session with the NCP containing the link station being deactivated. For this reason, care should be taken not to deactivate a cross-subarea link station that could be supporting session traffic if it is the only link station in a transmission group and ACF/VTAM is the sole owner of the station.

The operator and, optionally, the system programmer, can prevent the automatic deactivation of cross-subarea link stations in adjacent subarea nodes when an NCP is deactivated. The system programmer (using the initial status specification in the link station definitions) and the operator (using individual VARY ACT commands or VARY ACT with the SCOPE operand) can ensure that the link stations in adjacent nodes have been directly or indirectly activated before the NCP is deactivated.

Migration Considerations: When a cross-subarea link station in an ACF/NCP/VS Release 2 becomes active, or when a cross-subarea link station establishes contact with an adjacent ACF/NCP/VS Release 2, ACF/VTAM issues a message to the operator indicating only the subarea address of the contacted adjacent NCP.

A cross-subarea link station defined within an ACF/NCP/VS Release 2 can be owned by only one SSCP.

NCP Major Nodes

Activating an NCP

As previously discussed, there is no resource hierarchy among major nodes, and thus any NCP major node can be activated at any time. (There must be at least one defined route to the NCP, however. This requires that an appropriate path definition set be activated prior to the activation of the NCP.) An NCP activation remains pending until a route to the NCP becomes physically available.

When activating an NCP, ACF/VTAM can be provided with a list of link stations in subarea nodes adjacent to the NCP that are to be automatically activated along with the NCP. These link stations, in combination with already-active link stations adjacent to the NCP, are the means by which the NCP is connected to the rest of the network. In addition to providing access to the NCP being activated, activating the link stations provides link station ownership (see "Link Stations" earlier in this chapter), whereby the ACF/VTAM SSCP is supplied with notification of link station failures by the NCP containing the link station. Activation of the link stations also provides the ability to dump or load the NCP through the link stations.

The link stations that are to be automatically activated can be specified by the system programmer in the CUADDR and RNAME operands of the PCCU definition statement for the NCP (this method is recommended to simplify operating procedures and reduce the chance for operator error). If the system programmer has not specified these link stations, or if there is a need to override the defined link station names, the operator can use the U or RNAME operands (or both) on the VARY ACT command when activating the NCP.

When the NCP is activated, the specified link stations and their associated links are automatically activated if they are not already active. If any of these link stations are not yet known to ACF/VTAM, (that is, if the NCP within which they are defined has not been activated), ACF/VTAM remembers them until they become known (through the activation of their major node) and then completes the activation. ACF/VTAM informs the operator of the link stations that are awaiting the activation of their NCP.

Figure 2-1 shows an example of this process. Assume that NCP1 is active and that LINK1, LINKSTA1, and NCP2 are not. Also assume that when defining NCP2, the system programmer specified the link stations 0C2-S and LINKSTA1 for automatic activation (by specifying CUADDR=0C2 and RNAME=LINKSTA1).

When the operator activates NCP2, ACF/VTAM automatically activates the channel link 0C2-L and its link station 0C2-S (enabling ACF/VTAM to communicate with NCP2 directly over the channel link), and also automatically
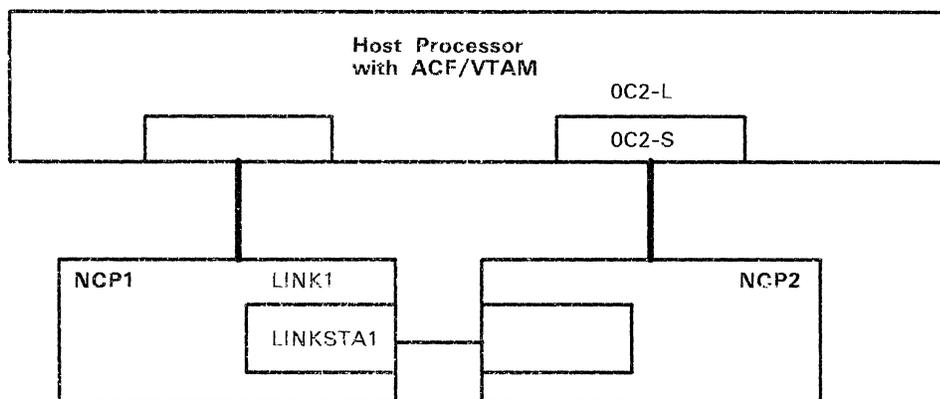
Figure 2-1. Activating an NCP

activates the SDLC link LINK1 and its link station LINKSTA1 (enabling
ACF/VTAM to communicate with NCP2 through NCP1).

If NCP1 were inactive when the operator tried to activate NCP2, the activation
of LINK1 and LINKSTA1 would be delayed until NCP1 was activated.
ACF/VTAM would still be able to communicate with NCP2 through its
channel connection.

If ACF/VTAM must delay the activation of all of the link stations specified for
automatic activation, and if there are no other active connections to the NCP
being activated, the NCP activation itself is delayed to await the availablilty of
an active connection. The operator should activate the adjacent NCPs
containing the link stations to allow the original NCP activation to complete.

Similarly, if none of the routes to an NCP being activated are physically
available, ACF/VTAM displays a message to the operator and delays the
activation of the NCP until at least one route becomes available. If a request is
entered to activate an NCP to which no route has been defined, ACF/VTAM
does not delay the activation; rather, the activation fails.

Any suspended activation of an NCP or link station can be terminated by
deactivating that NCP or link station.

When ACF/VTAM automatically activates an adjacent link station during
activation of an NCP, ACF/VTAM expects to find that the link station is
connected to a communication controller that either requires loading of an NCP
or that contains the NCP being activated. If, through an operator or system
programmer error, the list of link stations to be automatically activated includes
one or more link stations that are connected to the wrong communication
controller, ACF/VTAM might not detect the error and could assume that this
wrong communication controller is to be reloaded with the NCP being activated.
Therefore, care should always be taken to ensure that link stations are correctly
chosen for automatic activation with an NCP; specifically, that the link stations
are in fact connected to the communication controller that does or should
contain that NCP.

Likewise, if the physical links to a communication controller running a given NCP are reconnected to a different communication controller (perhaps running another NCP), the link stations specified for automatic activation with the NCPs might need to be updated to reflect the new connections. That is, the CUADDR and RNAME values on the PCCU statement in the NCP definitions might need to be updated. (Alternatively, revised link station specifications could be supplied using the U and RNAME operands of the VARY ACT command.) Also, the WARM start option and the WARM operand of the VARY ACT command should be avoided when activating the affected NCPs if the link station specifications are changed. Failure to update the adjacent link station specifications might result in the activation or loading of the wrong communication controller when an NCP is activated.

Sharing an NCP

An NCP can be shared by more than one SSCP. A VARY ACT command for an NCP causes the ACF/VTAM SSCP to activate the NCP, establishing an SSCP-to-NCP session. If multiple SSCPs activate an NCP, each of those SSCPs established an SSCP-to-NCP session and each is considered an owner of that NCP. Each SSCP can also activate and share ownership of the NCP's links and link stations (except that in ACF/NCP/VS Release 2, link stations cannot be shared). However, the NCP's physical units and logical units can belong to only one SSCP at a time. Whichever SSCP activates a particular physical unit first becomes the exclusive owner of that physical unit; the other SSCP cannot activate it until the SSCP that currently owns the physical unit deactivates it.

Besides operational division of resources within an NCP as described above (where the first operator to enter VARY ACT becomes the owner of a physical unit, for example), the unsharable resources of an NCP can also be explicitly divided among the SSCPs that own the NCP. The system programmer can use the OWNER operand in NCP definition statements to explicitly identify the SSCP that is to own a particular resource. If a resource is allocated to a particular SSCP by the OWNER operand, then that resource can be controlled only by operator commands entered from that SSCP. Therefore, VARY ACT and VARY INACT commands can be entered for these resources from the SSCP that owns them, but not from any of the other SSCPs that share the NCP.

If the Multisystem Networking Facility is installed, the BACKUP operand can also be used in the NCP definition. The system programmer can use this operand to specify that the NCP's resources can be taken over by a backup SSCP. The operator at a backup SSCP can enter a VARY ACQ command to acquire resources that belong to another SSCP. The VARY ACQ command makes available all of the NCP's resources, regardless of how the OWNER operand is specified. The operator can return the resources by using the VARY REL command.

Chapter 3 describes how to use NCP sharing and division of resources for backup and recovery in a multiple-domain network. See in particular "SSCP-to-NCP Session Failure" and. "Resource Takeover Strategies." The OWNER and BACKUP operands are described in the *ACF/VTAM Planning and Installation Reference* manual.

Loading an NCP into a Communication Controller

The activation of an NCP could cause the NCP to be loaded into its designated communication controller. The communication controller is determined by the adjacent link stations specified for automatic activation with the NCP. (These link stations in adjacent nodes "locate" the communication controller in the network.)

The operator can directly control whether the communication controller is loaded by using the LOAD operand of the VARY ACT command. The LOAD operand specifies one of the following:

- LOAD=YES--the communication controller is to be loaded, regardless of its current status or contents.

- LOAD=NO--the communication controller is *not* to be loaded, regardless of its current status or contents. (This does not preclude a later reload of the communication controller [after NCP activation] as a result of error recovery procedures.) If the communication controller does not contain the expected NCP load module, the NCP activation fails.

- LOAD=U--ACF/VTAM is to decide whether the communication controller is to be loaded.

If ACF/VTAM is allowed to decide whether to reload the communication controller, one of the following occurs:

- If the communication controller contains no program, ACF/VTAM loads the NCP into the communication controller.

- If the communication controller already contains the NCP being activated, the operator might be asked whether the existing NCP should be refreshed with a new copy. If the system programmer specified AUTOSYN=NO on the PCCU macro in the NCP definition, ACF/VTAM does not automatically resynchronize itself with the existing NCP, but rather asks the operator whether resynchronization or reloading should occur. Otherwise, ACF/VTAM resynchronizes itself with the NCP without operator intervention and without reloading the communication controller.

- If the communication controller contains an NCP other than the one being activated, the operator might be asked whether the existing NCP should be replaced. If the system programmer specified VFYLM=YES on the PCCU macro instruction in the NCP definition, the operator is asked to confirm that the communication controller should be reloaded. Otherwise, ACF/VTAM goes ahead with the reload without operator intervention.

- If the communication controller contains a program other than an NCP (for example, an EP program in a channel-attached communication controller), the NCP activation fails when ACF/VTAM attempts to send the SNA ACTPU request. Another VARY ACT command specifying LOAD=YES can be entered to force loading of the NCP.

Besides those considerations previously described, the operator should be aware of other considerations involved in activating an NCP in a communication controller that already contains a different NCP. The operator should first deactivate the current NCP (if it is not already inactive), and deactivate any active link stations in adjacent subarea nodes that are connected to that NCP. The operator can then enter the command to activate the new NCP, which

causes the communication controller to be reloaded as described above (if LOAD=U is specified or assumed). If adjacent link stations are not deactivated, the activation of the new NCP might fail because:

- There are no link stations available (ACF/VTAM does not automatically break the existing connections with the old NCP).

- The names of the old and new NCPs are the same, but their subarea addresses are different.

- The subarea addresses of the old and new NCPs are the same, but their names are different.

ACF/VTAM fails an NCP activation (instead of loading a fresh copy of the NCP) if the NCP rejects ACF/VTAM's activation request. The operator can then investigate the cause of the failure, and force a reload of the NCP, if necessary.

Within its domain, ACF/VTAM ensures that no more than one load or dump operation is attempted at one time for a given NCP through the various adjacent link stations that might be available. In a multiple-domain network, however, it is up to the individual domain operators to prevent simultaneous attempts to load or dump the same communication controller from different domains.

For an additional discussion of loading and dumping NCPs, see "Dumping and Loading an NCP" in Chapter 3.

Migration Considerations: When replacing an ACF/NCP/VS Release 2 with ACF/NCP/VS Release 3, the operator should force a reload of the communication controller. Unless this is done (or unless the Release 3 NCP has a different name and subarea number), ACF/VTAM will be misled into believing that a reload of the communication controller is not required.

Selecting a Load Station

When loading an NCP, ACF/VTAM needs to know the name of the adjacent link station through which the load operation is to be carried out. The load station can be either a channel link station or an SDLC link station. ACF/VTAM can be allowed to select a load station, or the system programmer or the operator can specify a load station. The load station can be specified in the NCP definition, on the VARY ACT command, or during NCP error recovery if ACF/VTAM asks the operator whether the NCP should be reloaded. ACF/VTAM selects the load station whenever there is no load station name currently in effect from one of the above sources.

When ACF/VTAM selects a load station, it selects a channel link station, if one is available. If no channel link station is available, ACF/VTAM uses any available SDLC link station.

If the operator wants to override a load station name specified in an NCP definition, the LOADSTA operand of the VARY ACT command can be used to specify the name of another link station. This override capability can also be used to specify that ACF/VTAM should select the load station, despite the NCP definition. This is done by specifying a null value for the load station (that is, specifying LOADSTA without a value). If the operator chooses not to

override the NCP definition value, ACF/VTAM uses that definition value to determine the link station to be used.

A link station chosen as a load station must also be specified for automatic activation with the NCP, or must be already active when it is needed (with ACF/VTAM thus knowing of its connection to the NCP). The former method is recommended. If a specified load station is not available for a load operation resulting from a VARY ACT command, the command fails. If a specified load station is not available for a load operation resulting from error recovery procedures for an NCP, ACF/VTAM either prompts the operator for a link station name or selects a link station from among those that are available, as described above. (See "Dumping and Loading an NCP" in Chapter 3 for details regarding NCP error recovery procedures.)

As with the link stations specified for automatic activation with an NCP, care should be taken to avoid the error of naming a link station connected to some communication controller other than the intended one. Such an error might result in loading the wrong communication controller. Likewise, the reconnection of cross-subarea links from one communication controller to another might require the changing of load station specifications for those NCPs intended to run in the communication controllers. The WARM start option and the WARM operand of the VARY ACT command should be avoided when activating the affected NCPs if the load station specifications are changed.

Note that improperly specified LOADSTA values for two or more NCPs can result in a deadlock during their activation, with the activation of each NCP's load station waiting for the adjacent NCP's activation, which in turn can be waiting the availability of a load station.

Note also that any link to be used to load (or dump) a communication controller must be defined to both the NCP and the communication controller as being capable of initial program load (IPL). For the NCP, this is done by specifying IPL=YES on the LINE macro instruction in the NCP definition. For the communication controller, the ability of a link to accept an IPL is indicated in the configuration data set (CDS) residing in the communication controller's diskette storage. Any attempt to load the communication controller over an SDLC link that is not so specified will fail (including an attempt resulting from the selection of an otherwise available SDLC link station by ACF/VTAM in the absence of a specific LOADSTA specification).

Communication Controller Channel Enable Switches

The channel-enable switches on a communication controller panel determine whether ACF/VTAM can activate a channel link and link station during an NCP activation. For a communication controller that is both channel- and SDLC-link-attached, these switches also determine whether an NCP can be loaded over a channel or an SDLC link. If any channel adapters are enabled on the communication controller, the Remote Program Load (RPL) feature of the communication controller is disabled, and the communication controller can be loaded only over one of these channels. If none of the channel adapters are enabled, the communication controller can be loaded only over SDLC links defined as being capable of IPL (as described under "Selecting a Load Station").

All channel adapters should be kept enabled during normal operations with channel-attached NCPs. This is because a channel link station activation fails (with the channel appearing to be "not operational") if the channel adapter for the channel ACF/VTAM is attempting to use is disabled. ACF/VTAM does not recover the use of the channel (even if the channel adapter is later enabled) unless the NCP is deactivated and reactivated. By keeping all channel adapters enabled, the SDLC links are still available for normal use after the NCP is loaded or if the NCP was previously loaded. The channel enable switches should only be turned off when a communication controller *must* be loaded over an SDLC link (such as when the channel-attached host has failed along with the NCP).

Figure 2-2 shows an example of an NCP that is both channel- and SDLC-link-attached to an ACF/VTAM host. For this example, assume that NCP1 is active and that NCP2 is inactive and requires loading of its NCP load module.

The operator activates NCP2 as follows (with NCP2's channel adapter enabled on the communication controller panel):

VARY NET,ACT,ID=NCP2,U=0C2,RNAME=LINKSTA1

ACF/VTAM attempts to activate the adjacent link stations 0C2-S and LINKSTA1. The activation of LINKSTA1 in NCP1 is delayed because NCP1 receives no response to link-level commands sent on the SDLC link to NCP2's communication controller before and during the loading of NCP2 over the channel 0C2. Because the channel adapter is enabled, the activation of 0C2-S proceeds and ACF/VTAM begins the loading of NCP2 over the channel. After the load completes and LINKSTA2 is activated, contact is established with NCP1, and the activation of LINKSTA1 completes.

Deactivating an NCP

The fact that there is no resource hierarchy among major nodes means that any NCP major node can be deactivated at any time. The deactivation of an NCP does not cause ACF/VTAM to deactivate any other NCP. However, due to the topological relationship among subarea nodes, deactivation of an NCP or a cross-subarea link or link station can have significant and disruptive effects on other subarea nodes.

To avoid disrupting sessions, the operator must be concerned about the status of cross-subarea links and link stations after an NCP deactivation. There are two types of cross-subarea links to be concerned with: same-domain links and cross-domain links. Those links connecting two subarea nodes that are both active in the operator's domain are same-domain links; those links connecting a subarea node that is active in the operator's domain with a subarea node that is not active in the operator's domain are cross-domain links.

Same-domain links are governed by the following rule. When the operator enters a VARY INACT command for an NCP, ACF/VTAM automatically deactivates any link or link station in an adjacent subarea node that was automatically activated when the NCP was activated. ACF/VTAM does not perform these automatic deactivations if the links and link stations were also directly or indirectly activated by the operator. (ACF/VTAM never deactivates same-domain links and link stations from the side within an NCP being
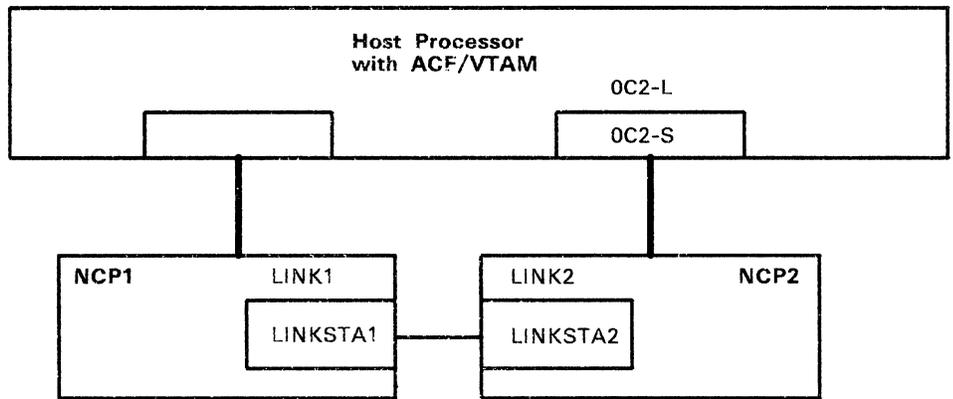
Figure 2-2. Loading over a Channel

deactivated. Deactivation from the other side, if it is done, is sufficient to take down the link.)

The rule for cross-domain links is as follows. When the operator enters a VARY INACT command for an NCP, ACF/VTAM indirectly deactivates any cross-domain link or link station unless CDLINK=ACT is specified on the VARY INACT command.

(The CDLINK operand also applies to the HALT command. See "Halting ACF/VTAM" for a discussion of how cross-subarea links are treated when ACF/VTAM is halted.)

Figure 2-3 can be used to illustrate these rules. NCP1 and NCP2 have been activated by HOST1 (and thus are in HOST1's domain). NCP3 has not been activated by HOST1 (and is therefore not in HOST1's domain). Therefore, the link between NCP1 and NCP2 is a same-domain link, and the link between NCP2 and NCP3 is a cross-domain link. HOST1 is to deactivate NCP2.

The same-domain link between NCP1 and NCP2 was made available through the activation of LINK1 and LINKSTA1 by HOST1. This link and link station could have been:

Directly or indirectly activated (for example, the operator could have entered specific VARY ACT commands for LINK1 and LINKSTA1, or LINK1 and LINKSTA1 could have been defined to be initially active in NCP1's definition statements)

Automatically activated when NCP2 was activated (by specifying LINKSTA1 in the RNAME operand of the VARY ACT command or the NCP definition for NCP2)

If LINK1 and LINKSTA1 were automatically activated, then when NCP2 is deactivated, LINK1 and LINKSTA1 are automatically deactivated, *unless they were also directly or indirectly activated*.
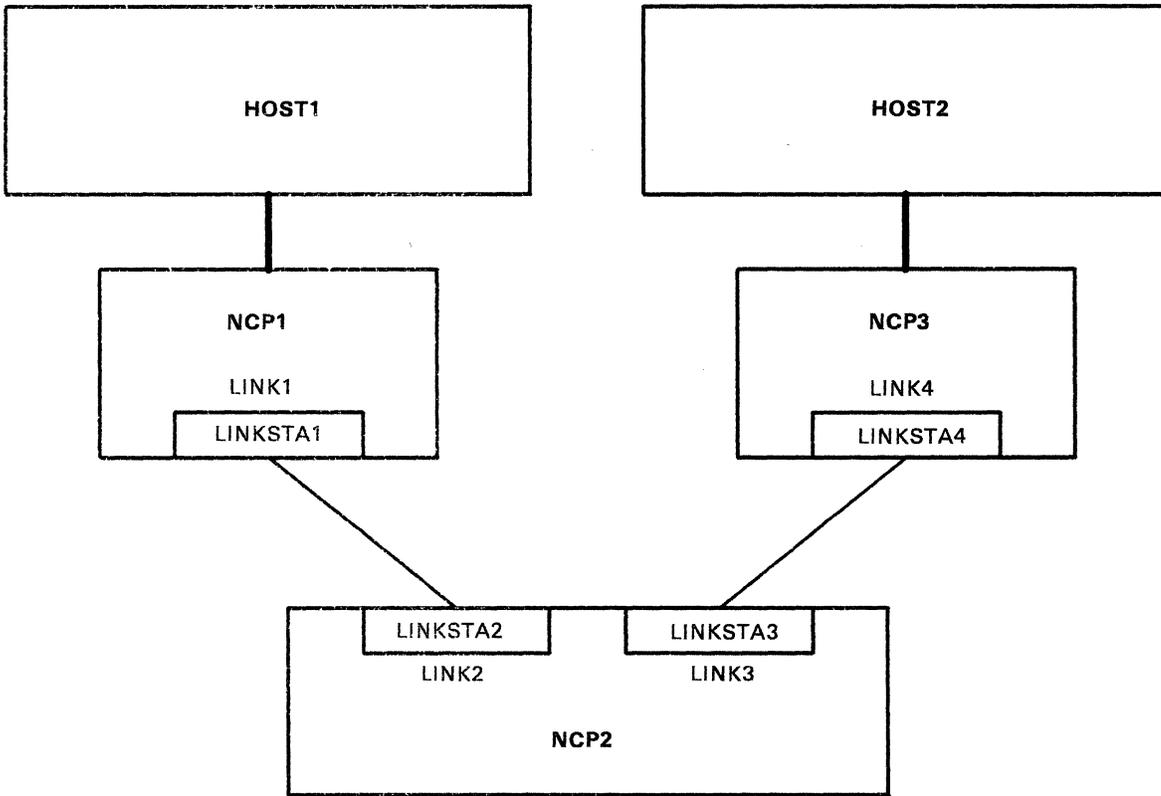
Figure 2-3. Effects of NCP Deactivation on Cross-Subarea Links and Link Stations

Therefore, if the link between NCP1 and NCP2 is to continue to carry session traffic after NCP2 is deactivated by HOST1, the operator should ensure that LINK1 and LINKSTA1 were directly or indirectly activated. This can be verified by entering a DISPLAY command for the link or link station (a DISPLAY of either resource displays the status of both).

(Note that in this example the activation of LINK2 and LINKSTA2 by HOST1 has no effect on the availability of the link between NCP1 and NCP2. The activation of LINK2 and LINKSTA2 that is required to make the link itself available must have occurred by specifying SDLC monitor mode for LINK2 in NCP2's definition, or by HOST2's activating NCP2, LINK2, and LINKSTA2. If LINK2 and LINKSTA2 *are* activated by HOST1, HOST1's ACF/VTAM does not deactivate them when NCP2 is deactivated. In this case, ACF/VTAM loses its ownership of LINK2 and LINKSTA2 within NCP2 by virtue of the deactivation command sent to NCP2 itself.)

The cross-domain link between NCP2 and NCP3 was made available through the activation of LINK3 and LINKSTA3 by HOST1. Because this link is a cross-domain link, by definition, NCP3 was not activated by HOST1, and LINK3 and LINKSTA3 could not have been automatically activated. Therefore, a cross-domain link and link station must be directly or indirectly activated. When NCP2 is deactivated, ACF/VTAM indirectly deactivates all cross-domain links and link stations (because they are below the NCP in the resource hierarchy), *unless CDLINK=ACT is specified in the VARY INACT command.*

Therefore, if the link between NCP2 and NCP3 is to continue to carry session traffic after NCP2 is deactivated by HOST1, the operator should specify CDLINK=ACT on the VARY INACT command for NCP2.

(As in the parenthetical explanation of the activation of LINK2 and LINKSTA2 above, LINK4 and LINKSTA4 must have become active in NCP3 either through the SDLC monitor mode function or through activation by HOST2.)

The order of deactivation of NCPs determines the way in which an ACF/VTAM domain contracts. (As explained above, the deactivation of an NCP by an ACF/VTAM host removes that NCP from the domain of that host.) After an NCP is deactivated in a domain, all links leading to it are considered cross-domain links. During an NCP deactivation, then, same-domain links might become cross-domain links. If two or more NCPs are deactivated simultaneously (except as a result of a HALT command, see "Halting ACF/VTAM"), the time when the change occurs is unpredictable, and it might be difficult to apply the previously described rules for not disrupting sessions. Unless these rules are followed such that all links have the same final disposition (active or inactive), regardless of which rule applies, NCPs *should not* be deactivated simultaneously.

Because the topological shape of a domain changes when an NCP is deactivated, the operator should be aware of the possibility of creating a *discontiguous* domain. In Figure 2-3 for example, if HOST1 had activated NCP3 as well as NCP1 and NCP2, and if HOST1 then deactivated NCP2, NCP3 would be in an isolated part of HOST1's domain. That is, HOST1, NCP1, and NCP3 would all be part of the domain, but the only access to NCP3 from HOST1 is through NCP2, which would not be in the domain. (Continued session traffic might or might not be possible to resources in or beyond NCP3,

depending on whether the deactivation of NCP2 caused deactivation of the cross-subarea links connected to NCP2, as previously described.)

Discontiguous domains should be avoided because, in this example, the lack of ownership by HOST1 of elements of the route to NCP3 means that the HOST1 operator will not get notification of failures of links and link stations in NCP2. (The operator *will* always get notification of explicit route failures.) In addition, ACF/VTAM's ability to recover link station failures in NCP2 is lost. Finally, if NCP3 fails, the HOST1 operator will have no capability for reloading that communication controller.

To avoid a discontiguous domain, always deactivate those NCPs first that are farthest away from the host, working inward toward the host. In this example, HOST1 should deactivate NCP3 first, NCP2 second, and NCP1 last. NCPs need not be deactivated before halting ACF/VTAM to ensure that the proper order of deactivation is followed. ACF/VTAM follows special procedures during its halt processing to simultaneously deactivate all NCPs that are still active in the domain (see "Halting ACF/VTAM").

If a discontiguous domain exists, *all* cross-subarea links connected to an isolated NCP are cross-domain links. When the NCP is eventually deactivated, the only way to ensure an orderly deactivation is to specify CDLINK=ACT on the VARY INACT or HALT command.

Dynamic Reconfiguration of an NCP

If the physical configuration of the physical units and logical units in an NCP major node is changed (for example, a peripheral physical unit is moved from one line to another), one or more VARY DRDS commands can be used to inform the NCP of the changes without having to generate a new NCP. To use the VARY DRDS command, the system programmer must define the appropriate *dynamic reconfiguration (DR)* files, as described in the *ACF/VTAM Planning and Installation Reference* manual.

An NCP to be reconfigured must be active. Any logical units in the existing configuration that are to be deleted by the reconfiguration must be inactive. The physical units to which these logical unit are subordinate must also be inactive.

Dynamic reconfiguration is not meant to replace NCP generations, but to supplement them to allow quick and efficient control of changes in the domain configuration. Dynamic reconfiguration should be used as a temporary method of reconfiguration; a new NCP should be generated to reflect the changes as soon as time permits.

Changing NCP Line Scheduling Parameters

ACF/VTAM allows the operator to change the line scheduling parameters in the NCP for a line attaching polled nonswitched BSC 3270 devices. These values can be set as often as desired while the NCP is active. When the NCP is deactivated and later reactivated, the parameter values in effect are the ones in the NCP definition, unless a configuration restart file was defined for the NCP. In that case, the line scheduling parameters are restored to their checkpointed values, regardless of whether the WARM option is used when the NCP is reactivated.

The MODIFY NEGPOLL command is used to change the negative polling limit. The negative polling limit is the maximum number of consecutive negative polling responses the NCP accepts from a terminal on a line before it starts polling another terminal on the line.

The MODIFY POLL command is used to change the polling delay. If an NCP is polling a line, the polling delay is the number of seconds the NCP waits before polling the line again.

The MODIFY SESSION command is used to change the line scheduling session limit. The line scheduling session limit is the maximum number of NCP line scheduling sessions allowed at the same time on a polled line. Normally the limit should be no greater than the maximum number of terminals on the line. A changed limit does not become effective until the current number of sessions falls below the new limit.

Switched Devices

Switched lines and placeholder physical units are defined in an NCP major node. The actual physical units, their switched paths (that is, telephone numbers), and their subordinate logical units are defined to ACF/VTAM in switched major nodes. For switched lines using the X.21 Direct Call capability, ACF/VTAM does not need to know the telephone numbers. Instead the switched physical unit definition specifies the switched line to be used, and the X.21 network establishes the connection automatically when requested.

The VARY ACT command is used to activate the physical units and logical units in a switched major node, just as it is for physical units and logical units in other major nodes. For physical units in a switched major node, activation does not establish a physical connection; activation just asks ACF/VTAM to accept incoming calls from the physical unit or to initiate outgoing calls on behalf of application programs. ACF/VTAM waits for a physical unit to call in or for an application program to request a session before trying to establish a physical connection.

The VARY INACT command is used to deactivate the resources in a switched major node. Deactivation of switched resources means that switched connections involving those resources can no longer be created, and therefore no new sessions can be established.

Note: *A forced deactivation of a switched physical unit does not actually deactivate the physical unit. Forced deactivation does the equivalent of a VARY INACT,R command. That is, all existing switched connections are broken, and the switched physical unit is left eligible to establish new switched connections. A normal or immediate deactivation must be used to deactivate a switched physical unit.*

A session involving a switched logical unit can be initiated by either session partner. A terminal operator or an ACF/VTAM application program can request a session. Terminal operators use dial-in lines and ACF/VTAM application programs use dial-out lines.

For purposes of the following discussion, normal dial-in refers to calls originating from a physical unit, automatic dial-out refers to a call established by ACF/VTAM using the communication controller's autocall unit, and manual dial-out refers to an ACF/VTAM-operator-assisted call from the

communication controller to the physical unit.

For normal dial-in operation, the terminal operator calls the communication controller, and the NCP notifies ACF/VTAM of the incoming call. ACF/VTAM then requests that the physical unit identify itself. When the physical unit responds, ACF/VTAM locates the proper physical unit definition in an active switched major node. After ACF/VTAM completes activation of the physical unit and its subordinate logical units, sessions involving the logical units can be initiated as if the line were nonswitched.

When an application program requests a session, ACF/VTAM selects a dial-out line. Depending on the capabilities of the switched line, the dial-out can be automatic (done entirely by ACF/VTAM and the NCP) or manual (done partly by the ACF/VTAM operator).

For automatic dial-out, ACF/VTAM sends the telephone number or an X.21 Direct Call request to the NCP. The NCP establishes the connection to the physical unit, using either its communication controller's autocall unit or the Direct Call facility of an X.21 network. The NCP notifies ACF/VTAM when the connection is complete. ACF/VTAM then verifies the identity of the physical unit. From this point, the process continues as for a dial-in connection.

For manual dial-out, ACF/VTAM displays a message with the line and telephone number to use. The ACF/VTAM operator manually calls the physical unit. The NCP notifies ACF/VTAM when the switched connection is complete, and ACF/VTAM then verifies the identity of the physical unit. From this point, the process continues as for a dial-in connection.

If the ACF/VTAM operator is unable to complete a manual dial-out, the VARY INOP command can be used to specify whether ACF/VTAM is to select an alternate line or terminate the dial-out operation.

Dial-out requests (except for X.21 Direct Call) can be placed on one of a number of switched paths to a physical unit as defined within a switched major node. The dial-out path assignment for switched physical units can be controlled by making switched paths usable or not usable with the VARY PATH command. This command can be used for individual switched paths by specifying the path identifier (PID), or for a group of switched paths by specifying the group identifier (GID). For example, all switched paths that use Wide Area Telephone Service (WATS) lines for dial-out connections can be associated with a GID in the switched major node definition, and can be made usable or not usable as a unit.

Switched lines with dial-in capability can allow or disallow incoming calls. For an incoming call to be allowed, the line must be in answer mode. The mode setting can be specified in the definition statement for the line and can be changed with the ANS operand of the VARY ACT command when activating the line, or with the VARY ANS command after the line is active.

Cross-Domain Resource Managers

A cross-domain resource manager (CDRM) is that part of an SSCP that supports cross-domain session setup and takedown. The CDRM defined to represent the SSCP in the operator's domain is called the host CDRM. The CDRMs defined to represent the SSCPs in other domains are called external

CDRMs. Before logical units in one domain can have cross-domain sessions with logical units in another domain, an SSCP-to-SSCP session must be established between the SSCPs of the two domains. First, the host CDRM major node and the host CDRM must be activated in each domain. This enables each host CDRM to request sessions with and to accept session requests from other known CDRMs (SSCPs). Next, the external CDRMs must be made known to each ACF/VTAM by activating the CDRM major nodes containing these CDRMs. Finally, an SSCP-to-SSCP session is established between two domains when one or both of the operators in the two domains activates the external CDRM representing the other domain. This activation of an external CDRM causes ACF/VTAM to request a session with the SSCP that the external CDRM represents. The request is rejected unless the other domain has activated both its host CDRM and the CDRM major node that contains the external CDRM representing the SSCP making the request.

The effects of a CDRM deactivation on LU-to-LU sessions are the same as for other resource deactivations, as described under "Deactivating Resources." The sessions affected are:

> For deactivation of an external CDRM, all LU-to-LU sessions with logical units controlled by the SSCP represented by the external CDRM.

> For deactivation of the host CDRM, all LU-to-LU sessions with logical units controlled by any SSCP in another domain.

The loss of an SSCP-to-SSCP session (for example, as the result of a link failure) is not the same as external CDRM deactivation and does not terminate existing LU-to-LU sessions. However, new sessions with logical units controlled by the SSCP that was lost cannot be started until the SSCP-to-SSCP session is reestablished. See "SSCP-to-SSCP Session Failure" in Chapter 3 for information (including migration considerations) on SSCP session recovery.

When defining the host CDRM, the system programmer can specify whether the host CDRM is authorized to dynamically define cross-domain resources. The system programmer can also specify which external CDRMs, if any, are authorized to make use of this dynamic definition capability. If the host CDRM and an external CDRM are so authorized in an ACF/VTAM domain, the other-domain SSCP represented by the external CDRM can request a session setup on behalf of a logical unit for which no cross-domain resource (CDRSC) was defined in the domain receiving the request (that is, the domain containing the authorized host and external CDRM definitions). The receiving SSCP handles the request by dynamically creating a temporary CDRSC definition for the logical unit.

A DISPLAY ID=cdrm-name command can be used to determine whether a CDRM is the host CDRM or an external CDRM. For the host CDRM, the display indicates whether dynamic CDRSC definition was authorized. For an external CDRM, the display indicates whether pre-definition of CDRSCs controlled by the represented other-domain SSCP is required. The output of a DISPLAY command with the EVERY or ACT option for an external CDRM includes both pre-defined and dynamically-defined CDRSCs controlled by the other-domain SSCP represented by the external CDRM.

Cross-Domain Resources

A cross-domain resource (CDRSC) is a representation in one domain of a logical unit (either application program or device-type logical unit) controlled by an SSCP in another domain. CDRSCs can either be pre-defined (in a CDRSC major node set up by the system programmer) or dynamically-defined (in the CDRSC major node ISTCDRDY set up by ACF/VTAM).

The operator can make cross-domain resources available to the domain by activating and deactivating CDRSC major and minor nodes. For communication to take place between logical units in different domains, the SSCPs must be in session as described under "Cross-Domain Resource Managers," and the session partners (logical unit and CDRSC in each domain) must be active. (Note that a CDRSC definition is not required in the domain of a logical unit receiving a cross-domain session request if the dynamic CDRSC definition function is being used.)

Dynamically-Defined CDRSCs

As introduced above and in the section "Cross-Domain Resource Managers," ACF/VTAM can dynamically define certain CDRSCs. With the proper authorization in the CDRM definitions, ACF/VTAM dynamically defines a CDRSC when a cross-domain session setup request is received from another SSCP for an unrecognized resource name. For a discussion of environments that might benefit from the use of dynamically-defined CDRSCs, see the *ACF/VTAM Planning and Installation Reference* manual.

Dynamically-defined CDRSCs are collected in a CDRSC major node named ISTCDRDY. ISTCDRDY is activated automatically by ACF/VTAM when the host CDRM is activated, if dynamic definition support has been specified in the host CDRM definition. ISTCDRDY is likewise deactivated automatically by ACF/VTAM when the host CDRM is deactivated.

The dynamic CDRSC definition function is active whenever all of the following conditions are met:

- The system programmer has defined the host CDRM to allow dynamic definition of CDRSCs.

- The host CDRM is active.

- ISTCDRDY is active.

Note that even with the dynamic CDRSC definition function fully active (with all of the above conditions met), an external CDRM definition must specify the function and the external CDRM must be active before a session can be established with a dynamically-defined cross-domain resource controlled by the external CDRM.

In general, the ACF/VTAM operator has the same control of dynamically-defined cross-domain resources as for pre-defined CDRSCs. Of course, no VARY ACT command is available or necessary, because a dynamically-defined CDRSC is considered active when it becomes dynamically defined. The DISPLAY ID and VARY INACT commands can both be used for dynamically-defined CDRSCs.

Likewise, the operator generally has the same control of the CDRSC major
node ISTCDRDY as for other CDRSC major nodes. The DISPLAY ID,
MODIFY CDRM, VARY ACT, and VARY INACT commands can all be used
for the CDRSC major node ISTCDRDY.

While the host CDRM is active, the operator can deactivate ISTCDRDY with
the VARY INACT command, in which case all dynamically-defined CDRSCs
are also deactivated and the dynamic CDRSC definition function is disabled.
The dynamic CDRSC definition function remains disabled until ISTCDRDY is
activated again. ISTCDRDY can be activated again by a VARY ACT
command naming ISTCDRDY directly, or by activating the host CDRM (even
if the host CDRM is already active). If the host CDRM is inactive or if the
host CDRM is not defined to allow the dynamic CDRSC definition function,
activating ISTCDRDY does not provide the function.

Dynamically-defined CDRSCs are deactivated and deleted by ACF/VTAM on
a periodic basis if they are not in use. That is, if a CDRSC has no active
sessions and has had none for a defined interval of time, the CDRSC definition
is discarded. Note that a dynamically-defined CDRSC that becomes a shadow
resource (see "Shadow Resources" in Chapter 3) has all of its sessions moved
to the corresponding logical unit definition, and thus is considered to have no
active sessions as soon as it becomes a shadow resource. See the *ACF/VTAM
Planning and Installation Reference* manual for information about the time
interval for dynamically-defined CDRSC deletion.

Changing CDRMs for Cross-Domain Resources

An external CDRM is named in the definition of each CDRSC to indicate the
other-domain SSCP that controls the logical unit represented by the CDRSC
definition. Such an external CDRM is referred to as the "owning CDRM" of
the CDRSC. The ownership of a CDRSC can be changed if an SSCP in
another domain loses its SSCP-to-LU session with the logical unit represented
by the CDRSC, and another SSCP (still in another domain) takes over the
logical unit. (See "Error Recovery Procedures for Failures in a
Multiple-Domain Network" in Chapter 3 for a discussion of resource takeover.)
The MODIFY CDRM command is used to inform ACF/VTAM of the
takeover, naming the two external CDRMs involved (the previous owner of the
CDRSC and the new owner). This command can be used whether the CDRSC
is active or inactive. If the CDRSC is already in session with a logical unit in
the operator's domain, the session is undisturbed, but any new session setups
are handled through the SSCP represented by the new owning CDRM.

The MODIFY CDRM command does not need to be used for
dynamically-defined CDRSCs. If a session setup request is received for a
dynamically-defined CDRSC from a CDRM other than the current CDRM
owner, ACF/VTAM automatically changes the CDRM ownership of the
CDRSC. However, the operator might still want to use the MODIFY CDRM
command if LU-to-LU session recovery is initiated by the logical unit that
received the original session request. For example, suppose a terminal user
originally logged on to an application program, with the CDRSC representing
the terminal being defined dynamically in the domain of the application
program. If the session between the application program and the terminal is
disrupted, the application program might try to reinitiate the session instead of
requiring the terminal user to logon again. In this case, the ACF/VTAM
operator in the domain of the application program needs to use the MODIFY
CDRM command to change the CDRM owner of the CDRSC representing the

terminal, if the terminal is taken over by a backup SSCP other than the SSCP in the application program's domain.

Note that an ACF/VTAM domain that takes over a cross-domain resource does not need to use the MODIFY CDRM command, because in this case ACF/VTAM's *shadow resource* function applies. See "Shadow Resources" in Chapter 3 for more information.

Monitoring the Domain

ACF/VTAM automatically provides the operator with messages that contain information about the ACF/VTAM domain. If more information is required, various DISPLAY commands are available to request status information about domain resources, and to verify changes resulting from previous operator requests. In general, DISPLAY commands can be used to obtain status information about active major nodes and their minor nodes (active or inactive). Some DISPLAY commands can be used to obtain information about resources that are not nodes. For example, the DISPLAY BFRUSE command provides information about ACF/VTAM's use of buffers.

The DISPLAY ID command is used to request the status of a particular resource. The name of the resource is provided as the value of the ID operand.

DISPLAY commands can be used to obtain information about:

* The explicit routes and virtual routes known to ACF/VTAM (DISPLAY ROUTE or DISPLAY PATHTAB)

* Any major node (other than an application program major node) or all active major nodes (DISPLAY ID=*major node name* or DISPLAY MAJNODES)

* Any or all application programs (DISPLAY ID=*application program name* or DISPLAY APPLS)

* Any or all lines (DISPLAY ID=*line name* or DISPLAY LINES)

* Any or all link stations (DISPLAY ID=*link station name* or DISPLAY STATIONS)

* Any or all physical units (DISPLAY ID=*physical unit name* or DISPLAY CLSTRS)

* Any or all device-type logical units (DISPLAY ID=*logical unit name* or DISPLAY TERMS)

* Dial-out path information for a physical unit in a switched major node (DISPLAY PATHS)

* In OS/VS2 (MVS), any TSO user ID (DISPLAY U)

* Any node with session-activation or termination I/O pending (DISPLAY PENDING)

* Any or all cross-domain resource managers (CDRMs) (DISPLAY ID=*cdrm name* or DISPLAY CDRMS)

* Any or all cross-domain resources (CDRSCs) (DISPLAY ID=*cdrsc name* or DISPLAY CDRSCS)

- The virtual route (VR) and transmission priority (TP) numbers for an LU-to-LU session. (DISPLAY ID=*application program or logical unit or cdrsc name*. Note that for some cross-domain sessions, such as for those involving logical units attached to an NCP, this information is not available to ACF/VTAM and is not displayed.)

For a summary of some of the information available from these DISPLAY commands, see the descriptions of them in Chapter 4. See Appendix A for examples of display output. For an explanation of the messages that make up the display output, see *ACF/VTAM Messages and Codes*.

When entering DISPLAY commands, the operator should try to use the most limited command that will get the required information. These commands require sizeable storage allocations and affect storage requests from other parts of ACF/VTAM. For example, if the required information can be obtained from a DISPLAY ID=*logical unit name* command, that command should be used rather than a DISPLAY ID=*its major node name* command. Sometimes a limited request for a display is not possible. In this case, the ACF/VTAM operator could try requesting the display when there is not much activity in the domain. If the need for the display information is immediate, a judgement can be made as to whether the display is more important than its possible adverse effects on ACF/VTAM operation.

Terminating Sessions with Operator Commands

The usual way for a session to be terminated is for one of the session partners to request termination. However, the operator can also terminate sessions by using the VARY TERM or VARY INACT command.

The VARY TERM command allows the operator to terminate a particular session or set of sessions without deactivating either of the session partners. Added control of session termination is provided by the SCOPE and TYPE operands on the VARY TERM command.

Another way of terminating a session is to use the VARY INACT command for one of the logical units participating in the session. This command with one of the I, F, or R operands breaks any sessions with the logical unit. See "Resource Deactivation" earlier in this chapter for more information on the effect that resource deactivation has on sessions.

Halting ACF/VTAM

ACF/VTAM can be halted as a result of the HALT or HALT QUICK commands. When ACF/VTAM is halted, all of its resources are deactivated and all sessions involving those resources are terminated. If the HALT or HALT QUICK commands do not properly complete, the operator can cancel ACF/VTAM. These methods of halting ACF/VTAM are described below.

The CDLINK operand for the HALT command is the same as for the VARY INACT command, except that the cross-subarea links to which it applies are determined when the HALT command is entered and are not redefined as the domain contracts. That is, the CDLINK operand applies to all cross-subarea links that are cross-domain at the time the HALT command is entered.

Except for channel links, all other cross-subarea links (those that are entirely within the domain at the time the HALT command is entered) remain active during and after the halt, regardless of how CDLINK is specified. That is, their final status does not depend on whether the links and their link stations were automatically, directly, or indirectly activated. This allows non-disruptive, simultaneous NCP deactivations, regardless of how the communication controllers are connected within the domain. Cross-subarea channel links are always deactivated during an ACF/VTAM halt.

HALT and HALT QUICK Commands

For a normal halt, enter the HALT command. The HALT command notifies application programs of the domain shutdown and waits for them to close their ACBs. New sessions are not permitted and new ACBs may not be opened, but otherwise the application programs can continue their current operations. After all application programs have stopped using ACF/VTAM services (that is, after they have closed their ACBs), processing is the same as for the HALT QUICK command, described below.

During a normal halt, the ACF/VTAM operator can monitor the shutdown of the domain by displaying the status of application programs and other logical units. The VARY TERM command can be used to terminate sessions, if necessary, to speed the processing of the HALT command.

The HALT QUICK command can also be used at this time, if necessary, to speed halt processing. The HALT QUICK command notifies application programs of the domain shutdown and then proceeds with the equivalent of VARY INACT,I commands for each major node. After ACF/VTAM has received a HALT QUICK command, the only ACF/VTAM commands that can be used are DISPLAY commands, VARY TERM commands (to terminate sessions), and VARY INACT,F commands (to force the deactivation of resources). In VSE systems, MODIFY DETACH commands can also be used to detach ACF/VTAM subtasks. In OS/VS systems, the HALT CANCEL command can be used to cancel ACF/VTAM.

If, during HALT QUICK processing, after all the major nodes are inactive, any application programs have not yet closed their ACBs, ACF/VTAM displays a message listing the names of these application programs. Because ACF/VTAM cannot shut down the domain until all application programs have been disconnected from ACF/VTAM, the operator might want to speed up the halt process by canceling the jobs of application programs with open ACBs. The HALT QUICK command can prevent an application program from using ACF/VTAM services, but ACF/VTAM cannot force the program to disconnect itself from ACF/VTAM. When the operator cancels an application program, the host operating system disconnects it from ACF/VTAM.

Canceling ACF/VTAM

It might be necessary to cancel ACF/VTAM if ACF/VTAM cannot be halted in any other way. ACF/VTAM should be canceled only if the HALT and HALT QUICK commands do not work properly. Canceling ACF/VTAM causes the immediate abnormal termination of ACF/VTAM without an orderly shutdown of the domain. The method used to cancel ACF/VTAM differs in VSE and OS/VS systems.

In VSE systems, ACF/VTAM is canceled by canceling ACF/VTAM's partition.

In OS/VS systems, ACF/VTAM is canceled by using the HALT CANCEL command. This command depends only on the proper functioning of the host operating system's abnormal termination facilities. The HALT CANCEL command causes an abnormal termination with the system completion code hex 0A9. No further I/O operations are performed. Application programs using ACF/VTAM are notified of an ACF/VTAM shutdown through their TPEND exit routines, if possible. Data in the process of being transmitted on sessions might be lost. If TPEND cannot be scheduled for an application program, the application program is also abnormally terminated, if possible. In extraordinary circumstances, the operator might have to cancel some application programs.

Using Diagnostic Facilities

This section gives a brief summary of the diagnosic facilities that are available through ACF/VTAM operator commands. For a more detailed description of when and how to use these facilities, see *ACF/VTAM Diagnosis Guide.*

Displaying and Testing Routes

The DISPLAY ROUTE command is used to provide information about what routes are available between the ACF/VTAM host node and a destination subarea node. In addition, the TEST operand of the DISPLAY ROUTE command allows the operator to test the explicit routes between the host node and a destination subarea node for the routes' ability to transfer data between the subareas. The routes to be displayed can be specified by explicit route number, virtual route number, or class of service name. If the TEST operand is specified and the routes to be displayed are specified by virtual route number, the explicit routes tested are those to which the specified virtual routes are currently mapped. If the TEST operand is specified and the routes to be displayed are specified by class of service name, the explicit routes tested are those to which the virtual routes in the specified class of service are currently mapped. See "Route Verification" in Chapter 3 for more information.

The DISPLAY PATHTAB command also provides information about routes, but without the capability to test routes. The information available is a subset of that provided by the DISPLAY ROUTE command, but in a different format. The DISPLAY PATHTAB command was available in previous releases of ACF/VTAM. The DISPLAY ROUTE command can be considered to be a replacement for it.

Dumping an NCP

An NCP can be dumped by either of two methods: *a static dump* or *a dynamic dump*.

A static dump is requested by entering the MODIFY DUMP command without the DYNA operand, or by replying in the affirmative when ACF/VTAM offers to dump a failed NCP (message IST095A in OS/VS or message 5A95A in VSE). The latter method occurs during error recovery procedures for an NCP and is more thoroughly described in Chapter 3 under "Dumping and Loading an NCP." When a static dump is requested, NCP processing stops and the current storage contents of the NCP are dumped. This dump effectively destroys a running NCP. The NCP must be reactivated (and reloaded) before communication with that NCP can resume.

A static dump can also be obtained by using the NCP independent dump utility, if the NCP is in a channel-attached communication controller. For more information, see the *ACF/NCP/VS Utilities* manual.

A dynamic dump is requested by entering the MODIFY DUMP command with the DYNA operand. When a dynamic dump is requested, NCP processing continues while the NCP's contents are being dumped. A dynamic dump thus reflects the storage contents of the communication controller over a period of time.

To print the contents of the NCP dump file, use the NCP independent dump utility described in the *ACF/NCP/VS Utilities* manual.

In OS/VS only: If an expiration date exists for the dump data set and it has not yet been reached, *do not* respond to message IEC107D (in OS/VS1) or IEC507D (in MVS) by entering REPLY xx,'M'. Enter REPLY xx,'U' to override the expiration date and allow write access to the data set, or see the system programmer if write access cannot be allowed for this data set. Entering REPLY xx,'M' causes ACF/VTAM to be abnormally terminated by the operating system.

Selecting a Dump Station

When dumping an NCP, ACF/VTAM needs to know the name of the adjacent link station through which the dump operation is to be carried out. The dump station can be either a channel link station or an SDLC link station. ACF/VTAM can be allowed to select a dump station, or the system programmer or the operator can specify a dump station. The dump station can be specified in the NCP definition, on the VARY ACT command, on the MODIFY DUMP command, or during NCP error recovery if ACF/VTAM asks the operator whether the NCP should be dumped. ACF/VTAM selects the dump station whenever there is no dump station name currently in effect from one of the above sources.

When ACF/VTAM selects a dump station, it selects a channel link station, if one is available. If no channel link station is available, ACF/VTAM uses any available SDLC link station.

If the operator wants to override a dump station name specified in an NCP definition, the DUMPSTA operand of the VARY ACT command can be used to specify the name of another link station. This override capability can also be used to specify that ACF/VTAM should select the dump station, despite the NCP definition. This is done by specifying a null value for the dump station (that is, specifying DUMPSTA without a value). If the operator chooses not to override the NCP definition value, ACF/VTAM uses that definition value to determine the link station to be used. The DUMPSTA operand of the MODIFY DUMP command can likewise be used to override a dump station name specified in an NCP definition or on the VARY ACT command.

A link station chosen as a dump station must also be specified for automatic activation with the NCP, or must be already active when it is needed (with ACF/VTAM thus knowing of its connection to the NCP). The former method is recommended. If a specified dump station is not available for a dump operation resulting from a MODIFY DUMP command, the command fails. If a specified dump station is not available for a dump operation resulting from error recovery procedures for an NCP, ACF/VTAM either prompts the operator for

a link station name or selects a link station from among those that are available, as described above. (See "Dumping and Loading an NCP" in Chapter 3 for details regarding NCP error recovery procedures.)

As with the link stations specified for automatic activation with an NCP, the reconnection of cross-subarea links from one communication controller to another might require the changing of dump station specifications for those NCPs intended to run in the communication controllers. The WARM start option and the WARM operand of the VARY ACT command should be avoided when activating the affected NCPs if the dump station specifications are changed.

Note that any link to be used to dump (or load) a communication controller must be defined to both the NCP and the communication controller as being capable of initial program load (IPL). For the NCP this is done by specifying IPL=YES on the LINE macro instruction in the NCP definition. For the communication controller, the ability of a link to accept an IPL is indicated in the configuration data set (CDS) residing in the controller's diskette storage. Any attempt to dump the communication controller over an SDLC link that is not so specified will fail (including an attempt resulting from the selection of an otherwise available SDLC link station by ACF/VTAM in the absence of a specific DUMPSTA specification).

Link Level 2 Test

The ACF/VTAM link level 2 test is used to test an SDLC communication line between an NCP and one of its peripheral physical units, or between two NCPs.

The operator can specify:

- Either a continuous link test or the number of test transmissions to be sent
- The cancelation of an ongoing link test
- Any user data to be included in the test transmissions

The test data is returned from the remote station (NCP or peripheral PU) to the controlling NCP. This NCP then compares the data received with the data sent and forwards the results to ACF/VTAM. The following information is displayed by ACF/VTAM:

- The number of test messages sent
- The total number of test messages returned (including those in error)
- The number of test messages returned without error

For a link level 2 test between an NCP and a peripheral physical unit, the SDLC link must be active and the physical unit must be inactive before the link level 2 test is started. The name of the physical unit must be specified on the ID operand of the MODIFY LL2 command. This test can be done on a point-to-point line, or on a multipoint line without affecting any other physical units on the line.

For a link level 2 test between two NCPs, the SDLC link to be tested must be active and the associated link stations must be inactive in each of the two NCPs prior to requesting the link level 2 test. In a multiple-domain network with

shared host ownership of link stations, both link stations must be inactive to all SSCPs. The name of the link station in the NCP initiating the test must be specified on the ID operand of the MODIFY LL2 command.

Migration Considerations: For ACF/NCP/VS Release 2, an NCP definition must specify whether the NCP is the primary or secondary end of an SDLC link. The link level 2 test can be initiated only from the NCP at the primary end of the link.

Because ACF/NCP/VS Release 2 does not support multiple-link transmission groups, the system programmer might define a backup link to be used if the principal link fails. (See the migration considerations under "Error Recovery Procedures for Link Failures" in Chapter 3.) If an ACF/NCP/VS Release 2 is initiating the link level 2 test, the link that is tested could either be the principal link (the link being backed up) or the backup link. The choice of which link the NCP tests is based on whether the link station associated with the principal link or the link station associated with the backup link was last active. If neither link station has yet been activated since the activation of its NCP, the principal link is tested.

Intensive Mode Recording

The operator can request detailed information concerning temporary line errors or other hardware error conditions by specifying the MODIFY IMR command to start *intensive mode recording (IMR)*. This error information can be requested for a communication link between an NCP and one of its peripheral physical units, or between two NCP major nodes.

For intensive mode recording on a link between an NCP and a peripheral physical unit, the SDLC link to be tested must be active. The name of the physical unit must be specified on the ID operand of the MODIFY IMR command. This test can be done on a point-to-point line, or on a multipoint line without running intensive mode recording for any other physical units on the line.

For intensive mode recording on a link between two NCPs, the SDLC link to be tested must be active. The name of the link station in the NCP initiating the test must be specified on the ID operand of the MODIFY IMR command.

On the MODIFY IMR command the operator can also specify the number of IMR records to be generated by the NCP. After this number is reached, IMR is automatically terminated for this physical unit or link station. IMR can also be canceled by operator command before this limit is reached.

ACF/VTAM converts each IMR record to a miscellaneous data recorder (MDR) record. MDR records are written to the SYS1.LOGREC data set in OS/VS systems or to the SYSREC file in VSE systems. If the IBM Network Problem Determination Application (NPDA) program product is installed, ACF/VTAM can send a copy of the IMR records to NPDA.

Identifying the Issuing Module for Each ACF/VTAM Message

When diagnosing system problems, it might be useful to know which ACF/VTAM module caused a particular error message to be issued. The operator can use the MODIFY MSGMOD command to specify whether each ACF/VTAM message should contain the last five characters of the name of the

ACF/VTAM module that originated the message. It should be noted, however, that this option causes certain (longer) ACF/VTAM messages to be truncated, with the consequent loss of potentially significant information.

Traces

ACF/VTAM Diagnosis Guide provides a complete description of when and how to use ACF/VTAM traces and of the trace records that are produced by these traces. Chapter 4 describes the syntax of the MODIFY TRACE and MODIFY NOTRACE commands, which are used to start and stop ACF/VTAM traces. The following paragraphs give a brief overview of the kinds of traces that can be started and stopped with ACF/VTAM commands.

The MODIFY TRACE command is used to start or modify the operation of any one of ACF/VTAM's traces. (ACF/VTAM traces can also be started with the TRACE start option.) The TYPE operand specifies the type of trace to be started or modified. The types of traces that can be specified are:

- The buffer contents trace (TYPE=BUF), which records data that passes through ACF/VTAM's buffers on the way to or from a specified node.

- The buffer usage or storage management services (SMS) trace (TYPE=SMS), which records information about how ACF/VTAM is using its buffer pools.

- The trace of I/O events (TYPE=IO), which records the order of I/O events between ACF/VTAM and a network node. The trace records show the request/response sequence for each PIU to and from any network node.

- The line trace (TYPE=LINE), which provides an NCP line trace. The line trace records the operating parameters of a line each time a level-two interruption occurs on that line.

- The transmission group trace (TYPE=TG), which provides a PIU trace of a transmission group. A transmission group trace can be started by naming any line within the transmission group. A line is part of a transmission group only when both the line and its subordinate link station are active.

  All the lines in the transmission group are traced as if they were a single logical line. Once a transmission group trace is started, another trace of the same transmission group cannot be requested by naming the same or another line within the transmission group in another MODIFY TRACE command. If the line or its link station subsequently fails or is deactivated (that is, if the line is removed from the transmission group), the transmission group trace is ended, even though the transmission group continues to operate if there are any remaining lines in the transmission group. The trace can be restarted, naming another line in the transmission group.

  The NCP line trace and the transmission group trace are mutually exclusive for a particular line. Therefore, when starting a transmission group trace, select a line that is not being used (and is not likely to be used) for a line trace.

- In OS/VS2 (MVS), the TSO user trace (TYPE=TSO), which provides a trace of the input and output requests (TGET, TPUT, TPG macro instructions) within the TSO user ID address space.

- The ACF/VTAM internal trace (TYPE=VTAM), which provides a trace of internal ACF/VTAM activities. The OPTIONS operand can be used to select one or more of the following areas to be traced:

  - The application program interface (API)

  - Channel I/O for channel-attached devices (CIO)

  - Locking (LOCK)

  - Operator messages (MSG)

  - The flow of path information units (PIU)

  - Events within ACF/VTAM's process scheduling services (PSS)

  - Events within ACF/VTAM's storage management services (SMS)

  - The flow of work elements through the primitive VTAM interface (PVI) to and from ACF/VTAM service managers (SSCP)

In OS/VS systems, if the MODE=EXT option is specified, the records of all ACF/VTAM traces can be printed by the generalized trace facility (GTF).

In VSE systems, if the MODE=EXT option is specified, the records of all ACF/VTAM traces can be printed by the TPRINT utility program. The TPRINT utility program can be run as an ACF/VTAM subtask by using a MODIFY TPRINT command or as a separate job by using an EXEC PGM=TPRINT JCL statement.

For more information on TPRINT, see "Recording and Printing Trace Records and Tuning Statistics in VSE" later in this chapter.

The MODIFY NOTRACE command can be used to change trace parameters or to stop a trace entirely.

Recording and Printing Trace Records in OS/VS

In OS/VS systems, ACF/VTAM uses the generalized trace facility (GTF) to record ACF/VTAM trace records. The trace records are recorded in SYS1.TRACE along with all other GTF output.

Three GTF options are required to record ACF/VTAM traces:

- RNIO must be specified so that the ACF/VTAM I/O trace can function for an NCP or for a peripheral physical unit.

- IO or IOP must be specified so that the GTF I/O trace can function for a channel-attached device.

- USR must be specified so that the ACF/VTAM internal trace, ACF/VTAM buffer contents trace, NCP line trace, and SMS buffer usage trace can function.

The keywords for formatting ACF/VTAM trace data for printed output are similar to the GTF trace options for ACF/VTAM and are listed under "Formatting Printed Output in OS/VS" below.

Starting GTF in OS/VS

GTF must be started before any ACF/VTAM trace can be activated. Unless the system programmer has modified the IBM-supplied GTF cataloged procedure, the time-stamping option (TIME=YES) should be specified when starting GTF. If the GTF options required for ACF/VTAM traces were not stored by the system programmer on SYS1.PARMLIB, the operator is prompted to supply these options when GTF is started.

For information on starting GTF and on altering the IBM-supplied GTF cataloged procedure, see the service aids manual for your operating system.

Formatting Printed Output in OS/VS

To print ACF/VTAM trace output, use the PRDMP service aid. The PRDMP (HMDPRDMP in OS/VS1 or AMDPRDMP in OS/VS2) service aid prints all GTF trace data, including the ACF/VTAM trace data. The operator can format the trace data by specifying the following keywords in the PRDMP EDIT control statement:

- IO specifies formatting of all I/O trace records for channel-attached devices.

- IO=(cuu1,cuu2, ... ,cuu50) specifies formatting of I/O trace records for channel-attached devices with the channel device names cuu1, cuu2,, and so on, up to a maximum of 50 devices.

- RNIO specifies formatting of the I/O trace records for an NCP or a peripheral physical unit.

- USR=([,CL01][,TPIO][,LINE]) specifies formatting of the buffer trace recorded at the user's buffers (CL01), before leaving the ACF/VTAM transmission subsystem component (TPIO), or the NCP line trace (LINE). See the system programmer's guide for your operating system for a full explanation of the CL01, TPIO, and LINE options of the USR keyword. If more than one option is coded, separate them with commas.

- USR=(CL02) specifies formatting of the SMS buffer usage trace.

For a complete description of the PRDMP service aid, see the system programmer's guide for your operating system.

Recording and Printing Trace Records and Tuning Statistics in VSE

In VSE systems, the ACF/VTAM trace print utility runs as a subtask under ACF/VTAM or as a job step under VSE. You can start printing in one of two ways:

- Use a separate job step, whether ACF/VTAM is active or not.
- Use the MODIFY TPRINT command while ACF/VTAM is active, as described in the section on the MODIFY TPRINT command in Chapter 4.

Either method can be used to print:

- Specific buffer, I/O, or line trace records, or tuning statistics
- All buffer, I/O, or line trace records, or tuning statistics

- All trace records

- Trace records of specified types within a selected time interval during which the tracing occured

For a trace printout, SYSLST must be assigned to a printer, tape, or disk with the name IJSYSLS.

The ACF/VTAM trace utility records trace records in wraparound fashion either in main storage or in a trace file assigned to a disk or tape. If the trace file is on a disk or tape, the operator is notified when the end of the trace file is reached. When a trace file is full, or the main storage buffer (when no file is used) is full, the oldest records are overlayed by new trace records. Therefore, if trace data is being produced faster than TPRINT can print it, trace data is lost due to wraparound.

If SYS001 is assigned to a tape device, ensure that an unlabeled scratch tape is mounted and ready before entering the first MODIFY TRACE command.

Starting and Canceling of Printing Using a Job Step

To start printing using a job step, assign a SYSLST disk, tape, or printer to a VSE partition. Execute the job step by using the EXEC TPRINT statement. A size parameter is not needed because the storage required is a minimal partition.

When printing is done using a job step, the trace print utility handles a trace file on a disk device differently from a trace file on tape.

If ACF/VTAM is active when TPRINT is requested and if the trace file is on a disk device, trace recording is suspended. For the ACF/VTAM internal trace, either stop the trace or switch the trace recording to an internal trace table.

If the trace file is on a tape, ACF/VTAM prompts the operator with the message 5K02A, "OPTION TO REPLACE TRFILE TAPE ON SYS001." The operator can enter a null character string, or specify the CANCEL or NEWTAP options, with the following results:

null character string
    If no option is specified, replacement of the tape that the operator took from ACF/VTAM is deferred. External recording of all ACF/VTAM traces is stopped temporarily. ACF/VTAM does not attempt to reopen the trace file until the next MODIFY TRACE command is entered.

CANCEL
    specifies that ACF/VTAM's trace recording is to be canceled because the operator took the tape from ACF/VTAM and did not replace it. External recording of all ACF/VTAM traces is stopped and cannot be resumed unless ACF/VTAM is restarted.

NEWTAP
    specifies that the operator has moved the tape to the trace print SYS004 unit and mounted a new tape for ACF/VTAM. ACF/VTAM records trace data on the new volume.

The operator can select a snapshot print of the contents of ACF/VTAM's main storage trace buffers containing the most recently recorded trace records, without suspending current trace recording. A snapshot print of ACF/VTAM's internal trace buffer is not available. The operator is prompted to select a snapshot print if SYS001 is assigned to a file.

If ACF/VTAM is not active, the operator can use the trace print utility if SYS004 is assigned to a disk file or tape.

The operator can cancel the trace print by entering CANCEL when ACF/VTAM issues prompting messages, or by canceling the partition in which the trace print utility is running.

The operator can also enter the trace print options as described in the MODIFY TPRINT section of Chapter 4.

Examples of Using the Trace Print Utility

The following examples show how the trace print utilty can be used to print trace records.

To print all buffer contents, I/O, and line trace records, and tuning statistics, and erase the records after printing, enter:

    PRINT CLEAR=YES

To print specific buffer contents trace records, all I/O trace records, and tuning statistics for NCP001, enter:

    PRINT BUF=name,name,name,IO=ALL,TNST=NCP001

To print all buffer contents trace records and all I/O trace records, and to preserve the trace records, enter:

    PRINT BUF=ALL,IO=name,name,CLEAR=NO

To print specific NCP line trace records recorded from 6:00 p.m. to 6:05 p.m. Greenwich Mean Time, enter:

    PRINT LINE=name,name,INTERVAL=(18:00:00,18:05:00)

To print specific buffer contents trace records and I/O trace records, and to be prompted for additional entries on the next line, enter:

    PRINT BUF=name,name,IO=name,name,name,name,

Tuning Statistics

ACF/VTAM tuning statistics can be used to gather information on communications between ACF/VTAM and a communication controller or on communications between ACF/VTAM and a SNA cluster controller. These statistics can be used to adjust ACF/VTAM and NCP variables to improve performance. The gathering of tuning statistics is started with the MODIFY TNSTAT command and terminated with the MODIFY NOTNSTAT command.

If this facility is to be used, the TNSTAT start option must have been specified when ACF/VTAM was started. Additionally, in an OS/VS system, the System Management Facility (SMF) must have been included in the system during system generation.

For more information on using tuning statistics, see the *ACF/VTAM Planning and Installation Reference* manual.

TOLTEP

The teleprocessing online test executive program (TOLTEP) is a component of ACF/VTAM that is used to test selected hardware in an ACF/VTAM domain. This section contains information on how to invoke TOLTEP either from the operator's console or from a terminal in the ACF/VTAM domain. For details on how to use TOLTEP and the types of terminals that can invoke TOLTEP, see *ACF/VTAM Diagnosis Guide*. The MODIFY TEST command is used to start TOLTEP. In general, TOLTEP should be invoked from a terminal in the domain rather than from the operator's console; this avoids the inconvenience of running both TOLTEP and the rest of the system from the console. If TOLTEP is to be invoked by a terminal user and if a logon message for TOLTEP has been defined by the system programmer, a terminal user can enter that message to log on to TOLTEP and initiate testing of selected devices from the terminal. Alternatively, the ACF/VTAM operator can log the terminal onto TOLTEP by using the command:

VARY NET,LOGON=ISTOLTEP,ID=terminal name

If TOLTEP is invoked by a terminal user, the user must specify the terminals to be used or tested, and then TOLTEP asks the ACF/VTAM operator for permission to use the specified terminals. Before giving TOLTEP permission to use or test terminals, be certain that the terminals named in the request are those that are supposed to be tested, and be certain that those terminals are not in session with an application program.

Notes:

1. *Terminals should not be activated or deactivated while TOLTEP is using them.*

2. *Although TOLTEP can be invoked from the operator's console, it cannot be used to test the operator's console itself. Only selected hardware that is part of the ACF/VTAM domain can be tested by TOLTEP. See* ACF/VTAM Diagnosis Guide *for a list of the devices that can be tested by TOLTEP.*

Displaying NCP Storage

The storage contents of an NCP's communication controller can be displayed at the ACF/VTAM operator's console. Up to 256 bytes beginning at any address within the communication controller can be dynamically displayed. To display NCP storage contents, use the DISPLAY NCPSTOR command.

Changing the Suppression Level of ACF/VTAM Messages

ACF/VTAM allows most classes of its messages to be suppressed. Message suppression can be used to adjust the amount of information the operator receives from ACF/VTAM to suit the needs of the operator.

Messages are divided into these classes (in order, from lowest suppression level to highest):

- Informational
- Warning
- Normal
- Serious
- Unsuppressible

The categories of messages to be suppressed can be specified, either when ACF/VTAM is started or later, with the MODIFY SUPP command. Unsuppressible messages cannot be suppressed. Examples of such messages are those that solicit information from the operator, and messages that are responses to DISPLAY commands.

For more information on ACF/VTAM message suppression classes, see *ACF/VTAM Messages and Codes.*

Attaching and Detaching Subtasks (VSE Only)

In VSE systems, the MODIFY ATTACH and MODIFY DETACH commands make it possible to attach or detach an IBM subsystem or program (such as BTP or SSS) as a subtask of ACF/VTAM. To determine whether a particular program can be run as a subtask, see the system programmer's guide for that program.

Changing a Logical Unit's Cryptographic Capability (OS/VS Only)

In OS/VS systems, if the Encrypt/Decrypt Feature of ACF/VTAM is installed, the cryptographic capability of the logical unit can be raised for future sessions by entering the MODIFY ENCR command. For more information on the Encrypt/Decrypt Feature of ACF/VTAM, see *ACF/VTAM Programming.*

Chapter 3. Backup and Recovery Procedures

This chapter provides information on backup and recovery actions an operator can take when various types of resources fail in the network. The types of failures discussed are:

- NCP failures
- Host failures within a single domain
- Route failures
- Link failures
- Session setup failures
- Failures involving multiple domains

For information on specific ACF/VTAM operator messages (including suggested operator and system programmer responses to the messages), see *ACF/VTAM Messages and Codes*. For information on diagnosing ACF/VTAM problems, see *ACF/VTAM Diagnosis Guide*.

Error Recovery Procedures for an NCP Failure

SSCP-to-NCP Session Recovery

To use the services of ACF/VTAM, an NCP must have a session with ACF/VTAM's SSCP. When an SSCP-to-NCP session fails, the services provided by the SSCP on behalf of the NCP's physical units and logical units cease. The NCP goes through automatic network shutdown with respect to ACF/VTAM and any resources activated by ACF/VTAM. LU-to-LU sessions involving the peripheral devices attached to the communication controller might be ended disruptively by automatic network shutdown, depending on how the NCP supports each device. As soon as the SSCP-to-NCP session has been restored, attempts can be made to recover the disrupted sessions.

ACF/VTAM automatically attempts logical (session) recovery for an NCP by trying to reestablish the SSCP-to-NCP session, possibly using another route if one is available within the SSCP's class of service. If, however, the availability of virtual routes depends on a physical recovery of some portion of the domain and that recovery fails, the SSCP-to-NCP session recovery remains pending indefinitely. As with NCP activation, however, the ACF/VTAM operator is informed of the queued route selection request. The operator can then cancel this request by deactivating the NCP.

After re-establishing the SSCP-to-NCP session, ACF/VTAM sends two SNA requests, ACTPU(ERP) and ACTLU(ERP), to the NCP's physical units and logical units. If these resources support these SNA commands, their LU-to-LU sessions that survived the NCP's automatic network shutdown procedure remain active, and the existence of these sessions is reported to ACF/VTAM.

The SSCP will lack some information about these sessions, such as the identity of the other session partner and the session identifier. This means that DISPLAY commands will provide incomplete information about these sessions.

(For example, a DISPLAY ID=logical unit name command will indicate that an active session exists but the ALLOC field will be blank, indicating that the session partner is unknown.) It also means that when using the VARY TERM command for one of these sessions, the command cannot refer to the session partner that is unknown to ACF/VTAM. Specifically, the PLU, SLU, or LU operand must name the session partner within the domain of the operator entering the command. Also, the TYPE=UNCOND or TYPE=FORCE operand must be specified.

Physical units that do not support ACTPU(ERP) break existing sessions of their subordinate logical units whenever the physical units are activated by an SSCP. Logical units that do not support ACTLU(ERP) break their existing sessions whenever the logical units are activated by an SSCP. Thus, if these SNA commands are not supported by the physical units and logical units, LU-to-LU sessions are terminated disruptively upon activation of these resources by the SSCP when the NCP is recovered.

Note: *The session disruption for physical units and logical units that do not support the ACTPU(ERP) and ACTLU(ERP) requests occurs whenever the SSCP is able to recover from the loss of its SSCP-to-NCP session. This could occur because the SSCP is able to physically recover a failed part of the route to the NCP (for example, by reactivating a link station along the route). It could also occur because of the availability of another route to the NCP. This session disruption can be controlled, if desired, by ensuring that no more than one route is made available to the SSCP for establishing its SSCP-to-NCP session.*

Migration Considerations: ACF/VTAM sends ACTPU(COLD) and ACTLU(COLD) requests to peripheral physical units and logical units attached to an ACF/NCP/VS Release 2, because ACF/NCP/VS Release 2 does not support ERP responses to ACTPU(ERP) and ACTLU(ERP) requests directed to its peripheral nodes. Therefore, existing sessions involving these physical units and logical units are disrupted, even if the physical units and logical units support the ACTPU(ERP) and ACTLU(ERP) requests.

Dumping and Loading an NCP

The failure of an NCP in a communication controller is discovered by ACF/VTAM from the resulting failures of the link stations in adjacent nodes that represent the attachments to the failed NCP. (ACF/VTAM receives the link station failure notifications as a result of having activated each link station.) Specifically, ACF/VTAM might find the need to reload the communication controller attached to the failed link stations during the recovery procedures for the link stations.

Depending on how the AUTODMP and AUTOIPL operands are specified in an NCP definition, ACF/VTAM can either dump and reload the NCP automatically or give the operator control of these operations. If AUTODMP=NO or AUTOIPL=NO is specified or assumed by default in the NCP definition, the operator is prompted for permission to dump or reload the NCP. In this case the operator can also specify the adjacent link station through which the dump or reload is to be done, or can specify that ACF/VTAM is to make a selection without regard to previous dump or load station specifications. If the operator does not specify a link station, the dump or load station specification in effect when the NCP was activated is used. If

no specification was in effect when the NCP was activated, ACF/VTAM makes a selection.

If an NCP is owned by only one SSCP, the dumping and reloading of the NCP can either be done automatically (through AUTODMP and AUTOIPL) or be controlled by the domain operator. If the system programmer has not specified automatic dumping and reloading, ACF/VTAM displays the "OPTION TO DUMP" message (IST095A in OS/VS or 5A95A in VSE) and "OPTION TO RELOAD" message (IST284A in OS/VS or 5C84A in VSE), to which the operator can give the appropriate response. The possible responses to these messages are described in *ACF/VTAM Messages and Codes*.

If an NCP is shared by more than one SSCP, it is recommended that the dumping and reloading of that NCP be controlled by the domain operators. If automatic dumping and reloading are specified, or if the domain operators reply to the "OPTION TO DUMP" and "OPTION TO RELOAD" messages without coordinating their actions, it is possible that two SSCPs will try to dump or load the same NCP at the same time. The recommended recovery sequence after an NCP failure is to respond "YES" to any "OPTION TO DUMP" and "OPTION TO RELOAD" messages in only one SSCP and withhold the responses to the corresponding messages in any other SSCPs sharing ownership of the NCP until the dump or load operation is completed. After completion, respond "NO" in the remaining SSCPs. Once one SSCP has completed an NCP reload, the "NO" response to the "OPTION TO RELOAD" message in the remaining SSCPs causes ACF/VTAM in these SSCPs to try to recover all of the adjacent link stations that were reported inoperative as a result of the NCP failure.

Option to Dump

If AUTODMP=NO is specified or assumed by default in the definition of an NCP, the "OPTION TO DUMP" message (IST095A in OS/VS or 5A95A in VSE) is produced during error recovery for that NCP. This message allows the operator to specify whether the NCP is to be dumped by this SSCP. See *ACF/VTAM Messages and Codes* for more information on this message.

If the operator specifies that the NCP is to be dumped by this SSCP, ACF/VTAM dumps the NCP through an adjacent link station. The error recovery continues after a successful dump.

Optionally, the operator can specify the name of the adjacent link station through which the dump operation is to be performed, thereby overriding the dump station specification currently in effect (if any). The operator can also cancel the specification currently in effect. In either case, the operator's specification applies only for this particular dump. "Dumping an NCP" in Chapter 2 describes how the current dump station specification was established and the requirements for using a link station for dumping an NCP.

If there is no dump station specification currently in effect, or if the operator cancels the specification, ACF/VTAM selects a channel link station, if one is available. If no channel link station is available, ACF/VTAM uses any available SDLC link station.

If the operator specifies that no dump is to be performed by this SSCP, the error recovery continues as if the NCP had been successfully dumped. The NCP is not deactivated. Use a VARY INACT command to deactivate the NCP, if desired.

If AUTOIPL is not specified in the definition statements for an NCP, the "OPTION TO RELOAD" message (IST284A in OS/VS or 5C84A in VSE) is produced during error recovery for that NCP. This message allows the operator to specify whether the NCP is to be reloaded by this SSCP. See *ACF/VTAM Messages and Codes* for more information on this message.

If the operator specifies that the NCP is to be reloaded by this SSCP, ACF/VTAM reloads the NCP through an adjacent link station, unless the adjacent link station is a channel link station and the NCP has already been successfully reloaded by another SSCP. The error recovery continues after a successful reload.

Optionally, the operator can specify the name of the adjacent link station through which the reload operation is to be performed, thereby overriding the load station specification currently in effect (if any). The operator can also cancel the specification currently in effect. In either case, the operator's specification applies only for this particular reload. "Loading an NCP" in Chapter 2 describes how the current load station specification was established and the requirements for using a link station for loading an NCP.

If there is no load station specification currently in effect, or if the operator cancels the specification, ACF/VTAM selects a channel link station, if one is available. If no channel link station is available, ACF/VTAM uses any available SDLC link station.

If the operator specifies that no reload is to be done by this SSCP, the error recovery continues, provided that the NCP has been successfully reloaded by another SSCP. If the NCP has not been reloaded, the recovery does not complete, and failing adjacent link stations are deactivated. As discussed under "SSCP-to-NCP Session Recovery" in this chapter, the session recovery remains pending, waiting for a route to become operative. Use a VARY INACT command to deactivate the NCP, if desired.

Switching to Another Channel or Communication Controller

The operator might find it necessary to reactivate an NCP in the same or a different communication controller. This could occur when:

- The channel to a channel-attached communication controller fails and the operator switches to another channel. If a communication controller is equipped with a type 3 channel adapter, the switch to an alternate channel is done automatically, without interrupting NCP operation. In this case there is no need to reactivate the NCP.

- A failure occurs in a communication controller and the operator has a backup communication controller available, either with equivalent cross-subarea links and peripheral devices or with the capability to switch cross-subarea and peripheral links to the backup communication controller.

After switching to another channel or communication controller, the operator enters the VARY ACT command to reactivate the NCP major node and, optionally, to provide either or both of the following:

- A new channel device name on the U operand, if the communication controller is channel-attached

- New link station names on the RNAME operand, if the communication controller is attached through SDLC links different from those used before switching to th~ backup communication controller

As a result of the VARY ACT command, ACF/VTAM loads the NCP, if necessary, and activates it. The operator can then enter more ACF/VTAM commands to restore the minor node status in the NCP's configuration. Optionally, the configuration restart facility can be used when activating the NCP to restore the minor node status. See "Configuration Restart" elsewhere in this chapter for information on the requirements for using configuration restart.

Error Recovery Procedures for an ACF/VTAM Host Failure

If ACF/VTAM fails, the operator can try to restart ACF/VTAM. The configuration restart facility can be used to restore the domain's resources (but not LU-to-LU sessions) to their status prior to the failure, assuming that the system programmer has provided for the use of this facility in the resource definitions. In a multiple-domain network, the SSCPs in other domains can take over ACF/VTAM's resources, as described in "Error Recovery Procedures for Failures in a Multiple-Domain Network" elsewhere in this chapter.

Configuration Restart

Configuration restart is an ACF/VTAM facility that maintains certain status information about ACF/VTAM resources. In general, this information includes active/inactive status and operator-specified values of activation and operating parameters. When restarting ACF/VTAM after a halt or failure, or when reactivating an individual major node after a deactivation or failure, ACF/VTAM can use this information to restore the resources to their status prior to the deactivation or failure.

Restarting Major Nodes

The system programmer can define a NODELST file in which to record the names of major nodes, path definition sets, and dynamic reconfiguration files (DRDS files) that are active in the domain, as described in *ACF/VTAM Planning and Installation Reference*. Information in the NODELST file can later be used when restarting ACF/VTAM to reactivate these major nodes, path definition sets, and dynamic reconfiguration files (DRDS files) without individual operator commands. This is done by specifying the name of the NODELST file as the value for the CONFIG start option.

If, in response to an attempted restart, ACF/VTAM displays message IST425I (in OS/VS) or 5E25I (in VSE), indicating that an OPEN failure occurred on the NODELST file with VSAM error codes X'04' and X'74', the operator should use the Access Method Services VERIFY operation (see *OS/VS1 Access*

Method Services, GC26-3840, *OS/VS2 Access Method Services*, GC26-3841, or *DOS/VS Access Method Services User's Guide*, GC33-5382) to ensure that the named NODELST file is properly closed. If the operator again tries the restart without first performing the VERIFY operation, this message is not repeated, but some of the information in the file might be lost.

Restarting Minor Nodes

The system programmer can define configuration restart files, as described in *ACF/VTAM Planning and Installation Reference*, in which to record status information about minor nodes. When restarting ACF/VTAM after a halt or failure, or when reactivating an individual major node after a deactivation or failure, ACF/VTAM can use this information to restore the minor nodes to their status prior to the deactivation or failure.

Every time the operator changes the status of a minor node, the change is recorded in the configuration restart file (if one exists) for the corresponding major node. Note that configuration restart files are not updated to reflect changes to resources acquired with the VARY ACQ command, or resources added or deleted through the use of the dynamic reconfiguration function.

Information in configuration restart files can be used when restarting ACF/VTAM by specifying the WARM start option. If the WARM start option is specified, ACF/VTAM restores the status of the minor nodes of each major node named in the file specified by the CONFIG start option. However, if a major node's configuration restart file has never been used for status recording, or if the major node has no configuration restart file, the minor node status information for that major node is set to the defined initial status. That is, the activation proceeds as if a VARY ACT,SCOPE=U command had been specified for the major node.

If the WARM start option is not specified when restarting ACF/VTAM, ACF/VTAM restores the major nodes' minor nodes to their defined initial status. That is, the activation proceeds as if a VARY ACT,SCOPE=COMP command had been specified for each major node. The previous status information in any configuration restart files for these major nodes is deleted.

The configuration restart files can also be used when individually reactivating a major node, by specifying the WARM operand on the VARY ACT command. If the WARM operand is specified, ACF/VTAM restores the minor nodes to the status recorded for them in their configuration restart file. However, if the major node's configuration restart file has never been used for status recording, or if the major node has no configuration restart file, ACF/VTAM rejects the VARY ACT command.

If the WARM operand is not specified on a VARY ACT command for a major node, ACF/VTAM sets the status of the minor nodes according to the specified value of the SCOPE operand. If the SCOPE operand is not specified, the default value of SCOPE=COMP is used. The previous status information in any configuration restart file for the major node is deleted.

When using the configuration restart facility, the operator must be aware of the following restart considerations to ensure a satisfactory restart:

- Because the status of any ACF/VTAM commands being processed at the time of a failure cannot be predicted, the ACF/VTAM operator should use DISPLAY commands to determine whether any commands being processed at the time of failure need to be entered again.

- The configuration restart facility does not record status information for resources acquired with the VARY ACQ command, or for resources added or deleted by the dynamic reconfiguration function. The operator must use ACF/VTAM commands to restore such resources to their previous status, if desired.

- After a failure in ACF/VTAM, the host processor, or the host operating system, and the subsequent restart of the domain, communication might not be possible with lines or terminals that were being tested with online test programs (OLTs) when the failure occurred. After the status of the domain is reestablished, TOLTEP should be run again for those lines or terminals.

- If a logical unit is restarted and if that logical unit has a controlling application program associated with it (whether through the LOGAPPL operand of its definition statement, through a VARY LOGON command, or through the LOGON operand of a VARY ACT or VARY ACQ command),· ACF/VTAM automatically generates a logon for that logical unit to the controlling application program, whether or not the logical unit was in session with that application program when the failure occurred in the domain.

- When an NCP is defined or activated, one or more link stations in adjacent NCPs can be specified for automatic activation when the NCP is activated. (Specifically, this involves the CUADDR and RNAME operands of the PCCU macro in the NCP definition, and the U and RNAME operands of the VARY ACT command.) Because these adjacent link stations are associated with the NCP being activated for purposes of automatic activation, reactivation of the NCP with the WARM option (either at start time or on the VARY ACT command) causes ACF/VTAM to automatically reactivate the link stations. This is true even if the link stations in the adjacent NCPs were inactive at the time of the failure.

Migration Considerations: Configuration restart files defined for NCP major nodes in a previous release of ACF/VTAM cannot be used for ACF/VTAM Release 3. For information on the definition requirements for configuration restart files, see *ACF/VTAM Planning and Installation Reference*.

Switching to a Backup Host Processor

If configuration restart files are defined, ACF/VTAM provides some support for switching one or more major nodes from a failing host to an ACF/VTAM in a backup processor. This kind of backup involves moving the VSAM configuration restart file for each major node to be switched. The NODELST file also can be moved, if desired. The primary and backup processors must meet these conditions:

- Both host processors must have the same levels of ACF/VTAM and VSAM installed, although they need not have the same operating system.

- The ACF/VTAM major node definitions and their corresponding hardware configurations must be the same in both systems. (Physically switching the hardware connections from one system to another would satisfy the requirement for matching hardware configurations.)

- The MAXSUBA value must be the same in both ACF/VTAM systems.

The VSAM files are moved by creating the files and a user catalog on the primary system and then using Access Method Services to 'IMPORT CONNECT' the user catalog (and all of its cataloged files) in the backup system. (See *OS/VS1 Access Method Services*, GC26-3840, *OS/VS2 Access Method Services*, GC26-3841, or *DOS/VS Access Method Services User's Guide*, GC33-5382.) The backup system can then gain access to the primary system's NODELST and configuration restart files through either a shared disk storage arrangement or by physically moving the VSAM volumes containing the user catalog and files.

If ACF/VTAM is restarted in the backup system after moving the VSAM volumes, the appropriate job control language for the VSAM user catalog and files can be included in the ACF/VTAM start procedure at that time. If, however, one or more major nodes are to be switched without restarting ACF/VTAM in the backup system, the job control language must be included when ACF/VTAM *is* started, sometime before the switch is made. For more information on including this job control language, refer to *ACF/VTAM Planning and Installation Reference*.

Reconfiguration for a Multiprocessor in MVS

In a suitably prepared multiprocessor, one processor can back up the other. The procedure required to do the necessary reconfiguration varies, depending on whether the attached devices are symmetric (devices that are attached to all processors in a multiprocessor) or asymmetric (devices that are attached to only one processor in a multiprocessor). The following guidelines might be useful when developing operator procedures for reconfiguring a specific multiprocessor:

- In most cases, recovery for symmetric devices is provided automatically. For a symmetric communication controller equipped with a type 3 channel adapter, the system VARY command can be used to bring the channel paths offline when doing a system reconfiguration. This is not necessary during a recovery from a processor failure, because the channel paths on the failing processor automatically go offline.

- Asymmetric devices must be equipped with a 2-channel switch to allow backup by an alternate processor.

  - If an NCP in an asymmetric communication controller has not been deactivated by the ACF/VTAM error recovery procedures, use the VARY INACT,I or VARY INACT,F command to deactivate the NCP.

  - If an asymmetric physical unit or logical unit has not already been deactivated by the ACF/VTAM error recovery procedures, use the VARY INACT,I or VARY INACT,F command to deactivate the resource, or to deactivate its major node.

  - Switch the device to the alternate processor.

  - For each device affected by the physical switching operation, use the system VARY command to bring the channel paths online for each device and, if necessary, to bring previous channel paths offline.

  - Use the VARY ACT command to reactivate the appropriate major and minor nodes. Configuration restart files can be used as described elsewhere in this chapter.

  - Restart user sessions as appropriate.

Error Recovery and Verification Procedures for Routes

Route Failures

An explicit route fails if a physical element of the explicit route (line, channel, host processor, communication controller, and so on) fails or is deactivated. An ACF/VTAM operator is informed of a failure of such a physical element only if it was activated in the ACF/VTAM domain. However, an ACF/VTAM operator is informed of an explicit route failure (by message IST526I [in OS/VS] or 5F26I [in VSE]) for any route ending in the operator's ACF/VTAM host, and is told which virtual routes are affected by the explicit route failure. Besides identifying the failed route, ACF/VTAM reports the location of the outage by identifying the subarea that detected the outage, the affected transmission group, and the subarea node at the other end of this transmission group.

A virtual route fails when the explicit route to which it is assigned becomes inoperative. When a virtual route failure disrupts a session, the session partners are notified of the session failure. The session partners can then decide whether or not to try to restart the session (perhaps using another route).

Route Activation Failures

As stated in Chapter 2, ACF/VTAM automatically activates explicit and virtual routes as they are requested for sessions. Such route activations can fail for various reasons, the most common being improperly defined routes (in the various intermediate nodes and the other end node) and inoperative routes (because of failed or inactive links or nodes). When ACF/VTAM initiates a route activation and the activation fails, ACF/VTAM displays a message (IST522I [in OS/VS] or 5F22I [in VSE] to inform the operator of the failure. This message identifies the explicit or virtual route, the two end nodes, and the reason for the failure. Because an explicit route activation can fail at an intermediate node along the route, this message also indicates (for an explicit

route activation failure) the subarea node rejecting the activation, the transmission group over which the activation request could not be forwarded or the transmission group over which the activation request was received, and the subarea node at the other end of this transmission group.

While the operator probably cannot correct route definition problems in intermediate nodes (because such definitions require an NCP generation to change them), route definition problems in another ACF/VTAM end node and inoperative route problems can be corrected. Coordination with operators in other domains is necessary, except in the case of inoperative routes that are entirely within a single domain.

Note that when a session requests a route and there are no routes that are both defined and operative within the requested class of service, no route activations are attempted and therefore no route activation failure messages appear. The operator *is* informed of the session setup failure, however, in message IST521I (in OS/VS) or 5F22I (in VSE), with an indication that no routes were defined or no routes were operative. (This message also appears if a session setup fails because all attempted route activations failed.)

An activation request can be received from the other end of a route for an explicit or virtual route that has not been defined to ACF/VTAM, or that has been defined in a way incompatible with the received route activation request. Such a route activation request is rejected and, because operator action might be required to activate a path definition set that properly defines the explicit or virtual route (so that future route activation requests can be accepted), a message (IST522I [in OS/VS] or 5F22I [in VSE]) is displayed to inform the operator of the problem. This message identifies the explicit or virtual route, the two end nodes, and the reason for the activation rejection.

Route Verification

The TEST operand of the DISPLAY ROUTE command allows an operator to cause any or all known explicit routes between the host subarea and any destination subarea to be tested for the route's ability to transfer data between the subareas. The operator can specify the testing of the explicit routes associated with a particular explicit route number, virtual route number, or class of service name. The operator can also specify the testing of all routes to a destination subarea. For route verification, ACF/VTAM sends a route test request on all of the specified explicit routes to the specified destination subarea. If an explicit route is both defined and operative over its entire length, the subarea at the other end replies to ACF/VTAM, which in turn tells the ACF/VTAM operator (in message IST533I [in OS/VS] or 5F33I [in VSE]) that the explicit route completed the test successfully. If the route test request is able to traverse only part of the explicit route (for example, because of an inoperative physical element or because the route was improperly defined in some node), the subarea that detects the problem notifies ACF/VTAM, which in turn tells the ACF/VTAM operator (in message IST533I or 5F33I of the route test failure. This multiple-line operator message identifies the subarea reporting the problem, the transmission group over which the route test request could not be forwarded or the transmission group over which the route test request was received, and the subarea node at the other end of this transmission group. The notification thereby isolates the problem to a specific transmission group or subarea. The subarea node that detects the route test failure also notifies all of its owning SSCPs that a route verification test failed, and identifies the subarea that originated the test. The SSCPs in turn pass this

information to their domain operators so that corrective action can be taken to make the route operative. (Note that there can thus be *two* failure notifications in a given host processor if the route test failure occurs in the domain originating the test. See the explanation of message IST533I or 5F33I in *ACF/VTAM Messages and Codes* for further details of such route test failure notifications.)

Migration Considerations: If the route being tested contains a node that does not support the route verification test (such as ACF/NCP/VS Release 2 or ACF/VTAM Release 2), the route test will fail (with the reason "MIGRATION NODE ENCOUNTERED" in message IST533I or 5F33I at that node. This does not necessarily mean that the route is unusable; it only means that the route cannot be tested beyond this particular node.

Error Recovery Procedures for Link Failures

Cross-Subarea Link Failures

Generally speaking, backup for cross-subarea link failures is best handled by the use of multiple-link transmission groups, parallel transmission groups, and multiple routes. All cross-subarea SDLC link stations can be individually activated and deactivated as needed, and therefore parallel connections to an adjacent subarea can be activated concurrently, or some can be activated in the event of failure of others. The link and link station definitions and activation procedures are the same either way.

While switched cross-subarea links are not supported directly by the NCP, a switched link can be used as a backup to a nonswitched cross-subarea link by defining the backup link as a nonswitched link and manually establishing the switched connection before the NCP's "enable timeout" expires. From this point, the link can be operated as a nonswitched link. (Such a switched link, of course, can also be run as a transmission group in parallel with nonswitched transmission groups.)

Migration Considerations: Because ACF/NCP/VS Release 2 does not support parallel transmission groups or multiple-link transmission groups, and because backup cross-subarea link stations must be explicitly defined to the NCP, backup procedures are quite different from those described above (but are the same as they were in previous releases of ACF/VTAM).

If the SDLC link connecting two communication controllers fails, and one or both controllers contain an ACF/NCP/VS Release 2, a backup link can be used to reestablish communication as follows:

1. If the original link and link station are not already inactive, deactivate them.

2. If the backup link is a switched link, manually establish the connection (as described above for NCPs not considered migration-level with respect to ACF/VTAM). The backup link is then treated as a nonswitched link.

3. Activate the backup link if it is not already active.

4. Activate the backup link station as follows:

    VARY NET,ACT,ID=original link station,RNAME=backup link station

ACF/VTAM initially accepts this command, before it can confirm that one or both of the connected NCPs is an ACF/NCP/VS Release 2. If ACF/VTAM finds, during the activation processing, that neither NCP is an ACF/NCP/VS Release 2, the command fails. A message is displayed indicating that a VARY ACT command should be entered to directly activate the backup link station (that is, the name of the backup link station should be specified for the ID operand and the RNAME operand should be omitted).

To return to the original link, deactivate the backup link and the *original* link station, and then reactivate the original link and link station.

Peripheral Link Failures

Backup of links to peripheral nodes of an NCP can be achieved by using switched links temporarily until the original links are repaired. There are two ways to do this. One way is to use a switched major node in a procedure called switched network backup. (The switched network backup procedure is not related to the switched network backup feature available on many modems.) The other way does not involve a switched major node; instead a backup switched link is defined as a nonswitched link to the NCP, and the NCP is dynamically reconfigured to move the affected physical unit from its original link to the backup link.

For switched network backup, ACF/VTAM allows the system programmer to define a physical unit and its logical units so that they can use a switched line to back up a nonswitched line. To do this, the system programmer defines the switched line in an NCP major node, and also defines the physical unit and its logical units in the NCP major node under the nonswitched line. The system programmer then defines the same logical unit names under a *different* physical unit name in a switched major node. If the physical unit and its logical units are active as part of the NCP major node and the nonswitched line fails, the ACF/VTAM operator can enter the VARY REL command for the nonswitched physical unit. This makes the logical unit names unknown to ACF/VTAM. The operator can then activate the switched major node, the backup switched line, and then the physical unit (under its backup, or switched, name) and its logical units. Later, when the nonswitched line is recovered, the operator can go back to it by deactivating the switched major node and then entering the VARY ACQ command for the nonswitched physical unit.

For example, suppose that the system programmer has defined an NCP with a peripheral physical unit named PU1 under a nonswitched line named LINE1. Suppose also that the system programmer has defined a switched major node containing the same physical unit, but *named* PU2, to be used with a switched line named LINE2, as shown in Figure 3-1.

If LINE1 fails, the operator can use the backup switched line by entering VARY NET,REL,ID=PU1 and then activating LINE2, the switched major node, and PU2 (which is just another name for PU1) and its logical units in the usual manner. If LINE1 is restored later, the operator can go back to it by deactivating the switched major node, reactivating LINE1, and then entering VARY NET,ACQ,ACT,ID=PU1,SCOPE=ALL.

The other method of peripheral link backup involves defining a switched line as a nonswitched line and manually establishing the switched connection between the NCP and the peripheral device before the NCP's "enable timeout" expires. From this point, the line is operated as a nonswitched line. The operator can
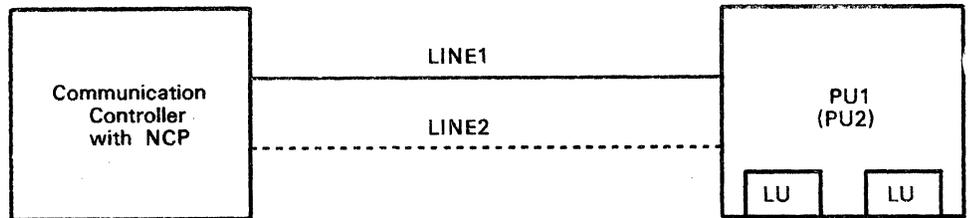
```
┌──────────────┐                LINE1              ┌──────────────────────┐
│ Communication│──────────────────────────────────│      PU1             │
│ Controller   │                LINE2              │     (PU2)            │
│ with  NCP    │- - - - - - - - - - - - - - - - - -│  ┌────┐    ┌────┐     │
│              │                                   │  │ LU │    │ LU │     │
└──────────────┘                                   └──┴────┴────┴────┴─────┘
```

Figure 3-1. Switched Network Backup

then use the dynamic reconfiguration facility to redefine the appropriate
physical units and logical units under the backup line.

Refer to the *ACF/VTAM Planning and Installation Reference* manual for an
additional discussion of this procedure.

Error Recovery Procedures for Session Setup Failures

In many cases, session setup failures are due to problems beyond the control of
the ACF/VTAM operator (such as faulty session parameters or incorrect route
definitions). However, one possible reason for a session setup failure is that
some resource required for the session (such as a path definition set, application
program, or line) has not been activated. In such cases the operator should
activate the required resource.

In a multiple-domain network, session setup for a cross-domain LU-to-LU
session might fail if the necessary SSCP-to-SSCP session and CDRSC
definitions are not active. (Note that certain CDRSC definitions can be defined
automatically, as described in Chapter 2 of this manual and in *ACF/VTAM
Planning and Installation Reference*.) Often these failures occur without
detailed messages to the terminal user that requested the session.

To aid in problem determination, ACF/VTAM informs the operator designated
to receive unsolicited messages when any of the following conditions prevent
setup of an LU-to-LU session:

• No routes are available within the requested class of service.

• The destination CDRM is not defined.

• The necessary SSCP-to-SSCP session is not active.

• A required cross-domain resource is not defined or not active.

When a session requests a route and there are no routes that are both defined
and operative within the requested class of service, or when all attempted route
activations fail, the operator is informed of the session setup failure in message
IST5211 (in OS/VS) or 5F211 (in VSE). This message indicates primary and
secondary logical units, the class of service name, and the virtual route numbers.
It also indicates the reason for the session setup failure: whether no routes
were defined, no routes were operative, or no routes were activated. These
reasons for failure are hierarchical, in that if any (but not necessarily all) routes
within the class of service are operative and defined and their activations fail,
the message reports that no routes were activated (with no indication of other
routes that might not be defined or operative). Likewise, if there are no routes

that are both operative and defined, but one or more (but not necessarily all) are defined, the message reports that no routes were operative. Only if *no* routes within the class of service are defined does the message report that no routes were defined.

The message for the non-routing-related session setup failures informs the operator of the name of the resource that prevented successful session initiation and the names of the primary and secondary logical units for which the session setup failed. The message is displayed in the domain that detected the problem. The operator at that domain can then activate the indicated resource so that the session setup can be retried.

Error Recovery Procedures for Failures in a Multiple-Domain Network

When ACF/VTAM is part of a multiple-domain network, the ACF/VTAM operator might be called upon to participate in error recovery procedures that involve other domains and other domain operators. These error recovery procedures include procedures to handle SSCP-to-SSCP session failures and SSCP-to-NCP session failures.

SSCP-to-SSCP Session Failure

A cross-domain LU-to-LU session requires the existence of a session between the SSCPs in the two domains to permit the establishment and termination of the LU-to-LU session. If the SSCP-to-SSCP session fails, the domain operators for both SSCPs receive a message informing them of the failure. Existing cross-domain sessions can continue undisturbed, but the SSCPs are unable to provide full termination services for these sessions. If the VARY TERM command is used to terminate a cross-domain session for which there is no SSCP-to-SSCP session, the TYPE=UNCOND or TYPE=FORCE operand must be specified.

To restart the SSCP-to-SSCP session, the operator of one of the affected SSCPs must activate the appropriate external CDRM minor node. It is not necessary to deactivate an external CDRM before reactivating it. Deactivation of an external CDRM, if requested, terminates all existing cross-domain sessions to the domain of the SSCP represented by that external CDRM. After the SSCP-to-SSCP session has been restarted, the VARY TERM command is again able to provide full termination services for cross-domain sessions to the domain of the other SSCP.

Migration Considerations: If a logical unit participating in a cross-domain session is attached to an ACF/NCP/VS Release 2, that session will be disruptively terminated when the SSCP-to-SSCP session is restarted. Also, if one of the SSCPs is an ACF/VTAM release prior to ACF/VTAM Release 3, an ACF/TCAM release prior to ACF/TCAM Version 2 Release 3, or an ACF/VTAME, all sessions between the two domains will be disruptively terminated when the SSCP-to-SSCP session is restarted.

SSCP-to-NCP Session Failure

In a multiple-domain network, one SSCP can be designated as a backup for another SSCP in the network. If an SSCP is so designated, the operator of that backup SSCP might need to take over the resources of an NCP that has lost its

session with another SSCP. The operator at a backup SSCP learns that an NCP has lost an SSCP either by being notified by the other SSCP's operator or as the result of receiving a "lost control point" message for the NCP from ACF/VTAM.

An ACF/VTAM operator receives a notification message from ACF/VTAM only if the SSCP is a shared owner of (that is, only if the operator has activated) the NCP whose resources are to be taken over. When an NCP loses an SSCP-to-NCP session, the NCP informs its other owning SSCPs (that is, the other SSCPs with which it has an SSCP-to-NCP session) about the lost SSCP. When ACF/VTAM receives such a notification, it displays the "lost control point" message.

Note: *Receiving a "lost control point" message for an NCP at the backup SSCP might not in itself indicate that resource takeover should be performed. The SSCP that normally owns the NCP might successfully recover from the loss of its SSCP-to-NCP session. If a message is also received at the backup SSCP indicating the SSCP-to-SSCP session with the other SSCP was lost, this could be taken as additional evidence that resource takeover is required. If there is any doubt, consult the operator of the lost SSCP.*

When an SSCP-to-NCP session fails, the SSCP can no longer provide control point services for the NCP's resources. The NCP goes through an automatic network shutdown procedure with respect to the lost SSCP and any resources activated by that SSCP. LU-to-LU sessions might be disrupted by the automatic network shutdown procedure, depending on how the NCP supports a given logical unit. As soon as a logical unit is reactivated by an SSCP, any disrupted sessions can be reinitiated.

There are a number of resource takeover strategies available in ACF/VTAM for use in the event of an NCP losing an SSCP. They are discussed in detail below, under "Resource Takeover Strategies."

Resource takeover can be accomplished without disrupting existing sessions (that is, those that survive the automatic network shutdown procedure in the NCP) of logical units being taken over if the logical units and their physical units support the SNA requests ACTPU(ERP) and ACTLU(ERP). ACF/VTAM uses these commands when activating physical units and logical units, respectively. Physical units that do not support ACTPU(ERP) break existing sessions of their subordinate logical units whenever the physical units are activated by an SSCP. Logical units that do not support ACTLU(ERP) break their existing sessions whenever the logical units are activated by an SSCP. Thus, if these SNA commands are not supported by the physical units and logical units, LU-to-LU sessions are terminated disruptively upon activation of these resources by an SSCP.

For physical and logical units that support these SNA commands, their existing LU-to-LU sessions remain active, and the existence of these sessions is reported to the SSCP taking over the physical and logical units. This SSCP might lack some information about these sessions, such as the identity of the other session partner and the session identifier. This will happen unless the backup SSCP originally participated in the establishment of a session as the owning SSCP of the other session partner. (For example, if a logical unit is in session with an application program in the domain of the SSCP taking over the logical unit, the SSCP will continue to have full information about the session.) The lack of full session information means that DISPLAY commands will provide incomplete

information about these sessions. (For example, a DISPLAY ID=logical unit name command will indicate that an active session exists but the ALLOC field will be blank, indicating that the session partner is unknown.) It also means that when using the VARY TERM command for one of these sessions, the command cannot refer to the (cross-domain) session partner that is unknown to ACF/VTAM. Specifically, the PLU, SLU, or LU operand must name the session partner within the domain of the operator entering the command. Also, the TYPE=UNCOND or TYPE=FORCE operand must be specified.

Migration Considerations: Existing sessions involving physical units and logical units attached to an ACF/NCP/VS Release 2 are disrupted when the physical units are activated, even if the physical units and logical units support the ACTPU(ERP) and ACTLU(ERP) requests.

In addition, ACF/NCP/VS Release 2 does not provide the "lost control point" notification discussed above. Notification of a lost SSCP-to-NCP session must be provided by the operator of the affected SSCP to the operator of the backup SSCP.

Shadow Resources

ACF/VTAM's shadow resource function enables an SSCP to take over ownership of an NCP's resources without the need for the operator to deactivate cross-domain resource definitions, and therefore without the need to disrupt existing cross-domain LU-to-LU sessions.

In a typical multiple-domain network, the resources to be taken over are usually already defined to the backup SSCP as cross-domain resources. A resource takeover (that is, the activation of a same-domain representation of an already-active cross-domain resource) does not result in a duplicate name situation because ACF/VTAM recognizes this situation and deals with it in the following manner.

When a logical unit and a cross-domain resource have the same name, ACF/VTAM assumes that they represent the same physical resource. When the logical unit definition is active, the resource is considered part of the SSCP's own domain, and when the cross-domain resource definition is active, the resource is considered part of another domain. While the operator might have activated both the logical unit and the cross-domain resource representations of the same resource, only one of the definitions is used at a time. ACF/VTAM decides which definition to use by examining the state of the physical unit associated with the logical unit definition:

- If the physical unit is unknown to ACF/VTAM (that is, the major node is not active, or the physical unit is not defined as owned by this ACF/VTAM and has not yet been acquired through the VARY ACQ command), the cross-domain resource definition is used.

- If the physical unit is known but inactive, and if the CDRSC minor node is active, the cross-domain resource definition is used.

- If the physical unit is known but inactive, and if the CDRSC minor node is also inactive, the logical unit definition is used.

- If the physical unit is active, the logical unit definition is used.

- If the resource is an application program or a channel-attached non-SNA terminal, the ACF/VTAM physical unit (ISTPUS), which is always active as long as ACF/VTAM is running, is considered to be the resource's physical unit. Therefore, as long as an application program or local non-SNA definition is known to ACF/VTAM (that is, as long as the major node is active), the application program or local non-SNA terminal definition is used.

When a representation of a defined resource is not being used by ACF/VTAM, it is called a *shadow* resource. The representation currently being used is called the *real* resource. Operator commands cannot be entered for a shadow resource. Because real and shadow resources have the same name, all operator commands using that name are processed for the real resource. When the representation of a resource changes from a cross-domain resource to a logical unit, existing LU-to-LU sessions for the resource are switched (nondisruptively) to the logical unit representation, along with any I/O or buffer trace activity. The sessions become same-domain sessions.

Figure 3-2 shows an example of the use of shadow resources. Suppose an application program named APPL1 is in cross-domain session with a logical unit named LU2, and that a logical unit named LU1 is in cross-domain session with an application program named APPL2. If SSCP2 fails, SSCP1 can take over the resources of the NCP that were previously owned by SSCP2, including LU2. Because SSCP1 already has an SSCP-to-NCP session with the NCP, the operator in SSCP1's domain can enter VARY ACT (for example) for LU2's physical unit (PU2), at which time the LU2 CDRSC becomes a shadow resource and the LU2 LU becomes the real resource. No deactivation of the LU2 CDRSC is required. The cross-domain session between APPL1 and LU2 becomes a same-domain session. (Note that the session becomes associated with LU2's LU definition even though LU2 might not yet have been activated as an LU. LU2's LU definition must be activated, however, before any new sessions can be started.)

The session LU1 had with APPL2 was ended when HOST2, in which APPL2 was running, failed. This application program can be started in HOST1 and a VARY ACT command can be entered to activate an application program major node containing an APPL definition for APPL2. At this point, the APPL2 CDRSC becomes a shadow resource, and the APPL2 application program becomes the real resource. No deactivation of the APPL2 CDRSC is required. After APPL2 is active and running in HOST1, the session between APPL2 and LU1 can be restarted.

Resource Takeover Strategies

As previously described, the ability of an NCP to have multiple concurrent SSCP owners provides the option of automatic "lost control point" notification to the operators of the remaining SSCPs. Ownership of an NCP arises from the existence of an SSCP-to-NCP session, which in turn results from a VARY ACT or VARY ACQ command for the NCP. Only the SSCP-to-NCP session is needed for automatic notification about a lost SSCP, so a VARY ACT command specifying SCOPE=ONLY is sufficient. (That is, no minor nodes within the NCP need to be activated.) Alternatively, NCPs need not be shared, and operators can manually notify other (backup) operators when an SSCP fails and takeover of an NCP is required.

DOMAIN1
HOST1

Before SSCP2 Fails

DOMAIN2
HOST2

Domain
Boundary

SSCP1

SSCP2

APPL1

Cross-Domain Session

LU2

PU2

LU1

APPL2

**After SSCP1 Takes Over
Resources Previously Owned
by SSCP2 and APPL2 is
started in HOST1**

HOST1

Domain
Boundary

HOST2

SSCP1

SSCP2

APPL1
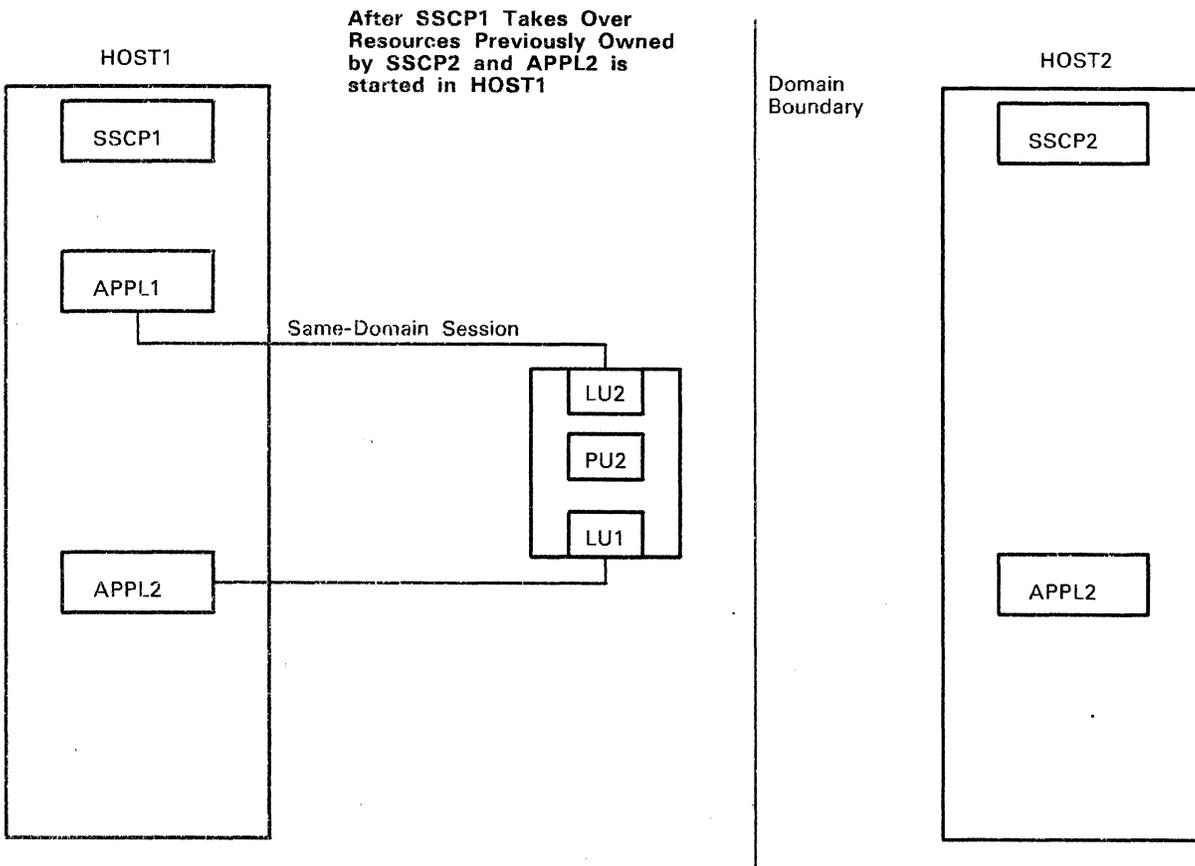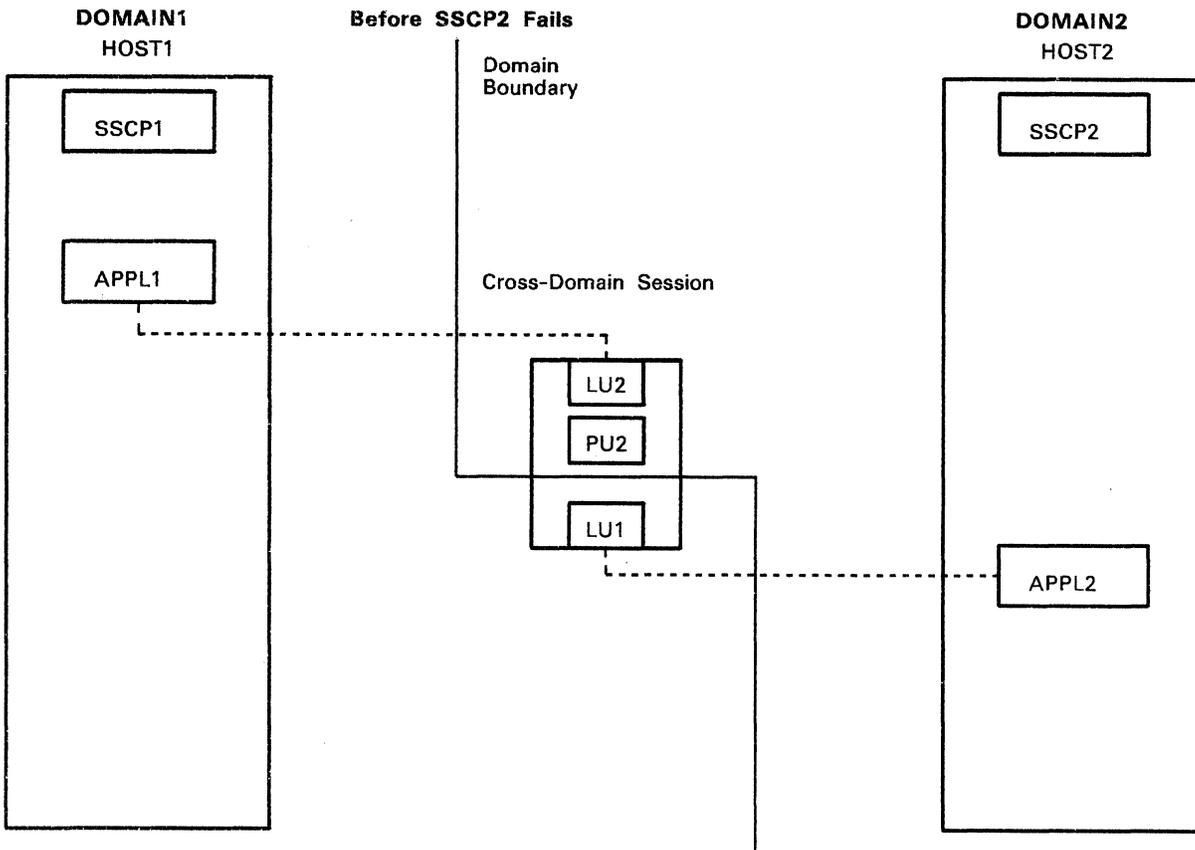
Same-Domain Session

LU2

PU2

LU1

APPL2

APPL2

Figure 3-2. Example of Using Shadow Resources

Given these two methods of notification of the loss of an SSCP by an NCP and the potential need for resource takeover by another SSCP, ACF/VTAM provides three basic methods for resource takeover (the first two of which might normally be used with either type of notification):

1. Sharing or taking over an NCP using the VARY ACT command (for a shared NCP, the NCP's resources can be divided by operational procedures)

2. Taking over a shared NCP using the VARY ACQ command (the NCP's resources can be divided by assigning ownership to an SSCP within the NCP's definition statements)

3. Taking over an SDLC-link-attached NCP using the VARY ACQ command (takeover of an entire NCP, without division of resources)

Those NCP resources that cannot be shared among more than one SSCP can be divided among the multiple owners of an NCP by operational procedures or by defining the division in the NCP definition. Resources that cannot be shared include physical units and logical units (and cross-subarea link stations in ACF/NCP/VS Release 2). Operational procedures can determine which SSCP should activate which resources. The first SSCP to request activation of a resource that cannot be shared becomes the (sole) owner; activation attempts of other SSCPs fail. Division of resources in the NCP definition involves the use of the BACKUP and OWNER operands in the resource definition statements. For more information, see *ACF/VTAM Planning and Installation Reference*.

Method 3 can also be used (subject to the restrictions mentioned in the detailed discussion of this method below) in a manner similar to Method 1 (including automatic "lost control point" notification). This might be done in order to use VARY ACQ of individual physical units as well as VARY ACT to control the contention for resources among an NCP's owners.

These three methods are discussed in detail in separate sections below. General procedures applicable to all three methods are as follows:

1. The domain operator at the backup SSCP must be notified of an SSCP-to-NCP session failure, either by the operator of the SSCP to be backed up, or by the automatic "lost control point" notification previously discussed.

2. Upon being notified of an SSCP-to-NCP session failure, the operator at the backup SSCP starts any backup application programs and makes available any backup files that might have been available in the host system of the lost SSCP.

3. The operator at the backup SSCP takes over the NCP (if the NCP is not already active in the backup domain), and then takes over the resources formerly in the domain of the lost SSCP.

4. As part of the takeover of the NCP's physical units, they must be activated. Because activation of a physical unit that does not support the SNA request ACTPU(ERP) disrupts the LU-to-LU sessions of subordinate logical units, the operator should be aware of which physical units might have logical units with sessions that would be disrupted.

   For those logical units whose sessions would be disrupted, the backup SSCP's operator might want to wait until all the sessions involving those logical units have terminated before activating the associated physical unit.

The existence of sessions with logical units can be determined by displaying, at this and other SSCPs, the status of the logical units or any application programs that might be in session with them.

5. If the NCP being taken over had been dynamically reconfigured by the lost SSCP, the VARY DRDS command is used to reconfigure the NCP in the backup domain, using the appropriate dynamic reconfiguration files. Dynamically-added resources are then activated.

6. The new domain ownership of the NCP's logical units and of any backup application programs must be provided to other SSCPs in the network. The operator at the backup SSCP tells the operators at other locations that these resources are now part of the backup SSCP's domain. These operators enter the appropriate command to inform their SSCPs of the new (backup) SSCP now responsible for the resources of the lost SSCP. In ACF/VTAM, the MODIFY CDRM command is used. Existing cross-domain sessions are unaffected by this command.

MODIFY CDRM might not be necessary to change the CDRM ownership of dynamically-defined CDRSCs. See "Changing CDRMs for Cross-Domain Resources"in Chapter 2 for details.

7. After the lost SSCP has been recovered, the domain operators at the backup SSCP and the recovered SSCP must cooperate to return the NCP's resources to their original owner. Unless a "nondisruptive return" procedure can be used, the process of returning these resources disrupts all of their existing sessions because the physical units must be deactivated in order to return them. (See "Nondisruptive Return of NCP Resources" for details of configurations and procedures for the nondisruptive return of an NCP's resources.)

The operator at the recovered SSCP can also avoid disrupting existing sessions by allowing the NCP resources to remain under the control of the backup SSCP, using the NCP's logical units as cross-domain resources. This permits the recovered SSCP's application programs to have sessions with these logical units until a convenient time is found to return the NCP's resources.

The activation of an NCP's physical units by the recovering SSCP will fail if they are still owned by the backup SSCP. If the backup SSCP has not yet deactivated an NCP's physical units, the operator at the recovering SSCP might want to ensure that these physical units are not automatically activated when ACF/VTAM is restarted and the NCP is reactivated. This can be done by not using a CONFIG list that will activate the NCPs containing the physical units, and by specifying SCOPE=ONLY on the VARY ACT command for each NCP. After the physical units have been deactivated by the backup SSCP, the recovering SSCP can resume ownership by activating them.

8. With the restoration of resource ownership to the recovered SSCP, other SSCPs in the network must again be notified of the change in ownership of the NCP's logical units and any (formerly backed-up) application programs. The operator at the recovered SSCP tells the operators at other locations that these resources are now back in the original SSCP's domain. These operators enter the appropriate command to inform their SSCPs of the new (recovered) SSCP now responsible for the resources. In ACF/VTAM, the MODIFY CDRM command is used.

MODIFY CDRM might not be necessary to change the CDRM ownership of dynamically-defined CDRSCs. See "Changing CDRMs for Cross-Domain Resources"in Chapter 2 for details.

Migration Considerations: See the migration considerations described under "SSCP-to-NCP Session Failure."

Resource Takeover in an NCP Using the VARY ACT Command

The ACF/VTAM operator can share or take over an NCP and take over the NCP's resources using the VARY ACT command.

1. To become a shared owner of an NCP in preparation for a backup role in the NCP's operation, or after receiving notification that an NCP has lost an SSCP in another domain (if the NCP is not being shared), the operator enters:

    VARY NET,ACT,ID=ncp name,SCOPE=ONLY

    If the NCP is being activated to prepare the SSCP for the role of a standby owner for backup, the SCOPE=ONLY operand achieves this NCP ownership without activating the NCP's minor nodes. If the SSCP is to control some of the NCP's resources during normal operations (that is, if the NCP's resources are to be divided by operational procedures), the resources to be controlled by the operator entering this command might be activated individually.

    If the NCP is being activated after the operator has been notified that the NCP has lost an SSCP in another domain, the SCOPE=ONLY operand ensures that none of the NCP's physical units or logical units are activated, thereby avoiding the possible disruption of existing sessions with the logical units (if their physical units do not support the ACTPU(ERP) request).

2. All of the NCP's resources may be activated at once in the backup host if the session disruption possibilities do not apply or do not matter to the installation. To activate all of the NCP's resources, the operator enters:

    VARY NET,ACT,ID=ncp name,SCOPE=ALL

    This command can be entered even if the NCP is already active. SCOPE=U can be specified instead of SCOPE=ALL to activate the NCP's resources to their defined initial status.

    If possible session disruption is a consideration, the operator can proceed with the takeover as described in the remaining steps below.

3. For any resources other than physical units and logical units (such as lines and link stations), the operator enters:

    VARY NET,ACT,ID=resource name

    The considerations for the SCOPE operand on the activation of these resources are the same as for the SCOPE operand on the activation of the NCP itself. The operator must decide whether a line, for example, that has subordinate physical and logical units with active sessions should be

activated with SCOPE=ONLY to protect the sessions. (The default value, SCOPE=COMP, has the same effect as SCOPE=ONLY *for line minor nodes*.)

4. Each physical unit is activated by entering:

> VARY NET,ACT,ID=physical unit name

This command will disrupt existing sessions with the physical unit's logical units if the physical unit does not support the ACTPU(ERP) request.

The logical units can be activated using the SCOPE operand, or they can be activated individually. These activations will disrupt existing sessions of the logical units if the logical units do not support the ACTLU(ERP) request.

Returning the NCP's Resources After Recovery: The following actions allow the original SSCP to regain its resources:

1. The operator of the recovering SSCP enters:

> VARY NET,ACT,ID=ncp name,SCOPE=ONLY

to reestablish the SSCP-to-NCP session.

2. To give up ownership of each resource that has been taken over, the backup SSCP's operator enters:

> VARY NET,INACT,ID=resource name

Recall that if the resource is a logical unit or one of its superior resources (that is, the physical unit or line), the logical unit's LU-to-LU sessions must be ended for the deactivation to complete. A stronger form of VARY INACT can be used if necessary.

Note that giving up a logical unit in the backup SSCP does not make it available to the recovering SSCP unless the physical unit is also given up.

3. The operator of the recovering SSCP takes back each of its resources by entering:

> VARY NET,ACT,ID=resource name

Alternatively, the SSCP's resources can be taken back by using a single VARY ACT command for the NCP (even if the NCP has been activated already), specifying an appropriate value of the SCOPE operand.

4. After all of the NCP's resources have been taken back by the recovering SSCP, the operator of the backup SSCP can give up ownership of the NCP itself (if the SSCP is not to continue to maintain standby ownership for future backup procedures). The operator enters:

> VARY NET,INACT,ID=ncp name,CDLINK=ACT

The CDLINK operand is optional but might be necessary to prevent disruption of sessions on cross-domain links. Refer to "Deactivating an NCP" in Chapter 2 for a full discussion of this and other possible disruptive effects of NCP deactivation.

The resources of an NCP can be explicitly divided for sharing among two or more SSCPs by using the OWNER operand on the applicable resource definition statements. In addition, the BACKUP=YES specification in the NCP definition allows a backup SSCP to take over the resources it does not normally own. Thus, for example, two SSCPs might each own half of an NCP's resources (each operator having entered VARY ACT), with each backing up the other's half. When one SSCP fails, the other takes over *all* of the resources it *does not normally own* when the operator of the backup SSCP enters a VARY ACQ command for the NCP. Another example is where one SSCP is defined as the owner of *all* of the NCP's resources, such that VARY ACT in the other (backup) SSCP merely establishes the SSCP-to-NCP session (for purposes of automatic "lost control point" notification). When the principal SSCP fails, the operator of the backup SSCP enters VARY ACQ, and in this example, takes over *all* of the NCP's resources (because none were defined with the backup SSCP as the normal owner).

Note that, as described below, this method of takeover requires individual VARY ACQ commands for each physical unit after entering VARY ACQ for the NCP as a whole. This extra step replaces the judicious use of the SCOPE=ONLY specification on VARY ACT as described in the first method of NCP takeover above, in order to avoid potential session disruption during takeover.

The ACF/VTAM operator takes over a shared NCP's resources using the following procedure.

1. After receiving notification that a shared NCP has lost an SSCP in another domain, the operator enters:

    VARY NET,ACQ,ID=ncp name

    The NCP's resources (except physical units and logical units) can be activated using the ACT and SCOPE operands, or they can be activated individually.

2. Each physical unit is taken over by entering:

    VARY NET,ACQ,ID=physical unit name

    The physical unit can be activated using the ACT operand, or it can be activated separately. As with the VARY ACT command for a physical unit, the ACT operand used with VARY ACQ of a physical unit disrupts existing sessions with the physical unit's logical units if the physical unit does not support the ACTPU(ERP) request.

    The logical units can be activated using the SCOPE operand, or they can be activated individually. These activations disrupt existing sessions of the logical units if the logical units do not support the ACTLU(ERP) request.

Returning the NCP's Resources After Recovery: The following actions allow the
original SSCP to regain its resources:

1. The operator of the recovering SSCP enters:

    VARY NET,ACT,ID=ncp name,SCOPE=ONLY

    to reestablish the SSCP-to-NCP session.

2. The backup SSCP's operator can use a single command to give up
    ownership of all of the resources that were taken over, or can give up
    ownership of each physical unit individually. To give up each physical unit
    individually, the operator enters:

    VARY NET,REL,ID=physical unit name

    As with VARY INACT, the LU-to-LU sessions of the physical unit's logical
    units must be ended for the release to complete. A stronger form of VARY
    REL can be used if necessary.

3. To give up ownership of the remaining resources that were taken over, or to
    give up ownership of all such resources if individual VARY REL commands
    were not used in the preceding step, the backup SSCP's operator enters:

    VARY NET,REL,ID=ncp name,CDLINK=ACT

    This VARY REL command does not affect any physical units that originally
    belonged to the backup SSCP.

    If CDLINK=ACT is not specified, any cross-domain links that were taken
    over are deactivated, and any sessions using the links are disrupted (unless
    the links and link stations have been activated by other SSCPs).

4. The operator of the recovering SSCP takes back each of its resources by
    entering:

    VARY NET,ACT,ID=resource name

    Alternatively, the SSCP's resources can be taken back by using a single
    VARY ACT command for the NCP (even if the NCP has been activated
    already), specifying an appropriate value of the SCOPE operand.

Resource Takeover in an SDLC-Link-Attached NCP Using the VARY ACQ Command

The ACF/VTAM operator can take over an inactive NCP attached through an
active SDLC link station in an adjacent node by using the VARY ACQ
command.

1. After receiving notification that an NCP has lost an SSCP in another
    domain, and if an active SDLC link connection is not already available in
    the backup SSCP, the ACF/VTAM operator at the backup SSCP enters:

    VARY NET,ACT,ID=link station name

where the link station name is the name of a link station associated with an SDLC link leading to the NCP that is to be taken over.

2. The ACF/VTAM operator at the backup SSCP takes over the NCP by entering:

    VARY NET,ACQ,ID=ncp name

    The NCP's resources (except physical units and logical units) can be activated using the ACT and SCOPE operands, or they can be activated individually.

3. Each physical unit is taken over by entering:

    VARY NET,ACQ,ID=physical unit name

    The physical unit can be activated using the ACT operand, or it can be activated separately. As with the VARY ACT command for a physical unit, the ACT operand used with VARY ACQ of a physical unit disrupts existing sessions with the physical unit's logical units if the physical unit does not support the ACTPU(ERP) request.

    The logical units can be activated using the SCOPE operand, or they can be activated individually. These activations disrupt existing sessions of the logical units if the logical units do not support the ACTLU(ERP) request.

Returning the NCP's Resources After Recovery: The following actions allow the original SSCP to regain its resources:

1. The operator of the recovering SSCP enters:

    VARY NET,ACT,ID=ncp name,SCOPE=ONLY

    to reestablish the SSCP-to-NCP session.

2. The backup SSCP's operator can use a single command to give up ownership of the entire NCP, or can give up ownership of each physical unit individually. To give up each physical unit individually, the operator enters:

    VARY NET,REL,ID=physical unit name

    As with VARY INACT, the LU-to-LU sessions of the physical unit's logical units must be ended for the release to complete. A stronger form of VARY REL can be used if necessary.

3. To give up ownership of the remaining resources and the NCP itself, the backup SSCP's operator enters:

    VARY NET,REL,ID=ncp name,CDLINK=ACT

    If CDLINK=ACT is not specified, active cross-domain links are deactivated, and any sessions using the links are disrupted (unless the links and link stations are shared by other SSCPs).

4. The operator of the recovering SSCP takes back each of its resources by entering:

    VARY NET,ACT,ID=resource name

    Alternatively, the SSCP's resources can be taken back by using a single VARY ACT command for the NCP (even if the NCP has been activated already), specifying an appropriate value of the SCOPE operand.

Nondisruptive Return of NCP Resources

Although, in general, the return of NCP resources to an original owner is disruptive, there are certain network configurations and procedures that make it possible for a backup SSCP to return NCP resources to their original owner without disrupting LU-to-LU sessions. Consider the configuration shown in Figure 3-3. In this example, HOST1 is dedicated to network management; that is, control of network resources is centralized in HOST1, and all application programs are in other host processors. (This is known as a communication management configuration, or CMC.) Suppose that HOST1 fails and that another host, named HOST1B, is to be used for backup. HOST1B performs resource takeover using the VARY ACT command as described in "Resource Takeover Strategies" and "Resource Takeover in an NCP Using the VARY ACT command." After HOST1 recovers, HOST1B must be withdrawn from the network to allow HOST1 to take back control of the network resources.

This can be done by having the domain operator at HOST1B deactivate the channel link 0D1-L. This deactivation breaks all routes between HOST1B and the rest of the network, causing all of the NCPs controlled by HOST1B to go through the NCP's automatic network shutdown procedure with respect to HOST1B. As with the original failure of HOST1, only those sessions that cannot survive the automatic network shutdown procedure are disrupted. HOST1 can then re-enter the network by performing a resource takeover from HOST1B, just as HOST1B did when HOST1 failed. Only LU-to-LU sessions with logical units that do not support the ACTLU(ERP) request, or with logical units subordinate to physical units that do not support the ACTPU(ERP) request, are disrupted.

The requirements for nondisruptive return of NCP resources (that is, in addition to those for nondisruptive takeover) can be summarized as follows:

- All channel links connecting the backup host to the network must be deactivated when the return of NCP resources is desired.

- The backup host must contain no application programs, so that it can be removed from the network without removing participants in LU-to-LU sessions.

If application programs are allowed to run in HOST1, and are moved into HOST1B when HOST1 fails, there must be further disruption of these application programs if the above method is used to return NCP resources to HOST1. However, the disruption will be limited to those application programs in HOST1B, as they are moved back into HOST1.
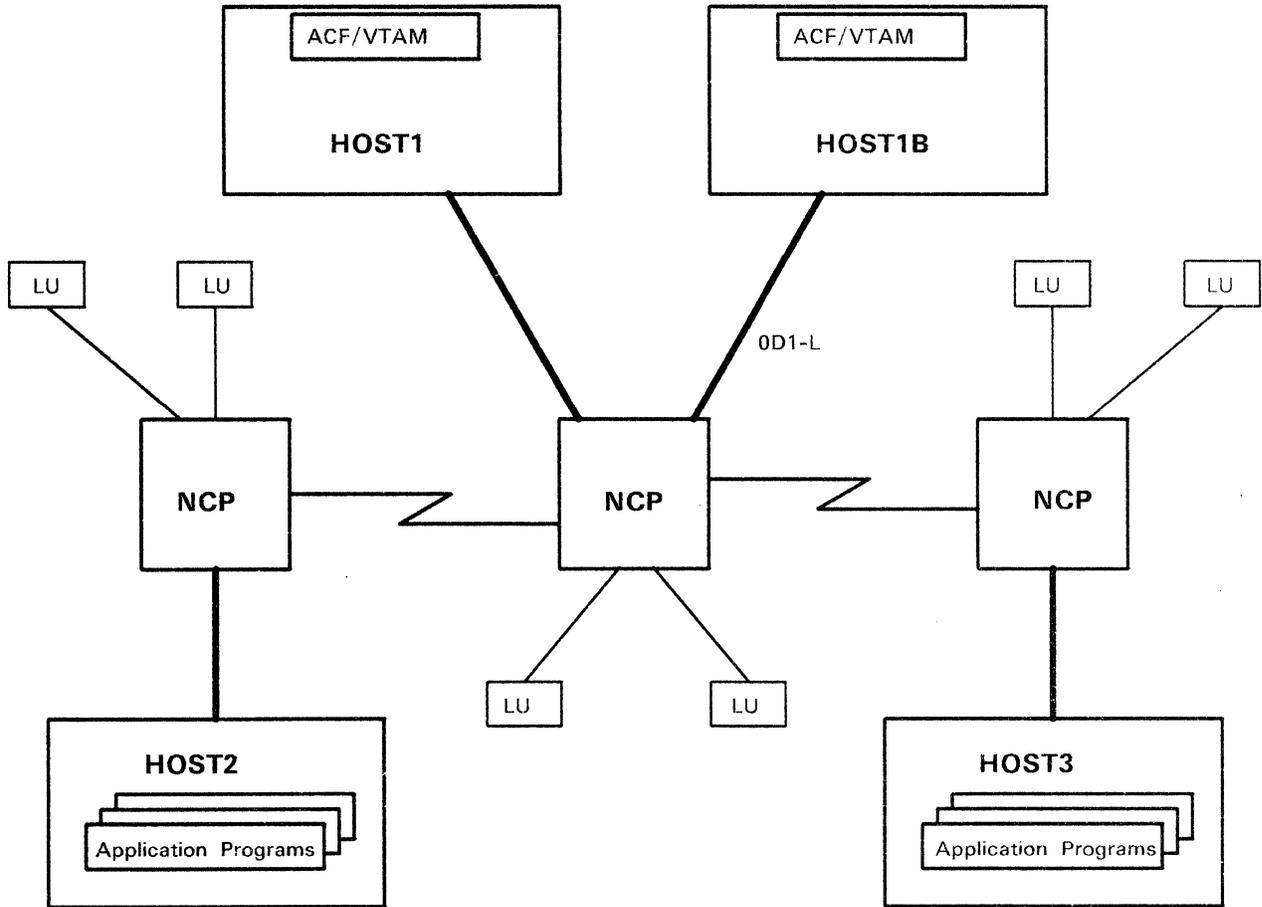
Figure 3-3. Nondisruptive Return of NCP Resources

Chapter 4. ACF/VTAM Operator Commands

This chapter is a reference section on the ACF/VTAM operator command facilities. It includes a description of the format and the applicable operands for each command. The descriptions are arranged alphabetically by command. Whenever it is appropriate, a table is given of the node types for which the command can be used. For each operand, a bullet appears in the columns of all node types for which the operand can be used.

Command Fundamentals

An ACF/VTAM operator command consists of the command name or its abbreviation and various operands that describe the operation to be performed. Each ACF/VTAM operator command has a *procedure name* that tells the operating system that the command is to be sent to ACF/VTAM for processing. The procedure name must be the first operand entered on a command. The procedure name varies according to what command is used and on the operating system.

In OS/VS2 systems, the procedure name for ACF/VTAM commands is **NET**, with the exception of the MODIFY command, which uses the name of the ACF/VTAM start procedure for the procedure name. For consistency and ease of operation, it is recommended that the ACF/VTAM start procedure be named NET.

In OS/VS1 systems, the procedure name for ACF/VTAM commands is **NET**, with the exception of the MODIFY command. For the MODIFY command, the procedure name must be in the form *procname.Pnn,* where *procname* is the name of the procedure that was used to start ACF/VTAM and *nn* is a 1- or 2-digit decimal number that indicates the partition in which ACF/VTAM is running. For example if the name of the start procedure is NET, and ACF/VTAM is running in partition number 2, then the procedure name for the MODIFY command is "NET.P02." For consistency and ease of operation, it is recommended that the ACF/VTAM start procedure be named NET.

In VSE systems, the procedure name for ACF/VTAM commands is always **NET**.

To avoid needless repetition, the NET operand is not described in every command description. However, on MODIFY commands where the procedure name is different for each operating system, each possibility is described.

Syntax Notation

Throughout this publication the formats of ACF/VTAM operator commands use the syntax notation described below. The following VARY REL command syntax is used as an example.

Operation	Operands
{VARY | V}	NET,REL,ID=name [,CDLINK=ACT | <u>INACT</u>] [,I]

Uppercase Characters

Command names or operands consisting of uppercase characters must be spelled as shown but can be entered in uppercase or lowercase. In the example, the REL operand is shown in uppercase characters because it must be entered exactly as shown.

Lowercase Characters

Lowercase characters are variables that show the *kind* of information, rather than the exact information, that must be supplied. The actual entry, usually the name of a resource, replaces the lowercase description. In the example, the "name" part of the ID operand is shown in lowercase characters because it must be replaced with the name of an NCP or a physical unit.

Underscored Values

An underscored value indicates the default value that is assumed for an operand if that operand is not specified in the command. In the example, the underscoring of INACT indicates that CDLINK=INACT is the default value for the CDLINK operand.

Braces { }

Braces are used to indicate the available options for a required specification. For example, there are two ways to specify the VARY command. Either the full command name (VARY) or its abbreviation (V) can be specified, but one of them must be specified.

Braces are never included when entering the desired option.

Square Brackets [ ]

When square brackets enclose an operand, they indicate a completely optional specification. This includes any accompanying commas or equal signs. For example, the CDLINK and I operands are optional on the VARY REL command.

Square brackets are not included when entering the specification.

Or-sign |

The or-sign is used to separate options for a single optional or required specification. If a group of options is enclosed by square brackets, and the individual options are separated by or-signs, none of the options in the group has to be chosen. If none of these operands are coded, the default value is used. Default values are always underscored.

In the example, The or-sign in CDLINK=ACT | INACT in the syntax description indicates that either CDLINK=ACT or CDLINK=INACT can be specified for the CDLINK operand. The or-sign should not be included as part of the command.

Commas and Equal Signs

Commas and equal signs must be entered as shown. When commas and equal signs appear within brackets, they are optional and are to be used only if the accompanying optional operand is used.

Entering Operator Commands

Operator commands are entered and ACF/VTAM messages are received at the system console or remote network console. Details of the formats of all the ACF/VTAM operator commands can be found later in this chapter.

Operator command input devices, particular program operator application programs (such as the Network Communications Control Facility [NCCF]), and the ACF/VTAM program operator interface impose size limitations on the length of ACF/VTAM operator commands that can be entered. Except for the prompting that ACF/VTAM provides for start options, all ACF/VTAM operator commands must be entered on a single input line from whatever input device is being used.

Valid and Invalid Commands

ACF/VTAM issues messages that tell the operators whether the commands they entered were accepted or rejected. Note that this does not indicate command completion. When a command is entered correctly, with valid operands, ACF/VTAM issues a message of acknowledgment. If an error is made in entering a command, ACF/VTAM issues one or more error messages and rejects the command.

System-Programmer-Modified Command Syntax

The system programmer can supply a modified syntax for an ACF/VTAM command if that command is defined in the IBM-supplied USS definition table ISTINCNO. If the syntax of a command has been changed, it is the responsibility of the system programmer to supply the operator with an explanation of the new command syntax. For more information , see *ACF/VTAM Planning and Installation Reference*.

DISPLAY APPLS Command

To display the status of all *active* application program major nodes in the domain and their respective application program minor nodes, enter:

Operation	Operands
{DISPLAY | D}	NET,APPLS [,ACT | EVERY | INACT]

ACT | EVERY | INACT
specifies the desired scope of the display.

ACF/VTAM treats resources in transition to or from the active state as "active" for the purposes of the display; otherwise the resources are considered to be "inactive."

ACT
specifies that the names of all active application program minor nodes within each major node are to be displayed.

ACT may be abbreviated as A.

EVERY
specifies that the name and status of all application program minor nodes within each major node are to be displayed (regardless of their status).

EVERY is the default value; it may be abbreviated as E.

INACT
specifies that the names of all inactive application program minor nodes within each major node are to be displayed.

INACT may be abbreviated as I.

The resulting ACF/VTAM display indicates:

- The name and status of each active application program major node. Inactive application program major nodes are not known to ACF/VTAM and are therefore not displayed.

- For each active application program major node, the name and status of each subordinate application program minor node (limited to active or inactive minor nodes if so requested in the DISPLAY command).

DISPLAY BFRUSE Command

To display information about ACF/VTAM buffer use, enter:

Operation	Operands
{DISPLAY	D}	NET,BFRUSE

The resulting display indicates for each ACF/VTAM buffer pool:

- The buffer pool identification.

- The existence of queued buffer requests (indicated by a Q after the buffer pool identification).

- Whether an expansion attempt has failed (indicated by an F after the buffer pool identification).

- The size (in bytes) of each buffer. (Note that for certain buffer pools, such as IOBUF in OS/VS and LFBUF in VSE, the size displayed might not match the size specified in the buffer pool start options. This occurs because ACF/VTAM increases the size of some buffers to allow for buffer headers that must be added to those buffers.)

- The number of buffers currently assigned to the pool.

- The number of buffers currently available for use.

- The maximum number of buffers ever assigned to the pool (since the last SMS trace record was written, if an SMS trace is active).

- The maximum number of buffers ever used within the pool (since the last SMS trace record was written, if an SMS trace is active).

- The number of times that the buffer pool has been expanded (since the last SMS trace record was written, if an SMS trace is active).

- The number of available buffers at or below which expansion is to occur. This field contains "N/A" (not applicable) if the dynamic buffer expansion function is not being used.

- The number of available buffers at or above which contraction is to be attempted. This field contains "N/A" (not applicable) if the dynamic buffer expansion function is not being used.

- The number of buffers to be added during each expansion. This field contains "N/A" (not applicable) if the dynamic buffer expansion function is not being used.

Note for OS/VS2 (MVS) Systems Only: ACF/VTAM's common service area (CSA) usage limit, current usage, and maximum usage are also provided in this display.

Note for VSE Systems Only: Some of the values that are normally displayed as a number of buffers are instead displayed as a number of pages for certain buffer pools. In these cases, the number is suffixed by a P. Also, for the variable-length fixed pool (VFBUF) and the variable-length pageable pool (VPBUF), dynamic buffer expansion does not apply; therefore, information applicable only to the expansion function is displayed as "N/A" (not applicable).

For more information about using ACF/VTAM buffer use data, see the *ACF/VTAM Diagnosis Guide*.

DISPLAY CDRMS Command

To display the status of all *active* cross-domain resource manager (CDRM) major nodes in your domain of a multiple-domain network, enter:

Operation	Operands
{DISPLAY | D}	NET,CDRMS [,ACT | EVERY | INACT]

ACT \| EVERY \| INACT
specifies the desired scope of the display.

ACF/VTAM treats resources in transition to or from the active state as "active" for the purposes of the display; otherwise the resources are considered to be "inactive."

ACT
specifies that information is to be displayed about all active CDRM minor nodes within each major node.

ACT may be abbreviated as A.

EVERY
specifies that information is to be displayed about all CDRM minor nodes within each major node (regardless of their status).

EVERY is the default value; it may be abbreviated as E.

INACT
specifies that information is to be displayed about all inactive CDRM minor nodes within each major node.

INACT may be abbreviated as I.

The resulting display indicates:

* The name and status of each active CDRM major node.

* For each active CDRM major node, the name, status, and subarea address of each subordinate CDRM minor node (limited to active or inactive minor nodes if so requested in the DISPLAY command).

Inactive CDRM major nodes are not known to ACF/VTAM and are therefore not displayed.

DISPLAY CDRSCS Command

To display information about all *active* cross-domain resource (CDRSC) major nodes in your domain of a multiple-domain network, enter:

Operation	Operands
{DISPLAY | D}	NET,CDRSCS [,ACT | EVERY | INACT]

ACT \| EVERY \| INACT
   specifies the desired scope of the display.

   ACF/VTAM treats resources in transition to or from the active state as "active" for the purposes of the display; otherwise the resources are considered to be "inactive."

   ACT
      specifies that information is to be displayed about all active CDRSC minor nodes within each major node.

      ACT may be abbreviated as A.

   EVERY
      specifies that information is to be displayed about all CDRSC minor nodes within each major node (regardless of their status).

      EVERY is the default value; it may be abbreviated as E.

   INACT
      specifies that information is to be displayed about all inactive CDRSC minor nodes within each major node.

      INACT may be abbreviated as I.

The resulting display indicates:

- The name and status of each active CDRSC major node in the domain. Inactive CDRSC major nodes are not known to ACF/VTAM and are therefore not displayed.

- For each CDRSC major node, the name, status, and owning CDRM of each subordinate CDRSC minor node (limited to active or inactive minor nodes if so requested in the DISPLAY command).

DISPLAY CLSTRS Command

To display the status of all physical units, and their respective major nodes, enter:

Operation	Operands
{DISPLAY | D}	NET,CLSTRS [,ACT | EVERY | INACT]

ACT \| EVERY \| INACT
> specifies the desired scope of the display.

> ACF/VTAM treats resources in transition to or from the active state as "active" for the purposes of the display; otherwise the resources are considered to be "inactive."

> **ACT**
>> specifies that information is to be displayed about all active physical units within each major node, and their respective major nodes.

>> ACT may be abbreviated as A.

> **EVERY**
>> specifies that information is to be displayed about all physical units within each major node (regardless of their status), and their respective major nodes.

>> EVERY is the default value; it may be abbreviated as E.

> **INACT**
>> specifies that information is to be displayed about all inactive physical units in the domain, and their respective major nodes.

>> INACT may be abbreviated as I.

The resulting ACF/VTAM display indicates:

- For each active major node defining physical units, the major node name and type, the names of the active physical units, inactive physical units, or every physical unit (as specified in the DISPLAY command) associated with the major node, and the status and node type for each subordinate resource listed.

- For local SNA major nodes, the channel device name for every physical unit in the local SNA major node.

DISPLAY ID Command

The DISPLAY ID command provides information about a particular major node or minor node. Optionally, additional information can be displayed about the node's subordinate resources.

To display the status of an active major node or of a minor node within an active major node, enter:

Operation	Operands
{DISPLAY | D}	NET,ID=name [,ACT | EVERY | INACT | NONE]

ID=name
specifies the name of a major node or minor node.

Notes:

1. *This command does not apply to application program major nodes.*

2. *For an application program in this domain, the ID operand can specify either the application program minor node name or the name under which the application program opened its ACB.*

3. *In general, this command applies only to active major nodes and minor nodes within active major nodes. Inactive subarea nodes (for example, NCP major nodes) that have been contacted by ACF/VTAM as a result of the activation of a cross-subarea link station can be displayed, if the name is known to ACF/VTAM. This is the case only when both the NCP being displayed and the NCP containing the link station are ACF/NCP/VS Release 3. With this one exception, inactive major nodes and their minor nodes are not known to ACF/VTAM and are therefore not displayed.*

ACT | EVERY | INACT | NONE
specifies the desired scope of the display.

The ACT, EVERY, INACT, and NONE operands specify whether information is to be provided about the specified node's subordinate resources in addition to the information about the node itself. These operands have meaning only for resources that have subordinate resources. Depending on the type of resource specified with the ID operand, different subordinate resources can be displayed as result of the ACT, EVERY, or INACT operand. The different types of subordinate resources that are displayed for each major node or minor node are listed later in this discription.

ACF/VTAM treats resources in transition to or from the active state as "active" for the purposes of the display; otherwise the resources are considered to be "inactive."

ACT
> specifies that, in addition to the name and status of the resource specified on the ID operand, the name and status of all its active subordinate resources, if any, are to be displayed.

> ACT may be abbreviated as A.

EVERY
> specifies that, in addition to the name and status of the resource specified on the ID operand, the name and status of all its subordinate resources, if any, are to be displayed (regardless of their status).

> EVERY may be abbreviated as E.

INACT
> specifies that, in addition to the name and status of the resource specified on the ID operand, the name and status of all its inactive subordinate resources, if any, are to be displayed.

> INACT may be abbreviated as I.

NONE
> tells ACF/VTAM not to display the name and status of any subordinate resources.

> NONE is the default value; it may be abbreviated as N.

The resulting display shows the name and status of the resource specified on the ID operand. In addition, if the ACT, EVERY, or INACT operand is specified, the display shows information about the node's subordinate resources. The following list shows the subordinate resources whose name and status are displayed for each major node and minor node. This display can be limited to active or inactive resources, or all resources can be displayed, depending on whether the ACT, INACT, or EVERY operand is specified.

- Major Nodes:

    - For ID=CDRM major node, its subordinate CDRMs.

    - For ID=CDRSC major node, its subordinate CDRSCs.

    - For ID=local SNA major node, its subordinate logical units and the physical units to which the logical units are subordinate.

    - For ID=local non-SNA 3270 major node, its subordinate logical units.

    - For ID=NCP major node, its subordinate lines.

    - For ID=ISTPUS, its subordinate cross-subarea links.

    - For ID=switched major node, its subordinate logical units and the physical units to which the logical units are subordinate.

- Minor Nodes:

  - For ID=application program minor node or ACB name:

    — For ACT, the established sessions with the application program.

    — For INACT, the names of logical units waiting for sessions with the application program.

    — For EVERY, the information provided for both ACT and INACT, as described above.

  - For ID=CDRSC minor node:

    — For ACT, the established sessions with the cross-domain resource.

    — For INACT, the names of logical units waiting for sessions with the cross-domain resource.

    — For EVERY, the information provided for both ACT and INACT, as described above.

  - For ID=external CDRM name, only the cross-domain resources with established sessions that are owned by the external CDRM.

  - For ID=host CDRM name, only the external CDRM session partner and session status for established sessions with the host CDRM.

  - For ID=line, either:

    — Its subordinate link stations.

    — Its subordinate logical units and the physical units to which the logical units are subordinate.

  - For ID=physical unit, its subordinate logical units.

DISPLAY LINES Command

To display the status of the lines in the domain, enter:

Operation	Operands
{DISPLAY | D}	NET,LINES [,ACT | EVERY | INACT]

ACT | EVERY | INACT
   specifies the desired scope of the display.

   ACF/VTAM treats resources in transition to or from the active state as "active" for the purposes of the display; otherwise the resources are considered to be "inactive."

   ACT
      specifies that information is to be displayed about all active lines within each major node, and their respective major nodes.

      ACT may be abbreviated as A.

   EVERY
      specifies that information is to be displayed about all lines within each major node (regardless of their status), and their respective major nodes.

      EVERY is the default value; it may be abbreviated as E.

   INACT
      specifies that information is to be displayed about all inactive lines within each major node, and their respective major nodes.

      INACT may be abbreviated as I.

For each active major node containing lines, the resulting ACF/VTAM display indicates the name and status of each line within the major node (limited to active or inactive minor nodes if so requested in the DISPLAY command).

DISPLAY MAJNODES Command

To display the status of all the active major nodes in the domain, enter:

Operation	Operands
{DISPLAY | D}	NET,MAJNODES

This command displays the status of all *active* major nodes, which includes the following major node types:

- Application program
- CDRM (in a multiple-domain network)
- CDRSC (in a multiple-domain network)
- Local SNA
- Local non-SNA 3270
- NCP (see note below)
- Switched

Note: *NCP major nodes, which are type 4 physical units, are listed in the display as PU__T4/5 major nodes. The ACF/VTAM physical unit, ISTPUS, which is a type 5 physical unit, is also listed in the display as a PU__T4/5 major node.*

The resulting display indicates the name, type, and status of each known major node.

DISPLAY NCPSTOR Command

The storage contents of a communication controller running an NCP can be dynamically displayed at the ACF/VTAM operator's console. Up to 256 (decimal) bytes from any address within the communication controller can be dynamically displayed with each DISPLAY NCPSTOR command. To display NCP storage, enter:

Operation	Operands
{DISPLAY | D}	NET,NCPSTOR,ID=ncpname,ADDR=address [,LENGTH=n | 32]

NCPSTOR
is a positional parameter and must appear immediately after NET.

ID=ncpname
specifies the name of the NCP whose storage is to be displayed.

ADDR=address
specifies the address (in decimal) of the first byte of data to be displayed.

LENGTH=n | 32
specifies the number of bytes of NCP storage to be displayed. Any decimal integer in the range 1 through 256 can be specified. If no value is specified, ACF/VTAM displays 32 bytes.

DISPLAY PATHS Command

To display dial-out path information about a switched physical unit, enter:

Operation	Operands
{DISPLAY | D}	NET,PATHS,ID=switched physical unit name

ID=switched physical unit name
specifies the name of a switched physical unit.

Note: *The PATHS operand may be abbreviated as P.*

DISPLAY PATHTAB Command

The DISPLAY PATHTAB command provides essentially the same information as the DISPLAY ROUTE command, but does so in a different format. It is provided primarily for continuity with previous releases of ACF/VTAM (although the format and contents of the output differs from that of previous releases). The command can be used to display information about all routes, or may be limited by specifying the ADJSUB or DESTSUB operands. To display the status of explicit routes and their associated virtual routes, enter:

Operation	Operands
{DISPLAY | D}	NET,PATHTAB [,ADJSUB=subarea | DESTSUB=subarea]

PATHTAB
is a positional parameter and must appear immediately after NET.

ADJSUB=subarea
specifies that only information relating to routes *passing through* the named adjacent subarea is to be displayed.

DESTSUB=subarea
specifies that only information relating to routes *going to* the named destination subarea is to be displayed.

DISPLAY PENDING Command

To display information about those nodes in the domain in a "pending" state (that is, in a transient state to or from the fully active state, or with a BIND or UNBIND outstanding), enter:

Operation	Operands
{DISPLAY	D}	NET,PENDING

The resulting ACF/VTAM display indicates the name and status of each network node in a "pending" state.

DISPLAY ROUTE Command

To display the status of explicit routes and virtual routes in the domain, enter:

Operation	Operands
{DISPLAY | D}	NET,ROUTE,DESTSUB=subarea [,COSNAME=name | ER=n | ER=ALL | VR=n] [,TEST=YES | NO]

ROUTE
is a positional parameter and must appear immediately after NET.

DESTSUB=subarea
specifies the subarea address of the destination subarea of the routes to be displayed. The origin subarea for the routes to be displayed is always the subarea of the ACF/VTAM host processor to which the DISPLAY ROUTE command is issued.

COSNAME=name | ER=n | ER=ALL | VR=n
specifies which explicit routes or virtual routes are to be displayed.

COSNAME=name
specifies a class of service name. If this operand is specified, all virtual routes to the specified destination subarea within this class of service are displayed.

If COSNAME is specified, neither the VR nor the ER operands may be specified.

ER=n
specifies the explicit route number (an integer from 0 through 7). If this operand is specified, all the explicit routes identified by this explicit route number that are known to ACF/VTAM to the specified destination subarea are displayed. An explicit route becomes known to ACF/VTAM either by having been defined at one time (through the activation of a path definition set defining the ER), or by having been operative at one time (through the receipt of an ER__OP request unit from the network).

If ER is specified, neither the COSNAME nor the VR operands may be specified.

ER=ALL
specifies that every explicit route to the specified destination subarea is to be displayed.

If ER is specified, neither the COSNAME nor the VR operands may be specified.

If none of the COSNAME, ER, or VR options are specified, ER=ALL is assumed.

VR=n
specifies the virtual route number (an integer from 0 through 7). If this operand is specified, the virtual routes identified by this virtual route number to the specified destination subarea are displayed. There can be up to three virtual routes identified by virtual route number, with one route for each of the three transmission priority levels.

If VR is specified, neither the COSNAME nor the ER operands may be specified.

TEST=YES | NO
specifies whether an explicit route test is to be performed.

TEST=YES
specifies that ACF/VTAM is to perform an explicit route test for each explicit route contained in the requested display. That is, if the VR operand is specified, the explicit route defined to be used by the specified virtual route is tested; if the COSNAME operand is specified, those explicit routes defined to be used by the virtual routes within the specified class of service are tested. The test results are sent to the operator requesting the display when they are received, but separately from the initial display results. The test results include a display number that allows the results to be correlated to the original status display.

For an explicit route to be tested, it must be known to ACF/VTAM, either by having been defined at one time (through the activation of a path definition set defining the ER), or by having been operative at one time (through the receipt of an ER__OP request unit from the network).

If a node or link along a route becomes inoperative after the ER test request unit has been sent, ACF/VTAM may never receive any test results for that explicit route.

TEST=NO
specifies that the requested route status is to be displayed, but that no explicit route test is to be performed. TEST=NO is the default value.

DISPLAY STATIONS Command

To display the status of all cross-subarea link stations within each major node or a specific major node, enter:

Operation	Operands
{DISPLAY | D}	NET,STATIONS [,ACT | EVERY | INACT] [,ID=major node name]

STATIONS
is a positional parameter and must appear immediately after NET.

ACT | EVERY | INACT
specifies the desired scope of the display.

ACF/VTAM treats resources in transition to or from the active state as "active" for the purposes of the display; otherwise the resources are considered to be "inactive."

ACT
specifies that information is to be displayed about all active link stations within each major node, and their respective major nodes.

ACT may be abbreviated as A.

EVERY
specifies that information is to be displayed about all link stations within each major node (regardless of their status), and their respective major nodes.

EVERY is the default value; it may be abbreviated as E.

INACT
specifies that information is to be displayed about all inactive link stations within each major node, and their respective major nodes.

INACT may be abbreviated as I.

ID=major node name
specifies the name of a major node. If this operand is specified, information is displayed only about the link stations within the specified major node. If this operand is omitted, information is displayed about the link stations in every active major node.

The resulting display indicates:

- The name and subarea address for each physical unit type 4 or 5 (NCP or host subarea) that has subordinate link stations.
- For each link station:

    - The name and status of the line.

    - The name and status of the link station.

    - The current transmission group number.

    - The defined transmission group number. If no specific transmission group number was defined, it is displayed as "0."

    - The name (if known) and subarea (if known) of any adjacent NCP with which the link station is currently associated.

DISPLAY TERMS Command

Note: *In a domain that has many terminals, this command might result in an undesirably large display, especially if the EVERY operand, which is the default, is used.*

To display the status of all device-type logical units (terminals) in active major nodes, enter:

Operation	Operands
{DISPLAY | D}	NET,TERMS [,ACT | EVERY | INACT]

ACT | <u>EVERY</u> | INACT
    specifies the desired scope of the display.

    ACF/VTAM treats resources in transition to or from the active state as "active" for the purposes of the display; otherwise the resources are considered to be "inactive."

ACT
    specifies that information is to be displayed about all active device-type logical units within each major node, and their respective major nodes.

    ACT may be abbreviated as A.

EVERY
    specifies that information is to be displayed about all device-type logical units within each major node (regardless of their status), and their respective major nodes.

    EVERY is the default value; it may be abbreviated as E.

INACT
    specifies that information is to be displayed about all inactive device-type logical units within each major node, and their respective major nodes.

    INACT may be abbreviated as I.

For each major node with terminals, the resulting display indicates:

- The major node name
- The line name and status (if the terminal is attached over a line)
- The name and status of the associated physical unit (if any)
- The name and status of the logical unit

Note: *Physical units and logical units in a switched major node are always listed under the switched major node and never under the NCP (and line) through which they are attached. To determine the name of this NCP major node or line, enter a DISPLAY ID=physical unit name or a DISPLAY ID=logical unit name command.*

DISPLAY U Command (MVS Only)

To display the status of a TSO user ID, enter:

Operation	Operands
{DISPLAY | D}	NET,U,ID=userid

ID=userid
specifies the TSO user ID about which information is to be displayed.

The resulting display indicates the name and status of the TSO user ID, whether the TSO trace is active for this user ID, the application program name associated with the TSO user space, and the device-type logical unit the TSO user is using.

EXEC Command (VSE Only)

In VSE systems, ACF/VTAM is started with the EXEC command. (OS/VS users should use the START command.) The EXEC command can be entered only at the system console.

Operation	Operands
EXEC	PROC=procname

PROC=procname
provides the name of the filed procedure that contains the JCL needed to start and run ACF/VTAM. Written and named by the user, this start procedure should be on the VSE system procedure library (SYSPLB). For detailed information on the JCL needed for ACF/VTAM, see the *ACF/VTAM Planning and Installation Reference* manual.

In the start option list (ATCSTR00), the system programmer can specify whether the ACF/VTAM operator is to be prompted to enter start options. If prompted, the operator can enter one or more of the options listed below:

```
CDRSCTI=n | 480
COLD | WARM
CONFIG=xx | 00 | name
HOSTSA=n | 1
IOINT=n | 180
ITLIM=n | 0
LIST=xx | 00
MAXAPPL=n | 10
MAXSUBA=n | 15
MSGMOD=YES | NO
NODELST=name
SONLIM=([m | 60][,n | 30])
SSCPID=n
SUPP=[NOSUP | INFO | WARN | NORM | SER]
⌈ TNSTAT[,CNSL | NOCNSL][,TIME=n | 60 ] ⌉
⌊ NOTNSTAT                              ⌋
TRACE | NOTRACE,TYPE=BUF,ID=nodename[,EVERY | E]
TRACE | NOTRACE,TYPE=IO,ID=nodename[,EVERY | E]
TRACE | NOTRACE,TYPE=LINE,ID=linename
TRACE | NOTRACE,TYPE=SMS,ID=VTAMBUF
⌈ TRACE,TYPE=VTAM[,MODE=INT | EXT]                   ⌉
│                [,OPTIONS=(options) | (API,MSG,PI U) │
⌊                [,SIZE=nnn | 2]                      ⌋
NOTRACE,TYPE=VTAM
USSTAB=name
VFBUF=vbsz
VPBUF=vbsz
VTAMEAS=n | 404
poolname=(baseno,bufsize,slowpt,xpanno,xpanpt)
```

Enclose the group of options in parentheses, separate the options with commas, and leave no blanks between options. If more than one line is necessary for the start options, enter a comma after the last option and ACF/VTAM will prompt for another line. The values established by the start options go into effect when ACF/VTAM is started and remain in effect until ACF/VTAM is halted. Many of the options, however, can be altered while ACF/VTAM is running.

For a description of the start options, see the *ACF/VTAM Planning and Installation Reference* manual.

HALT Command

The HALT command is used to request a normal halt of ACF/VTAM. (See also the HALT CANCEL and HALT QUICK commands.) To halt ACF/VTAM normally, enter:

Operation	Operands
{HALT | Z}	NET [,CDLINK=ACT | INACT]

CDLINK=ACT | INACT
specifies whether any active cross-domain SDLC links are to remain active after the NCPs have been deactivated. If the CDLINK operand is not specified, CDLINK=INACT is used. Therefore, if the CDLINK operand is omitted, the other domains' cross-domain sessions might be disrupted.

This option is effective only on the first HALT command. Any CDLINK specifications on subsequent HALT commands are ignored.

CDLINK=ACT
specifies that any active cross-domain SDLC links are to remain active after the NCP major nodes are deactivated, so that information being routed through the NCPs can continue to be so routed. That is, any cross-domain sessions that use the NCPs as transit nodes can continue.

CDLINK=INACT
specifies that cross-domain SDLC links are to be deactivated, along with the rest of the domain. This disrupts any sessions through these cross-domain links.

HALT CANCEL Command (OS/VS Only)

The HALT CANCEL command applies only in OS/VS. In VSE systems, similar results can be obtained by canceling the ACF/VTAM partition.

The HALT CANCEL command should be used only if the HALT and HALT QUICK commands do not work properly. This command depends only on the proper functioning of the operating system's abnormal termination facilities.

To cause the abnormal termination (ABEND) of ACF/VTAM, enter:

Operation	Operands
{HALT	Z}	NET,CANCEL

The HALT CANCEL command results in an ABEND of ACF/VTAM with a system completion code of hex 0A9. No further I/O operations are performed. Application programs using ACF/VTAM are notified of an ACF/VTAM shutdown with a TPEND exit, if possible, and data in the process of being transmitted might be lost. If TPEND cannot be scheduled, the application program is abnormally terminated. In extraordinary circumstances the operator might have to cancel some application programs.

HALT QUICK Command

The HALT QUICK command can be used to halt ACF/VTAM more quickly than with a normal HALT command. However, HALT QUICK disrupts LU-to-LU sessions, as described in Chapter 2 under "HALT amd HALT QUICK Commands" and "Deactivating Resources."

To halt ACF/VTAM in this manner, enter:

Operation	Operands
{HALT | Z}	NET,QUICK [,CDLINK=ACT | INACT]

CDLINK=ACT \| INACT

specifies whether any active cross-domain SDLC links are to remain active after the NCPs have been deactivated. If the CDLINK operand is not specified, CDLINK=INACT is used. Therefore, if the CDLINK operand is omitted, the other domains' cross-domain sessions might be disrupted.

This option is effective only on the first HALT command. Any CDLINK specifications on subsequent HALT commands are ignored.

CDLINK=ACT

specifies that any active cross-domain SDLC links are to remain active after the NCP major nodes are deactivated, so that information being routed through the NCPs can continue to be so routed. That is, any cross-domain sessions that use the NCPs as transit nodes can continue.

CDLINK=INACT

specifies that cross-domain SDLC links are to be deactivated, along with the rest of the domain. This disrupts any sessions through these cross-domain links.

MODIFY ATTACH Command (VSE Only)

In VSE systems, certain IBM programs can be run as ACF/VTAM subtasks. To determine whether a particular program can be run as a subtask, see the documentation for that program. To attach a program as an ACF/VTAM subtask, enter:

Operation	Operands
{MODIFY	F}	NET,ATTACH,ID=name

ATTACH
specifies that a program is to be attached as an ACF/VTAM subtask.

ID=name
specifies the name of the program that is to be attached as a subtask. Two or more programs can be active as ACF/VTAM subtasks at the same time, but they must be specified in separate MODIFY ATTACH commands.

MODIFY CDRM Command

The MODIFY CDRM command is used to tell ACF/VTAM which SSCP (CDRM) is the owner of a particular cross-domain resource (CDRSC) or set of CDRSCs. Ongoing sessions of CDRSCs affected by this command are not disturbed. The command changes the name of the external CDRM responsible for all future session setups with such CDRSCs.

To change the CDRM associated with a CDRSC or set of CDRSCs, enter:

Operation	Operands
{MODIFY | F}	procname,CDRM=(new cdrm[,old cdrm]) [,ID=cdrsc major node name | cdrsc minor node name]

procname
> is the procedure name for the command. The procedure name is different for each operating system:
>
> *In VSE systems,* the procedure name is NET.
>
> *In OS/VS2 (MVS) systems,* the procedure name is the name of the procedure that was used to start ACF/VTAM.
>
> *In OS/VS1 systems,* the procedure name must be in the form *procname.Pnn,* where *procname* is the name of the procedure that was used to start ACF/VTAM and *nn* is a 1- or 2-digit decimal number that indicates the partition in which ACF/VTAM is running.

CDRM=(new cdrm[,old cdrm])
> indicates the new CDRM to be associated with the CDRSCs, and, optionally, the CDRM that it replaces.
>
> **new cdrm**
> > specifies the name of the new CDRM that is to be associated with the CDRSC(s).
>
> **old cdrm**
> > specifies the CDRM that was previously associated with the CDRSC(s). If *old cdrm* is specified, only the CDRM names that match this *old cdrm* name are changed. Otherwise (if *old cdrm* is not specified), the CDRM name is changed for the specified CDRSC(s), regardless of the previous value.

ID=cdrsc major node name | cdrsc minor node name
> specifies the name of the CDRSC major or minor node for which the owning CDRM name is to be changed (if permitted by the CDRM operand). If the ID operand is omitted, the command is applied to all CDRSCs known to ACF/VTAM.

MODIFY CSALIMIT Command (MVS Only)

The size limit for ACF/VTAM's use of the OS/VS2 (MVS) common service area (CSA) can be changed dynamically by the ACF/VTAM operator.

To change the CSA limit, enter:

Operation	Operands
{MODIFY	F}	procname,CSALIMIT=(n | 0[,F])

procname
is the name of the procedure that was used to start ACF/VTAM.

CSALIMIT=(n | 0[,F])
specifies the maximum amount of CSA storage to be used by ACF/VTAM.

CSALIMIT=n
specifies ACF/VTAM's CSA use limit in units of 1024 bytes (K-bytes). That is, if CSALIMIT=4 is specified, ACF/VTAM will not use more than 4096 bytes of CSA storage. The value specified should be a multiple of 4 and is rounded up, if necessary, to the next page size multiple, which is 4 K-bytes in MVS.

Note that a request to change the CSA limit might be rejected depending on how the CSALIMIT start option was specified and on the amount of storage currently allocated to ACF/VTAM. The operator can force the change to be accepted, however, with the F operand, described below.

CSALIMIT=0
specifies that no limit on ACF/VTAM's use of CSA storage is to be enforced.

F

specifies that the value of n is to be used as the CSA use limit regardless of how the CSALIMIT start option was specified or how much CSA storage is currently allocated to ACF/VTAM. If ACF/VTAM is currently using more CSA storage than the newly-specified limit, all subsequent CSA requests by ACF/VTAM components are rejected until the CSA allocation falls below that limit.

If the F operand is not specified, a request to change the CSA limit is rejected if:

- The CSALIMIT start option was omitted or CSALIMIT=0 was specified when ACF/VTAM was started.

- The operator has specified a limit smaller than the amount of CSA storage currently allocated to ACF/VTAM.

If the F operand is specified, these restrictions do not apply.

If a CSA limit is specified that is too low and the operator forces this limit to take effect (by using the F operand), the operator will be effectively "locked out" of further ACF/VTAM command usage until the CSA usage falls below the specified limit, because CSA storage is needed to process all ACF/VTAM operator commands except HALT CANCEL. If the CSA usage does not fall below such a new level, ACF/VTAM must be canceled and restarted, with a more appropriate CSALIMIT value specified.

MODIFY DETACH Command (VSE Only)

In VSE systems, certain IBM-supplied programs can be run as ACF/VTAM subtasks. To detach a program that has been attached as an ACF/VTAM subtask, enter:

Operation	Operands
{MODIFY | F}	NET,DETACH,ID=name

DETACH

specifies that a program is to be detached as a subtask. This command can be entered during normal operation or while ACF/VTAM is halting.

ID=name

specifies the name of the program that is to be detached. If TPRINT is specified, ACF/VTAM invokes the TPRINT operator communication facility by converting the MODIFY DETACH command to a MODIFY MSG command. TPRINT can be terminated by responding CANCEL to the operator prompt.

MODIFY DUMP Command

To initiate a dump of an active NCP, enter:

Operation	Operands
{MODIFY | F}	procname,DUMP,ID=ncp name [,DUMPSTA=name] [,DYNA | RMPO]

procname
   is the procedure name for the command. The procedure name is different for each operating system:

   In VSE systems, the procedure name is NET.

   In OS/VS2 (MVS) systems, the procedure name is the name of the procedure that was used to start ACF/VTAM.

   In OS/VS1 systems, the procedure name must be in the form *procname.Pnn,* where *procname* is the name of the procedure that was used to start ACF/VTAM and *nn* is a 1- or 2-digit decimal number that indicates the partition in which ACF/VTAM is running.

DUMP
   specifies that a dump operation is to be performed.

ID=ncp name
   specifies the name of the NCP in the communication controller to be dumped.

DUMPSTA=name
   specifies the name of a link station (channel or SDLC) in a node adjacent to the NCP to be dumped, through which the dump operation is to be performed. The link station must be active at the time of the dump.

   DUMPSTA does not apply if the DYNA operand is specified.

   If the DUMPSTA operand is specified, any previous DUMPSTA specifications (from the VARY ACT command or from the NCP definition) are overridden for this one dump operation. If a null value is specified (that is, if DUMPSTA= is specified), ACF/VTAM selects an available link station, giving preference to a channel link station over any SDLC link stations.

   If the DUMPSTA operand is omitted, the current dump station name from the VARY ACT command or from the NCP definition (in that order) is used. If the current dump station name is null, ACF/VTAM selects an available link station as described above.

DYNA | RMPO

provide additional specifications for the dump. DYNA and RMPO are
mutually exclusive operands. If neither DYNA nor RMPO is specified, a
normal static (destructive) dump is taken of the NCP and the NCP is
deactivated.

DYNA

specifies that the NCP is to be dumped dynamically. That is, NCP
processing is to continue during and after the dump. The NCP is not
deactivated. The dump is taken by requesting 256 bytes at a time from
the NCP, and the resulting output will reflect the storage contents of
the communication controller over the period of time required to
complete the dump.

RMPO

specifies that the communication controller containing the NCP is to be
powered off after the NCP has been (statically) dumped and
deactivated. RMPO should be entered only for an NCP that is in a
communication controller with the remote power-off facility.

MODIFY ENCR Command (OS/VS Only)

If the Encrypt/Decrypt Feature of ACF/VTAM is installed, logical units (both application programs and device-type logical units) can be defined to have one of several cryptography specifications defining the cryptographic capabilities or requirements that are to apply to any user sessions involving the logical units, as described in the *ACF/VTAM Planning and Installation Reference* manual. To change the cryptography specifications of a logical unit, enter:

Operation	Operands
{MODIFY | F}	procname,ENCR={OPT | REQD},ID=logical unit name

procname
> is the procedure name for the command. The procedure name is different for each operating system:
>
> *In OS/VS2 (MVS) systems,* the procedure name is the name of the procedure that was used to start ACF/VTAM.
>
> *In OS/VS1 systems,* the procedure name must be in the form *procname.Pnn,* where *procname* is the name of the procedure that was used to start ACF/VTAM and *nn* is a 1- or 2-digit decimal number that indicates the partition in which ACF/VTAM is running.

ENCR={OPT \| REQD}
> specifies the new cryptography specifications of the logical unit. The level of the cryptography specification may only be raised. Any attempt to lower the level is rejected. The new level is effective for all future sessions involving the logical unit; existing active or pending sessions are not affected.
>
> **ENCR=OPT**
>> raises the level of the logical unit's cryptography specification from no cryptography to optional (capable of cryptography). ENCR=OPT essentially has no effect for an application program logical unit, because its cryptographic capability is that of the host processor.
>
> **ENCR=REQD**
>> raises the level of the logical unit's cryptography specification from no cryptography or optional (or selective, for application programs) to required (that is, all user sessions must be encrypted).

ID=logical unit name
> specifies the name of the logical unit whose cryptography specification is to be changed. The logical unit can be either an application program or a device-type logical unit.

MODIFY IMR Command

Intensive mode recording (IMR) provides detailed information concerning temporary line errors or other hardware error conditions for a station on an SDLC link. IMR can be specified for a peripheral physical unit of an NCP or for a cross-subarea link station.

To request or cancel intensive mode recording, enter:

Operation	Operands
{MODIFY | F}	procname,IMR,ID=link station or physical unit name [,OPT=<u>ACT</u> | INACT] [,RECLIM=n | <u>10</u>]

procname
    is the procedure name for the command. The procedure name is different for each operating system:

    In VSE systems, the procedure name is NET.

    In OS/VS2 (MVS) systems, the procedure name is the name of the procedure that was used to start ACF/VTAM.

    In OS/VS1 systems, the procedure name must be in the form *procname*.P*nn*, where *procname* is the name of the procedure that was used to start ACF/VTAM and *nn* is a 1- or 2-digit decimal number that indicates the partition in which ACF/VTAM is running.

IMR
    identifies an intensive mode recording request. IMR is a positional parameter and must appear immediately after the *procname* operand.

ID=link station or physical unit name
    specifies the name of the link station or physical unit for which IMR data is to be recorded.

OPT=<u>ACT</u> | INACT
    specifies whether IMR should be started or stopped for the named link station or physical unit.

    OPT=ACT
        specifies that IMR should be started for the named link station or physical unit.

        OPT=ACT is the default value.

    OPT=INACT
        specifies that ongoing intensive mode recording should be stopped, and that the NCP is not to generate any more IMR records for the named link station or physical unit.

RECLIM=n | 10
  specifies the maximum number of temporary errors that are to be recorded
  for the named link station or physical unit. When this limit is reached (or
  IMR is canceled with OPT=INACT) the NCP reverts to sending only
  permanent error records to ACF/VTAM. Any decimal integer in the range
  1 through 65535 can be specified. RECLIM is not applicable if
  OPT=INACT is specified.

  RECLIM=10 is the default value.

MODIFY IOPD Command

This command allows the operator to change the I/O problem determination time-out interval. This interval determines how long certain ACF/VTAM I/O operations or internal procedures can remain pending before ACF/VTAM reports them to the operator. The operator can then decide whether a problem exists and what action, if any, is warranted.

See *ACF/VTAM Diagnosis Guide* for guidance on setting the I/O problem determination time-out interval.

To change the I/O problem determination time-out interval, enter:

Operation	Operands
{MODIFY | F}	procname,IOPD [,IOINT=n]

procname
> is the procedure name for the command. The procedure name is different for each operating system:
>
> *In VSE systems,* the procedure name is NET.
>
> *In OS/VS2 (MVS) systems,* the procedure name is the name of the procedure that was used to start ACF/VTAM.
>
> *In OS/VS1 systems,* the procedure name must be in the form *procname.Pnn,* where *procname* is the name of the procedure that was used to start ACF/VTAM and *nn* is a 1- or 2-digit decimal number that indicates the partition in which ACF/VTAM is running.

IOPD
> indicates an I/O problem determination function request. IOPD is a positional parameter and must appear immediately after the *procname* operand.

IOINT=n
> specifies the time-out interval (in seconds) for the I/O problem determination function. Specify *n* as a decimal integer in the range of 0 through 5366000. IOINT=0 specifies that the I/O problem determination function is to be deactivated, meaning that ACF/VTAM will not notify the operator of pending I/O operations or internal procedures. If the IOINT operand is omitted, the current time-out interval remains in effect.

MODIFY LL2 Command

The MODIFY LL2 command is used to request a link level 2 test for an SDLC link attached to an NCP. The link level 2 SDLC line test is used to test a communication line between an NCP and one of its peripheral physical units, or for a link between two NCPs. The test is performed by sending test data over the link from the controlling NCP to the remote station (NCP or peripheral physical unit), which is then echoed back to the sending NCP. This NCP then compares the data received with the data sent and forwards the results to ACF/VTAM. ACF/VTAM displays a message indicating the results.

To request a link level 2 test enter:

Operation	Operands
{MODIFY | F}	procname,LL2,ID=name [,CANCEL | CONT | NTRANS=10 | m] [,DATA=data] [,NFRAMES=n | 1]

procname
> is the procedure name for the command. The procedure name is different for each operating system:
>
> *In VSE systems,* the procedure name is NET.
>
> *In OS/VS2 (MVS) systems,* the procedure name is the name of the procedure that was used to start ACF/VTAM.
>
> *In OS/VS1 systems,* the procedure name must be in the form *procname.Pnn,* where *procname* is the name of the procedure that was used to start ACF/VTAM and *nn* is a 1- or 2-digit decimal number that indicates the partition in which ACF/VTAM is running.

LL2
> indicates a request for a link level 2 test. LL2 is a positional parameter and must appear immediately after the *procname* operand.

ID=name
> specifies:
>
> - For a test of a link between two NCPs, the name of a link station on the link that is to be tested. The specified link station must be in the NCP that is to initiate the test. The link stations at each end of the link must both be inactive.
>
> - For a link between an NCP and a peripheral node, the name of a physical unit on the link that is to be tested. The specified physical unit must be inactive, but, for a multi-point link, the other physical units on the link can be active during the test.
>
> Users of ACF/NCP/VS Release 2 should refer to "Link Level 2 Test" in Chapter 2 for migration considerations.

CANCEL | CONT | <u>NTRANS=10</u> | m

    indicates either how many test messages are to be sent on the link or that a current test is to be halted. NTRANS=10 is the default value.

    CANCEL

        specifies that the currently running test should be stopped.

    CONT

        specifies that the test should run continuously until canceled by the ACF/VTAM operator.

    NTRANS=<u>10</u> | n

        indicates the number of test messages that are to be sent. Specify any decimal integer in the range 1 through 65534. (Specifying NTRANS=65535 is effectively the same as specifying CONT.)

DATA=data

    specifies optional user data to be used as part of the test message. Any EBCDIC alphabetic, numeric, or special characters (such as @ # $) can be specified. The maximum number of characters permitted depends on the characteristics of the device at the receiving end of the test. If the DATA operand is omitted, ACF/VTAM sends test messages without user data.

NFRAMES=n | <u>1</u>

    specifies (for a multipoint line) the number of test messages that are to be sent to the physical unit each time its station is selected. This option allows the test messages to be interleaved with other data going to other stations on a multipoint line. Specify any decimal integer in the range 1 through 65535. NFRAMES=1 is the default value.

MODIFY MSG Command (VSE Only)

After an IBM-supplied subsystem is attached as an ACF/VTAM subtask (see the MODIFY ATTACH command), the operator communication facility of the subtask can be invoked, if the subtask has one. This command can be used to request that an attached subtask issue a prompting message so that the ACF/VTAM operator can submit a command to the subtask.

To invoke the operator communication facility in a subtask, enter:

Operation	Operands
{MODIFY | F}	NET,MSG,ID=subtask name

MSG
> specifies that an attached subtask is to prompt the operator. MSG is a positional parameter and must appear immediately after the NET operand.

ID=subtask name
> specifies the phase name of the active subtask.

MODIFY MSGMOD Command

ACF/VTAM allows the operator to specify whether ACF/VTAM messages should contain an identifier that indicates which ACF/VTAM module originated the message. If specified, this function puts the last five characters of the name of the issuing module immediately after the message identifier.

Caution: If the addition of this identifier would cause the message text to exceed the maximum allowable message length, the message is truncated on the right, with the possible loss of information.

To specify whether ACF/VTAM messages should contain this identifier, enter:

Operation	Operands
{MODIFY	F}	procname,MSGMOD={YES	NO}

procname
    is the procedure name for the command. The procedure name is different for each operating system:

    In VSE systems, the procedure name is NET.

    In OS/VS2 (MVS) systems, the procedure name is the name of the procedure that was used to start ACF/VTAM.

    In OS/VS1 systems, the procedure name must be in the form *procname*.Pnn, where *procname* is the name of the procedure that was used to start ACF/VTAM and *nn* is a 1- or 2-digit decimal number that indicates the partition in which ACF/VTAM is running.

MSGMOD={YES | NO}
    specifies whether ACF/VTAM messages should contain an issuing-module identifier.

    MSGMOD=YES
        specifies that ACF/VTAM messages should contain an issuing-module identifier.

    MSGMOD=NO
        specifies that ACF/VTAM messages should not contain an issuing-module identifier.

MODIFY NEGPOLL Command

This command can be used to change the negative polling limit (the maximum number of consecutive negative polling responses accepted before polling another terminal on the line) in an NCP for a nonswitched, polled line to one or more attached BSC 3270 terminals.

To change the negative polling limit, enter:

Operation	Operands
{MODIFY | F}	procname,NEGPOLL=number of responses,ID=line name

procname
> is the procedure name for the command. The procedure name is different for each operating system:

> *In VSE systems,* the procedure name is NET.

> *In OS/VS2 (MVS) systems,* the procedure name is the name of the procedure that was used to start ACF/VTAM.

> *In OS/VS1 systems,* the procedure name must be in the form *procname.Pnn,* where *procname* is the name of the procedure that was used to start ACF/VTAM and *nn* is a 1- or 2-digit decimal number that indicates the partition in which ACF/VTAM is running.

NEGPOLL=number of responses
> specifies the negative polling limit as a decimal integer in the range of 1 through 255. This is the maximum number of consecutive negative polling responses accepted before polling another terminal on the line specified by the ID operand.

ID=line name
> specifies the name of a nonswitched, polled line to one or more attached BSC 3270 terminals.

MODIFY NOTNSTAT Command

See also the MODIFY TNSTAT command and the TNSTAT | NOTNSTAT start option.

To stop the recording of tuning statistics, enter:

Operation	Operands
{MODIFY	F}	procname,NOTNSTAT

procname
> is the procedure name for the command. The procedure name is different for each operating system:
>
> *In VSE systems,* the procedure name is NET.
>
> *In OS/VS2 (MVS) systems,* the procedure name is the name of the procedure that was used to start ACF/VTAM.
>
> *In OS/VS1 systems,* the procedure name must be in the form *procname.Pnn,* where *procname* is the name of the procedure that was used to start ACF/VTAM and *nn* is a 1- or 2-digit decimal number that indicates the partition in which ACF/VTAM is running.

NOTNSTAT
> specifies that the recording of tuning statistics is to be stopped.

MODIFY NOTRACE Command

See *ACF/VTAM Diagnosis Guide* for a more detailed description of the ACF/VTAM trace facilities. See also the MODIFY TRACE command and the TRACE | NOTRACE start option.

To stop an ACF/VTAM trace, enter:

Operation	Operands
{MODIFY | F}	procname,NOTRACE,TYPE={BUF | IO},ID=name [,EVERY] procname,NOTRACE,TYPE={LINE | SMS | TG | TSO} ,ID=name procname,NOTRACE,TYPE=VTAM [,OPTION=ALL | option | (option,...,option) | END]

procname
is the procedure name for the command. The procedure name is different for each operating system:

In VSE systems, the procedure name is NET.

In OS/VS2 (MVS) systems, the procedure name is the name of the procedure that was used to start ACF/VTAM.

In OS/VS1 systems, the procedure name must be in the form *procname.Pnn,* where *procname* is the name of the procedure that was used to start ACF/VTAM and *nn* is a 1- or 2-digit decimal number that indicates the partition in which ACF/VTAM is running.

NOTRACE
stops the trace specified by the TYPE operand.

TYPE={BUF | IO | LINE | SMS | TG | TSO | VTAM}
specifies the kind of trace that is to be stopped. Each trace must be stopped with a separate MODIFY NOTRACE command.

TYPE=BUF
specifies stopping the tracing of text that passes through ACF/VTAM buffers on the way to or from the node indicated by the ID operand. Optionally, the EVERY operand can be used to extend the scope of the trace to all nodes subordinate to the specified node.

TYPE=IO
specifies stopping a trace of I/O activity associated with the node indicated by the ID operand. Optionally, the EVERY operand can be used to extend the scope of the trace to all nodes subordinate to the specified node. In addition, for an NCP major node with an active channel attachment, the EVERY operand terminates any active channel I/O trace.

TYPE=LINE

　　specifies stopping an NCP line trace for the line indicated by the ID
　　operand.

Caution: Specifying TYPE=LINE stops any transmission **group trace that was**
started using the same line name.

TYPE=SMS

　　specifies stopping a storage management services (SMS) trace that is
　　recording ACF/VTAM buffer pool usage data.

TYPE=TG

　　specifies stopping an NCP transmission group trace for the transmission
　　group containing the line indicated by the ID operand.

TYPE=TSO

　　specifies stopping a TSO component trace for the user ID indicated by the
　　ID operand.

TYPE=VTAM

　　specifies stopping the ACF/VTAM internal trace for the components
　　specified by the OPTION operand. If OPTION is omitted, no internal
　　traces are stopped; rather, ACF/VTAM issues messages identifying the
　　components for which the internal trace is currently active.

ID=name

　　specifies the name of a node or TSO user ID for which there is an active
　　trace of the type specified by the TYPE operand.

EVERY

　　This operand applies only for TYPE=BUF or TYPE=IO. It specifies that
　　the traces for any nodes subordinate to the node specified are to be
　　stopped.

　　EVERY may be abbreviated as E.

OPTION=option | (option,...,option) | ALL | END

　　This operand applies only for TYPE=VTAM. It indicates the types of
　　ACF/VTAM internal traces to be stopped. OPTION may be abbreviated
　　as OPT.

　　If TYPE=VTAM is specified and OPTION is omitted, ACF/VTAM issues
　　messages identifying the components for which the internal trace is active,
　　without stopping any active traces.

　　OPTION=option | (option,...,option)
　　　　specifies the types of ACF/VTAM internal traces to be stopped.
　　　　Specify one or more of the following:

　　　　API　　Application program interface

　　　　CIO　　Channel I/O for channel-attached devices

　　　　LOCK　Locking

　　　　MSG　　Messages

　　　　PIU　　Path information units

　　　　PSS　　Process scheduling services

SMS Storage management services

SSCP System services control point

If more than one option is selected, separate them with commas and enclose the list in parentheses.

OPTION=ALL

specifies that all internal ACF/VTAM trace activity is to be stopped. It is equivalent to specifying all of the internal trace types shown above.

OPTION=END

specifies that all internal ACF/VTAM trace activity is to be stopped, and the internal trace table is to be freed (with consequent loss of existing trace data if external recording is not being used).

MODIFY POLL Command

This command can be used to change the polling delay (the time delay between polling sequences) in an NCP for a nonswitched, polled line to one or more attached BSC 3270 terminals.

To change the polling delay, enter:

Operation	Operands
{MODIFY	F}	procname,POLL=n,ID=line name

procname
    is the procedure name for the command. The procedure name is different for each operating system:

    In VSE systems, the procedure name is NET.

    In OS/VS2 (MVS) systems, the procedure name is the name of the procedure that was used to start ACF/VTAM.

    In OS/VS1 systems, the procedure name must be in the form *procname.Pnn,* where *procname* is the name of the procedure that was used to start ACF/VTAM and *nn* is a 1- or 2-digit decimal number that indicates the partition in which ACF/VTAM is running.

POLL=n
    specifies the polling delay in tenths of a second. This is the time delay between polling sequences on the line specified by the ID operand. Specify *n* as a decimal integer in the range of 0 through 255.

ID=line name
    specifies the name of a nonswitched, polled line to one or more attached BSC 3270 terminals.

MODIFY SESSION Command

This command can be used to change the session limit (the maximum number of concurrent line scheduling sessions allowed) in an NCP for a nonswitched, polled line to one or more attached BSC 3270 terminals.

Normally the limit that is set should be no greater than the maximum number of terminals on the line. This limit does not become effective until the number of sessions now in operation falls below the *new* limit.

To change the session limit, enter:

Operation	Operands
{MODIFY | F}	procname,SESSION=n,ID=line name

procname
    is the procedure name for the command. The procedure name is different for each operating system:

    In VSE systems, the procedure name is NET.

    In OS/VS2 (MVS) systems, the procedure name is the name of the procedure that was used to start ACF/VTAM.

    In OS/VS1 systems, the procedure name must be in the form *procname .Pnn,* where *procname* is the name of the procedure that was used to start ACF/VTAM and *nn* is a 1- or 2-digit decimal number that indicates the partition in which ACF/VTAM is running.

SESSION=n
    specifies the session limit as a decimal integer in the range of 1 through 255. This is the maximum number of concurrent line scheduling sessions allowed on the line specified by the ID operand.

ID=line name
    specifies the name of a nonswitched, polled line to one or more attached BSC 3270 terminals.

MODIFY SUPP Command

To change the message suppression level after ACF/VTAM has been started, enter:

Operation	Operands
{MODIFY | F}	procname,SUPP={NOSUP | INFO | WARN | NORM | SER}

procname
  is the procedure name for the command. The procedure name is different for each operating system:

  In VSE systems, the procedure name is NET.

  In OS/VS2 (MVS) systems, the procedure name is the name of the procedure that was used to start ACF/VTAM.

  In OS/VS1 systems, the procedure name must be in the form *procname.Pnn,* where *procname* is the name of the procedure that was used to start ACF/VTAM and *nn* is a 1- or 2-digit decimal number that indicates the partition in which ACF/VTAM is running.

SUPP={NOSUP | INFO | WARN | NORM | SER}
  specifies the suppression level for ACF/VTAM messages.

  SUPP=NOSUP
    specifies that no ACF/VTAM messages are to be suppressed.

  SUPP=INFO
    specifies that only those ACF/VTAM messages classified as informational messages are to be suppressed.

  SUPP=WARN
    specifies that those ACF/VTAM messages classified as warning messages, as well as informational messages, are to be suppressed.

  SUPP=NORM
    specifies that those ACF/VTAM messages classified as normal messages, as well as warning and informational messages, are to be suppressed.

  SUPP=SER
    specifies that those ACF/VTAM messages classified as serious error messages, as well as normal, warning, and informational messages, are to be suppressed.

Note that some error messages, such as those indicating abnormal termination of a task, are classified as "unsuppressible" and cannot be suppressed. Other messages that cannot be suppressed include those requiring a response from the ACF/VTAM operator (messages with a system classification of A) and those resulting from the operator's status inquiries (messages resulting from a DISPLAY command).

See the *ACF/VTAM Messages and Codes* manual for a definition of these message catagories and the classifications of specific ACF/VTAM messages.

MODIFY TEST Command

The Teleprocessing Online Test Executive Program (TOLTEP) is a component of ACF/VTAM that is used to test selected hardware in an ACF/VTAM domain. To invoke TOLTEP from the ACF/VTAM operator's console, enter:

Operation	Operands
{MODIFY | F}	procname,TEST

procname
> is the procedure name for the command. The procedure name is different for each operating system:

> *In VSE systems,* the procedure name is NET.

> *In OS/VS2 (MVS) systems,* the procedure name is the name of the procedure that was used to start ACF/VTAM.

> *In OS/VS1 systems,* the procedure name must be in the form *procname.Pnn,* where *procname* is the name of the procedure that was used to start ACF/VTAM and *nn* is a 1- or 2-digit decimal number that indicates the partition in which ACF/VTAM is running.

TEST
> specifies that TOLTEP is to be invoked for the testing of selected hardware in the domain.

Notes:

1. *Terminals should not be activated or deactivated while TOLTEP is using them.*

2. *If TOLTEP abnormally terminates prior to the termination of ACF/VTAM, ACF/VTAM automatically restarts TOLTEP.*

3. *Although TOLTEP can be invoked from the operator's console, it cannot be used to test the operator's console itself. Only selected hardware that is part of the ACF/VTAM domain can be tested by TOLTEP. See ACF/VTAM Diagnosis Guide for a list of the devices that can be tested by TOLTEP.*

MODIFY TNSTAT Command

ACF/VTAM provides a facility whereby tuning statistics can be recorded about some of ACF/VTAM's activities. These statistics can be used to adjust ACF/VTAM and NCP variables to improve performance. For more information on using tuning statistics, see the *ACF/VTAM Planning and Installation Reference* manual.

If this facility is to be used, the TNSTAT start option must have been specified when ACF/VTAM was started. Additionally, in an OS/VS system, the System Management Facility (SMF) must have been included in the system during system generation. To change or restart the recording of tuning statistics, enter:

Operation	Operands
{MODIFY | F}	procname,TNSTAT [,CNSL | NOCNSL] [,TIME=n]

procname
>   is the procedure name for the command. The procedure name is different for each operating system:

>   *In VSE systems,* theprocedure name is NET. the procedure name is NET.

>   *In OS/VS2 (MVS) systems,* the procedure name is the name of the procedure that was used to start ACF/VTAM.

>   *In OS/VS1 systems,* the procedure name must be in the form *procname.Pnn,* where *procname* is the name of the procedure that was used to start ACF/VTAM and *nn* is a 1- or 2-digit decimal number that indicates the partition in which ACF/VTAM is running.

TNSTAT
>   specifies that tuning statistics recording is to be started.

CNSL | NOCNSL
>   specifies where the tuning statistics are to be recorded.

>   **CNSL**
>>   specifies that tuning statistics records are to be sent to the system console as well as to the SMF data set (in OS/VS) or the trace file (in VSE systems).

>   **NOCNSL**
>>   specifies that tuning statistics records are to be sent only to the SMF data set (in OS/VS) or the trace file (in VSE systems). NOCNSL is the default value.

TIME=n
    specifies the number of minutes between tuning statistics recording events as a decimal integer in the range 1 through 1440. If the TIME parameter is not specified, the time value specified in the TNSTAT start option remains in effect.

MODIFY TPRINT Command (VSE Only)

The MODIFY TPRINT command attaches the trace print utility as a subtask of ACF/VTAM. When the MODIFY TPRINT command is entered to print specified trace records on the ACF/VTAM external trace file, all externally recorded tracing is suspended and does not resume until the appropriate trace records have been printed, but tracing continues internally, with possible wraparound and overlaying of trace data.

The ACF/VTAM trace facility records trace records in wraparound fashion either in main storage or in a trace file assigned to a disk or tape. If the trace file is on a disk or tape, the operator is notified when the end of the trace file is reached. When a trace file is full, or the main storage buffer (when no file is used) is full, the oldest records are overlayed by new trace records. Therefore, if trace data is being produced faster than TPRINT can print it, trace data is lost due to wraparound.

The handling of ACF/VTAM internal trace records is different from the handling of other trace records in that the trace print utility does not automatically print any internal trace records that are presently in its internal trace table. To guarantee that the ACF/VTAM internal trace records are complete (if they are being externally recorded), enter MODIFY NET,NOTRACE,TYPE=VTAM,OPT=END to terminate the trace or MODIFY NET,TRACE,TYPE=VTAM,MODE=INT,SIZE=nn to switch the recording of data to an internal trace table of size nn (see MODIFY TRACE for a full description of the SIZE operand).

To initiate trace printing, enter:

Operation	Operands
{MODIFY	F}	NET,TPRINT

This command specifies that the ACF/VTAM trace print utility is to be used. After the MODIFY TPRINT command has been entered, ACF/VTAM prompts the operator (with messages 5K07A and 5K05A) to request a snapshot print or to select print options as described below. The snapshot print does not apply to ACF/VTAM internal trace records.

A snapshot print of the contents of ACF/VTAM's main storage trace buffers containing the most recently recorded trace records can be selected without suspending trace recording. If SYS001 is assigned to a file, the operator is prompted to select either a snapshot print of ACF/VTAM's trace buffers or the full edit and print process. If ACF/VTAM is tracing with no external recording (SYS001 is unassigned), a buffer snapshot is automatically performed. A snapshot print of ACF/VTAM's internal trace buffer is not available.

Records can be printed only in the order in which they appear in the trace file.

For a trace printout, SYSLST must be assigned to a printer, tape, or disk with the name IJSYSLS. If SYS001 is assigned to a tape device, ensure that an unlabeled scratch tape is mounted and ready before entering the first MODIFY TRACE command.

The operator can cancel the trace print that was started by the MODIFY TPRINT command by entering CANCEL when ACF/VTAM issues prompting messages. The command MODIFY NET,MSG,ID=TPRINT can be entered to cause a prompting message to be issued.

The operator replies to this prompting message with one or more of the options described below as "Trace Print Options."

Trace Print Options

When ACF/VTAM prompts the operator (Message 5K05A: ENTER TPRINT OPTIONS OR 'CANCEL') to enter the TPRINT options, any combination of these options can be entered:

CANCEL
> specifies that the trace print utility is to be canceled.

PRINT
> specifies that trace records, described by the options below, are to be printed. If only PRINT is entered, all buffer contents and I/O trace records are printed.

BUF=ALL
> specifies that all buffer contents trace records are to be printed.

BUF=name[,...,name]
> specifies that the buffer contents trace records are to be printed for: VTAM, an NCP, a physical unit (including switched and channel-attached SNA physical units), a logical unit (including application programs), a channel-attached non-SNA terminal, a CDRM, or a CDRSC.

CLEAR=YES | NO
> specifies where ACF/VTAM is to resume recording information after the printing of the trace is completed. This option applies only for an online trace, which suspends tracing until the appropriate trace records have been printed.
>
> > CLEAR=YES causes the tracing to start at the beginning of the file. This causes the trace records to be overlayed by new trace records.
>
> > CLEAR=NO causes the tracing to continue after the last record recorded.
>
> > CLEAR=NO is the default value.

INTERVAL=beginning time | (,end time) | (beginning time,end time)
> specifies that only the trace records produced during a specific time interval are to be printed. Records can be requested by specifying either the time at which tracing began, the time at which tracing ended, or the time at which tracing began and ended. All trace recording and selection use Greenwich Mean Time.

Specify the time in one of the following formats:

yy.ddd/hh:mm:ss

yy.ddd

hh:mm:ss

where *yy* indicates the year, *ddd* indicates the day, *hh* indicates the hour, *mm* indicates the minute, and *ss* indicates the second.

IO=ALL
specifies that all I/O trace records are to be printed.

IO=name[,...,name]
specifies that the records tracing I/O activity are to be printed for: VTAM, an NCP, a physical unit (including switched and channel-attached SNA physical units), a logical unit (including application programs), a channel-attached non-SNA terminal, a CDRM, or a CDRSC.

LINE=ALL
specifies that all the NCP line trace records recorded while the lines were operating in network control mode are to be printed.

LINE=name
specifies that the NCP line trace records for the named line operating in network control mode are to be printed.

TNST=ALL
specifies that all tuning statistic records are to be printed.

TNST=name[,...,name]
specifies that name or names of the NCP major nodes for which the tuning statistic records are to be printed.

VIT
specifies that all ACF/VTAM internal trace records are to be printed.

The total number names specified on the BUF, IO, LINE, and TNST options for each MODIFY TPRINT command or job step must not exceed 50. (The BUF=ALL, IO=ALL, LINE=ALL, TNST=ALL options are not counted in this limit.) Commas are required between the option specifications and between the names specified for each option. If additional lines of options are to be entered, end the current line with a comma, and, when prompted (message 5K06A: ENTER ADDITIONAL OPTIONS OR 'CANCEL'), continue entering options.

MODIFY TRACE Command

The MODIFY TRACE command can be used to start traces or modify the parameters for currently running traces. Also see the description of the MODIFY NOTRACE command. (ACF/VTAM traces can also be started or stopped with the TRACE | NOTRACE start option, as described in the *ACF/VTAM Planning and Installation Reference* manual.)

For a complete description of when to use these traces and how to interpret the results, see *ACF/VTAM Diagnosis Guide*.

To start a trace, enter one of the following:

Operation	Operands
{MODIFY	F}	procname,TRACE,TYPE={BUF	IO},ID=name[,EVERY] procname,TRACE,TYPE={LINE	SMS	TG	TSO} ,ID=name procname,TRACE,TYPE=VTAM [,MODE=INT	EXT] [,OPTION=option	(option,...,option)	ALL] [,SIZE=nnn]

procname
   is the procedure name for the command. The procedure name is different for each operating system:

   In VSE systems, the procedure name is NET.

   In OS/VS2 (MVS) systems, the procedure name is the name of the procedure that was used to start ACF/VTAM.

   In OS/VS1 systems, the procedure name must be in the form *procname.Pnn,* where *procname* is the name of the procedure that was used to start ACF/VTAM and *nn* is a 1- or 2-digit decimal number that indicates the partition in which ACF/VTAM is running.

TRACE
   starts the type of trace specified by the TYPE operand.

TYPE={BUF | IO | LINE | SMS | TG | TSO | VTAM}
   specifies the kind of trace that is to be started. More than one kind of trace can be active at the same time, but each trace must be started with a separate MODIFY TRACE command.

   TYPE=BUF
      specifies starting the tracing of text that passes through ACF/VTAM buffers on the way to or from the node indicated by the ID operand. Optionally, the EVERY operand can be used to extend the scope of the trace to all nodes subordinate to the specified node. This trace is useful only when at least one of the logical units in the session is an application program in this domain.

TYPE=IO

specifies starting a trace of I/O activity associated with the node indicated by the ID operand. Optionally, the EVERY operand can be used to extend the scope of the trace to all nodes subordinate to the specified node. In addition, for an NCP major node with an active channel attachment, the EVERY operand provides a trace of all I/O going across the channel, including cross-domain session I/O.

TYPE=LINE

specifies starting an NCP line trace for the line indicated by the ID operand.

TYPE=SMS

specifies starting a storage management services (SMS) trace to record ACF/VTAM buffer pool usage data.

TYPE=TG

specifies starting an NCP transmission group trace for the transmission group containing the line indicated by the ID operand. A line is part of a transmission group only when both the line and its subordinate link station are active. A transmission group trace can be started by naming any line within the transmission group. Once a transmission group trace is started, another trace of the same transmission group cannot be requested by naming the same or another line within the transmission group in another MODIFY TRACE command.

If the line or its link station subsequently fails or is deactivated (that is, if the line is removed from the transmission group), the transmission group trace is ended, even though the transmission group continues to operate if there are any remaining lines in the transmission group. The trace can be restarted, naming another line in the transmission group.

The NCP line trace and the transmission group trace are mutually exclusive for a particular line. Therefore, when starting a transmission group trace, select a line that is not being used, and is not likely to be used, for a line trace.

TYPE=TSO

specifies starting a TSO component trace for the user ID indicated by the ID operand. GTF must be active when this trace option is specified.

TYPE=VTAM

specifies starting of the ACF/VTAM internal trace for the components specified by the OPTION operand. If OPTION is omitted, no new component internal traces are initiated; rather, ACF/VTAM issues messages identifying the components for which internal trace is currently active.

EVERY

This operand applies only for TYPE=BUF or TYPE=IO. It specifies that traces are to be started for all nodes subordinate to the specified node. Nodes for which trace does not apply are not traced.

For an I/O trace of a channel-attached NCP, the EVERY operand provides a trace of all channel I/O, including network message traffic routed through the channel-attached NCP.

EVERY may be abbreviated as E.

ID=name
> specifies the name of the resource for which tracing is to be done. Only active resources can be traced. This operand does *not* apply for TYPE=VTAM.
>
> Names of various types of resources can be specified, depending on the value of the TYPE operand.
>
> **For TYPE=BUF or TYPE=IO**
> > Any of the following names can be specified with the EVERY option to trace message activity with the named resource, if applicable, and all of the resource's subordinate nodes:
> >
> > - The name of a major node
> > - The name of a line group
> > - The name of a line
> > - The name of a physical unit (including switched and channel-attached SNA physical units)
> >
> > Any of the following names can be specified to trace message activity with the named resource:
> >
> > - VTAM (for a trace of all SSCP-FMCB sessions).
> > - The name of an NCP
> > - The name of a physical unit (including switched and channel-attached SNA physical units)
> > - The name of a logical unit (including application programs)
> > - The name of a channel-attached non-SNA terminal
> > - The name of a CDRM (only in a multiple-domain network)
> > - The name of a CDRSC (only in a multiple-domain network)
>
> **For TYPE=LINE**
> > The ID operand specifies the name of the line for which tracing is to be done.
>
> **For TYPE=SMS**
> > ID=VTAMBUF must be specified for an SMS trace.
>
> **For TYPE=TG**
> > The ID operand specifies the name of a line currently within the transmission group to be traced. All the lines in the transmission group are traced as if they were a single logical line.
>
> **For TYPE=TSO**
> > The ID operand specifies the TSO user ID for which tracing is to be done.

MODE=INT | EXT
> This operand applies only to TYPE=VTAM. It specifies whether ACF/VTAM internal trace is to record its data on an internal, wraparound table (MODE=INT) or on an external trace file (MODE=EXT).

Once the ACF/VTAM internal trace is started, the MODE operand does not have a default. If successive MODIFY commands change other options, the MODE specification remains the same until respecified on a MODIFY command. The default, MODE=INT, applies only when the internal trace is started as a start option or when a MODIFY TRACE,TYPE=VTAM command is entered to start the trace after it has been stopped.

In OS/VS systems, the generalized trace facility (GTF) USR trace must be activated before starting a trace with MODE=EXT.

In OS/VS systems, the MODE=EXT and SIZE operands are mutually exclusive.

In VSE systems, MODE=INT can be used prior to starting the TPRINT utility program to guarantee that the TPRINT output will be complete. The external file is the TRFILE to which SYS001 has been assigned. MODE=EXT significantly increases the amount of storage needed for TRFILE. It might be necessary to increase the file's disk storage or to use tape. Loss of data due to overrun conditions also can be avoided by increasing the SIZE value specified and by selecting a device that will not be slowed by channel or disk contention with other high priority functions such as paging. If there is no TRFILE (SYS001 is unassigned), the MODE=EXT operand is invalid.

OPTION=option | (option,...,option) | ALL

This operand applies only to TYPE=VTAM. It indicates the ACF/VTAM components for which the trace is to be started. OPTION may be abbreviated as OPT.

If TYPE=VTAM is specified and OPTION is omitted, ACF/VTAM issues messages identifying the components for which the internal trace is active, without stopping any active traces.

OPTION=option | (option,...,option)

specifies the ACF/VTAM components for which the internal trace is to be started. Specify one or more of the following:

API   Application program interface

CIO   Channel I/O for channel-attached devices

LOCK   Locking

MSG   Messages

PIU   Path information units

PSS   Process scheduling services

SMS   Storage management services

SSCP   System services control point

See "Traces" in Chapter 2 for operating considerations regarding traces.

If more than one option is selected, separate them with commas and enclose the list in parentheses. For information on what is traced for each component, refer to *ACF/VTAM Diagnosis Guide*.

OPTION=ALL

> specifies that the ACF/VTAM internal trace is to be started for all of the ACF/VTAM components for which the ACF/VTAM internal trace is available. It is equivalent to specifying all of the internal trace types shown above.

SIZE=nnn

This operand applies only to TYPE=VTAM. The use of this operand is different for OS/VS and VSE systems.

In OS/VS systems

> The SIZE operand can be specified only when MODE=INT is specified. The SIZE operand specifies the number of pages to be allocated for the internal trace table. Integers from 1 through 999 can be specified.

In VSE systems

> The SIZE operand has different meanings for MODE=INT and MODE=EXT.
>
> When MODE=INT is in effect, the SIZE operand specifies the number of pages to be allocated for the internal trace table. Integers from 1 through 999 can be specified.
>
> When MODE=EXT is in effect, the SIZE operand specifies the number of 2K-byte buffers to be used in writing records on the trace file. If the default value of SIZE=2 results in a loss of data (for example, because data is coming into the buffers faster than it can be written out), the operator should increase the SIZE value. When MODE=EXT is in effect, the maximum value for SIZE is 32. If the value specified is greater than that, ACF/VTAM uses SIZE=32.
>
> If the size of the trace table is changed while MODE=EXT is in effect, the current table contents are written to the trace file before the old table is freed.

Once the ACF/VTAM internal trace is started, the SIZE operand does not have a default. If successive MODIFY commands change other options, the SIZE specification remains the same until respecified on a MODIFY command. The default value, SIZE=2, applies only when the internal trace is started as a start option or when a MODIFY TRACE,TYPE=VTAM command is entered to start the trace after it has been stopped.

Caution: If MODE=INT is in effect and the SIZE value is too small, trace information might be destroyed because of wraparound in the internal trace table. In addition, if the SIZE operand specifies a size different from the current table size (specified on a previous command or start option), information will be lost because the trace table is freed when another table with a new size is obtained.

START Command (OS/VS Only)

In OS/VS systems, ACF/VTAM is started with the START command. (VSE users should use the VSE system EXEC command.) The START command can be entered only at the master or a secondary system console.

Operation	Operands
{START | S}	procname[,,,(options,...)]

procname

is the name of the filed procedure that contains the JCL needed to start and run ACF/VTAM. Written and named by the user, this procedure should be on SYS1.PROCLIB. For detailed information on the JCL needed for ACF/VTAM, see the *ACF/VTAM Planning and Installation Reference* manual.

In OS/VS1 systems, *procname* must be in the form *procname.Pnn,* where *nn* is a one- or two-digit decimal number that indicates the partition in which ACF/VTAM is to run.

options

are ACF/VTAM start options supplied by the system programmer. The ACF/VTAM operator can enter one or more of the options listed below:

```
CDRSCTI=n | 480
COLD | WARM
CONFIG=xx | 00 | name
CSALIMIT=n | 0      (MVS only)
DLRTCB=n | 8        (OS/VS1 only)
DLRTCB=n | 32       (MVS only)
HOSTSA=n | 0
IOINT=n | 180
ITLIM=n | 0
LIST=xx | 00
MAXAPPL=n | 10
MAXSUBA=n | 15
MSGMOD=YES | NO
NODELST=name
SONLIM=(m | 60,n | 30)
SSCPID=n
SUPP=NOSUP | INFO | WARN | NORM | SER
⎡TNSTAT[,CNSL | NOCNSL][,TIME=n | 60] ⎤
⎣NOTNSTAT                             ⎦
TRACE | NOTRACE,TYPE=BUF,ID=nodename[,EVERY | E]
TRACE | NOTRACE,TYPE=IO,ID=nodename[,EVERY | E]
TRACE | NOTRACE,TYPE=LINE,ID=linename
TRACE | NOTRACE,TYPE=SMS,ID=VTAMBUF
⎡TRACE,TYPE=VTAM[,MODE=INT | EXT]                      ⎤
⎢               [,OPTIONS=(options) | (API,MSG,PIU) | ALL]⎥
⎣               [,SIZE=nnn | 2]                        ⎦
  NOTRACE,TYPE=VTAM
```

USSTAB=name
VTAMEAS=n | <u>404</u>
poolname=(baseno,bufsize,slowpt,F,xpanno,xpanpt)

Precede the option list with three commas, enclose the group of options in parentheses, and separate the options with commas. Do not leave any blanks between options. If more than one line is necessary for the start options, enter a comma after the last option and ACF/VTAM will prompt for another line. The values established by the start options go into effect when ACF/VTAM is started and remain in effect until ACF/VTAM is halted. Many of the options, however, can be altered while ACF/VTAM is running.

For a description of the start options, see the *ACF/VTAM Planning and Installation Reference* manual.

VARY ACQ Command

The VARY ACQ command is used to acquire an NCP, or to acquire a physical unit attached by a nonswitched line to an NCP. An NCP or a physical unit can be acquired as part of a backup and recovery procedure in a multiple-domain network. A physical unit can also be acquired as part of a switched network backup procedure in either a single- or multiple-domain network.

The purpose of the VARY ACQ command is to:

1. Acquire ownership of NCP resources that are normally owned by another host (this kind of acquire, which requires that the Multisystem Networking Facility be installed, is performed with an NCP that has previously been activated).

2. Acquire ownership of all resources within an NCP, including the NCP itself (this kind of acquire, which requires that the Multisystem Networking Facility be installed, can be performed only with an inactive NCP attached through an active SDLC link station in an adjacent subarea node).

3. Acquire ownership of an individual physical unit and its logical units.

Acquiring resources within an NCP makes them known to ACF/VTAM until the NCP is released or deactivated; acquiring a physical unit makes it usable by the acquiring host and makes its logical units known until the physical unit is released. See Chapter 3 for descriptions of possible backup and recovery procedures using the VARY ACQ command.

The VARY ACQ command can also be entered for a physical unit when terminating a switched network backup procedure. The purpose of the VARY ACQ is to make a *nonswitched* physical units's logical units known to ACF/VTAM after a *switched* physical unit definition (representing the same physical device with a different physical unit name but with the same logical unit names) is deactivated. See Chapter 3 for a description of the switched network backup procedure.

To acquire an NCP or a physical unit, enter:

Operation	Operands

{VARY	V}	NET,ACQ,ID=name
		⌈,ACT[,LOGMODE=logon mode name]
		   [,LOGON=application program name or cdrsc name
		   [,SCOPE=ALL
			COMP	ONLY	U] ⌋

ACQ
specifies that the resource identified by the ID operand is to be acquired.

ID=name
specifies the name of the resource that is to be acquired. The resource must be either an NCP major node or a physical unit within an NCP major node.

ACT

specifies that the acquired resources should also be activated.

For an NCP major node, ACT specifies that acquired subordinate resources of the NCP should be activated, according to the value of the SCOPE operand. (The NCP itself is always activated or is already active when VARY ACQ is used.)

For a physical unit, ACT specifies that the acquired physical unit and its subordinate resources should be activated according to the value of the SCOPE operand.

The scope of the ACT command can be specified by the SCOPE operand.

The following operands apply only if ACT is specified.

LOGMODE=logon mode name

specifies the logon mode name to be used for any logon initiated for a logical unit as a result of this command (see the description of the LOGON operand). This logon mode name also becomes the logon mode name for all future automatic logons performed by ACF/VTAM, for logical units within the scope of this command, to their controlling application programs (if any).

If LOGMODE is not specified, the LOGMODE value specified in any previous command applicable to a logical unit also within the scope of this current VARY ACQ command is used. If no LOGMODE value was ever specified for a given logical unit within the scope of this command, the logical unit's default value is used.

LOGON=application program name or cdrsc name

specifies the name of an application program to which any logical units within the scope of this command are to be logged on. If the application program is in this domain, the name must be that of an application program minor node within an active application program major node. If the application program is located in another domain, the name must be that of a CSRSC minor node within an active CDRSC major node.

See also the description of the VARY LOGON command for more information on the operator-initiated logon function.

SCOPE=ALL | COMP | ONLY | U

specifies the scope of the command.

SCOPE=ALL

indicates that all of the acquired subordinate resources of the resource named in the ID operand are to be activated (regardless of their defined ISTATUS values).

SCOPE=COMP

indicates that the acquired subordinate resources of the resource named in the ID operand are to be activated in a manner comparable to the way they would be activated in ACF/VTAM Release 1 or VTAM Level 2.

SCOPE=COMP is the default value.

SCOPE=ONLY

indicates that none of the acquired subordinate resources of the resource named in the ID operand are to be activated at this time (regardless of their defined ISTATUS values); only the resource named in the ID operand is to be activated (except that, as explained under the ACT operand, an NCP name specified in the ID operand is always activated or is already active, regardless of the ACT and SCOPE operands).

SCOPE=U

indicates that the acquired subordinate resources of the resource named in the ID operand are to be activated according to their defined ISTATUS values.

VARY ACT Command

The VARY ACT command is used to activate ACF/VTAM resources. The different resource types that can be activated are specified in the table below.

Operation	Operands
{VARY | V}	NET,ACT,ID=name [,ANS=ON | OFF] [,DUMPSTA=name] [,LOAD=YES | NO | U] [,LOADSTA=name] [,LOGMODE=logon mode name] [,LOGON=application program name or cdrsc name] [,RNAME=name | (name1,...,name13)] [,SCOPE=ALL | COMP | ONLY | U] [,U=channel device name] [,WARM]

The following table indicates each resource type for which the command is valid and which operands can be used on the command. A bullet (•) indicates that the operand applies to that resource and an S indicates that the operand can be specified for sifting to subordinate resources. An M indicates that the operand applies to that resource only in certain migration cases.

V NET,ACT,

	Application Program Minor Node	Application Program Major Node	Local SNA Major Node	Local SNA Physical Unit	Local SNA Logical Unit	Local Non-SNA Major Node	Local Non-SNA Minor Node	NCP	Nonswitched Line	Switched Line	Link Station	Physical Unit	Logical Unit	Switched Major Node	Switched Physical Unit	Switched Logical Unit	Path Definition Set	CDRM Major Node	CDRM Minor Node	CDRSC Major Node	CDRSC Minor Node
ID=	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
ANS=									•												
DUMPSTA=								•													
LOAD=								•													
LOADSTA=								•													
LOGMODE=		S	S	•	S	•	S	S	S	S	S	•	S	S	•						
LOGON=		S	S	•	S	•	S	S	S	S	S	•	S	S	•						
RNAME=								•			M										
SCOPE=	•		•	•	•	•		•	•	•		•		•	•			•		•	
U=				•				•													
WARM=			•			•		•						•				•		•	

ACT

specifies that the named resource is to be activated.

ID=name

specifies the name of the resource to be activated. If the name specifies a resource that has subordinate resources (for example, the logical units subordinate to a physical unit), the subordinate resources might also be activated, depending on the specification of the SCOPE or WARM operand (these operands are described later in this chapter).

ANS=ON | OFF

specifies whether a switched SDLC line is to be put in answer mode.

ANS=ON

specifies that a switched SDLC line is to be put in answer mode. When the line is in answer mode (and active), the NCP answers incoming calls from dial-in devices and notifies ACF/VTAM of the calls so that sessions can be established.

ANS=OFF

specifies that a switched SDLC line is to be taken out of answer mode. If there is an existing session for the line, ANS=OFF does not break the session, but no further calls are accepted after the session ends.

DUMPSTA=name

applies only to the first activation of an NCP. (That is, DUMPSTA does not apply if the NCP is already active or is in the process of being activated.)

DUMPSTA specifies the name of a link station in an adjacent subarea node through which any later static dump operations for this NCP are to be carried out. The link station can be either a channel link station or an SDLC link station. The name specified for DUMPSTA should also be specified in the channel device name or RNAME specifications for this NCP, either in the NCP definition or in this VARY ACT command.

The DUMPSTA operand, if specified, overrides any NCP definition value of DUMPSTA. If DUMPSTA is specified neither in the NCP definition nor in this command, ACF/VTAM selects (at the time of each dump operation) an available adjacent link station, giving preference to a channel link station. Similarly, if DUMPSTA is specified without a value (that is, if DUMPSTA= is specified), DUMPSTA assumes a null value and ACF/VTAM selects an available adjacent link station as previously described.

LOAD=YES | NO | U

applies only to the first activation of an NCP. (That is, LOAD does not apply if the NCP is already active or is in the process of being activated.)

LOAD specifies whether the communication controller associated with the specified NCP is to be reloaded with the appropriate NCP load module. A communication controller is "associated with" an NCP for the purposes of this command if any of the following conditions are met:

* It is already known to contain the named NCP.

- It is attached through one or more of the adjacent link stations identified by the NCP's channel device name or RNAME specifications, or both.

- It is attached through the adjacent link station identified by the LOADSTA specification for the NCP.

LOAD=YES

specifies that the communication controller associated with the specified NCP is to be unconditionally loaded, regardless of the current state or contents of the communication controller.

LOAD=NO

specifies that the communication controller associated with the specified NCP is not to be loaded during the processing of this VARY ACT command, regardless of the current state or contents of the communication controller. (The communication controller is still subject to possible reload operations during error recovery procedures subsequent to the activation of the NCP.) If the communication controller does not contain the expected NCP load module, the VARY ACT command fails.

LOAD=U

specifies that ACF/VTAM is to determine whether the communication controller associated with the specified NCP is to be loaded during the processing of this VARY ACT command (based on the current contents of the communication controller and on the NCP definition statements), as it did before the availablity of the LOAD operand.

LOAD=U is the default value.

LOADSTA=name

applies only to the first activation of an NCP. (That is, LOADSTA does not apply if the NCP is already active or is in the process of being activated.)

LOADSTA specifies the name of a link station in an adjacent subarea node through which any load operations for this NCP are to be carried out. The link station can be either a channel link station or an SDLC link station. The name specified for LOADSTA should also be specified in the channel device name or RNAME specifications for this NCP, either in the NCP definition or in this VARY ACT command.

The LOADSTA operand, if specified, overrides any NCP definition value of LOADSTA. If LOADSTA is specified neither in the NCP definition nor in this command, ACF/VTAM selects (at the time of each reload operation) an available adjacent link station, giving preference to a channel link station. Similarly, if LOADSTA is specified without a value (that is, if LOADSTA= is specified), LOADSTA assumes a null value and ACF/VTAM selects an available adjacent link station as previously described.

LOGMODE=logon mode name

specifies the logon mode name to be used for any logon initiated for a logical unit as a result of this command (see the description of the LOGON operand). This logon mode name also becomes the logon mode name for all future automatic logons performed by ACF/VTAM, for logical units within the scope of this command, to their controlling application programs (if any).

If LOGMODE is not specified, the LOGMODE value specified in any previous command applicable to a logical unit also within the scope of this VARY ACT command is used. If no LOGMODE value was ever specified for a given logical unit within the scope of this command, the logical unit's default value is used

LOGON=application program name or cdrsc name
specifies the name of an application program to which any logical units within the scope of this command are to be logged on. If the application program is in this domain, the name must be that of an application program minor node within an active application program major node. If the application program is located in another domain, the name must be that of a CSRSC minor node within an active CDRSC major node.

See also the description of the VARY LOGON command for more information on the operator-initiated logon function.

RNAME=name | (name1,...,name13)
applies either to the activation of an NCP or, in certain migration cases, to the activation of a link station. For information on using RNAME when activating a link station, see the migration considerations described in "Cross-Subarea Link Failures" in Chapter 3.

For an NCP, the RNAME operand is described in the following paragraphs and applies only to the first activation of the NCP. (That is, RNAME does not apply if the NCP is already active or is in the process of being activated.)

RNAME specifies the names of up to 13 SDLC link stations in adjacent subarea nodes through which the specified NCP is attached to the network. It also specifies which SDLC link stations (and associated links) in adjacent subarea nodes are to be automatically activated as part of the activation of the specified NCP. Therefore, these RNAME values identify the location of the communication controller in the network and allow ACF/VTAM to establish the necessary connectivity to the specified NCP (if such connectivity does not already exist).

If more than one link station name is specified, the names must be enclosed in parentheses and separated by commas.

The RNAME operand, if specified, overrides any NCP definition RNAME values or the checkpointed RNAME values for the specified NCP. If RNAME values are specified on this command, ACF/VTAM uses those values to determine the link stations to be used. If the RNAME operand is not specified in this command, ACF/VTAM uses the checkpointed RNAME values for the specified NCP (if the WARM operand is specified). If neither the RNAME nor the WARM operands are specified, ACF/VTAM use the NCP definition values for RNAME, if any. If RNAME is not specified in the NCP definition, RNAME assumes a null value, and no SDLC link stations are automatically activated. If the RNAME operand is specified without a value (that is, RNAME= is specified), RNAME assumes a null value.

If both the RNAME and the channel device name specifications have null values, no automatic link station activations are performed, and there must be link stations already active in adjacent subarea nodes to provide the required connectivity. If this is not the case, the VARY ACT command fails.

SCOPE=ALL | COMP | ONLY | U
specifies the scope of the command.

WARM and SCOPE cannot be specified on the same command. If both are specified, the command fails.

If the SCOPE operand is used, any values for the checkpointed parameters for this resource are ignored and erased.

SCOPE=ALL
indicates that the resource named in the ID operand and all of the appropriate subordinate resources are to be activated (regardless of their defined ISTATUS values).

SCOPE=COMP
indicates that the resource named in the ID operand and the appropriate subordinate resources are to be activated in a manner comparable to the way they would be activated in ACF/VTAM Release 1 or VTAM Level 2.

SCOPE=COMP is the default value.

SCOPE=ONLY
indicates that only the resource named in the ID operand is to be activated; none of its subordinate resources are to be activated at this time (regardless of their defined ISTATUS values).

SCOPE=U
indicates that the resource named in the ID operand and all of the appropriate subordinate resources defined with ISTATUS=ACTIVE are to be activated.

U=device name
applies only to the first activation of a channel-attached NCP or SNA physical unit. (That is, the U operand does not apply to an NCP or physical unit that is already active or is in the process of being activated.)

The U operand specifies the channel device name by which a channel attachment to a communication controller or SNA physical unit is known to the operating system and through which ACF/VTAM is to establish connectivity to the specified NCP or physical unit. A channel device name must be supplied for a channel-attached physical unit because the physical unit can communicate only through the channel. A channel device name is optional for an NCP because an NCP can also communicate across SDLC links.

For an SNA Physical Unit
The U operand, if specified, overrides any previous channel device name specifications for the physical unit, including the CUADDR operand on the PU definition statement and any specification maintained by configuration restart.

If the U operand is omitted and there is no current channel device name specification for the physical unit, the VARY ACT command fails. The VARY ACT command also fails if the U operand is specified without a value (that is, if U= is specified).

For an NCP

The U operand, if specified, overrides any NCP definition CUADDR values or the checkpointed channel device name values for the specified NCP. If a U value is specified on this command, ACF/VTAM uses the value to determine the link station to be used. If the U operand is not specified in this command, ACF/VTAM uses the checkpointed channel device name values for the specified NCP (if the WARM operand is specified). If neither the U nor the WARM operands are specified, ACF/VTAM use the NCP definition value for CUADDR, if any. If CUADDR is not specified in the NCP definition, the channel device name specification assumes a null value, and no channel link station is automatically activated. If the U operand is specified without a value (that is, if U= is specified), the channel device name specification assumes a null value.

If both the RNAME and the channel device name specifications have null values, no automatic link station activations are performed, and there must be link stations already active in adjacent subarea nodes to provide the required connectivity. If this is not the case, the VARY ACT command fails.

WARM

applies only to major nodes (except application program major nodes) and specifies that the major node specified in the ID operand is to be activated to the status it had when it was last active. That is, those minor nodes that were active the last time the major node was active are reactivated, and other operator-modified values applicable to the major node or its minor nodes (such as controller application name and logmode name for a logical unit) are restored. By recording changes in a configuration restart file, ACF/VTAM keeps track of the status of the minor nodes as well operator changes to other checkpointed parameters. For a list of the checkpointed parameters for each major node and for a general description of the configuration restart facility, see the *ACF/VTAM Planning and Installation Reference* manual.

The WARM parameter is invalid and the VARY ACT command fails in the following circumstances:

- WARM and SCOPE are specified on the same command.

- WARM is specified for a major node that is already active.

- WARM is specified when activating a major node that has no associated VSAM configuration restart file or whose configuration restart file has not been used (that is, contains no checkpointed information).

VARY ANS Command

Active switched SDLC lines with dial-in capability can allow or disallow an incoming call from a physical unit defined in a switched major node. For an incoming call to be allowed, an active line must be in answer mode.

The mode setting can be specified in the definition statement for the line and can be changed whenever the line is active by using this command. The mode setting of a line can also be specified when the line is activated (see the description of the ANS operand on the VARY ACT command).

The VARY ANS command is most often used for lines with both dial-in and dial-out capability. To ensure that a line is available for dial-out requests, it can be taken out of answer mode while it is still active. Incoming calls are blocked, but outgoing calls proceed normally.

To change the mode setting, enter:

Operation	Operands
{VARY | V}	NET,ANS={ON | OFF},ID=line name [,ACT]

ANS=ON | OFF
> specifies whether the line is to be put in answer mode.

> **ANS=ON**
>> specifies that the line is to be put in answer mode. When a line is in answer mode (and active), the answering subarea node accepts an incoming call from a dial-in device and notifies ACF/VTAM of the call so that sessions can be established.

> **ANS=OFF**
>> specifies that the line is to be taken out of answer mode. If there is an existing session using the line, ANS=OFF does not break the session, but no further incoming calls are accepted after the session ends.

ID=line name
> specifies the name of an SDLC line. The line must be a switched line with dial-in capability. The line must also be active, unless the ACT operand is also specified on this command.

ACT
> specifies that the line is to be activated as well as have its answer mode setting changed. If ACT is not specified, the line must be active before the VARY ANS command is entered.

VARY DRDS Command

If the physical configuration of a communication controller is changed (for example, a physical unit is moved from one line to another), the NCP residing in the communication controller can be reconfigured without having to generate a new NCP. A previously-filed set of statements called a *dynamic reconfiguration (DR)* file must be available before the NCP can be reconfigured. For information on creating a DR file, see the *ACF/VTAM Planning and Installation Reference* manual.

To dynamically reconfigure an NCP, the NCP must be active. Any logical units in the existing configuration that are to be affected by the reconfiguration must be inactive. The physical units to which these logical units are subordinate must also be inactive.

Those minor nodes which are dynamically added to an NCP configuration as a result of this command are also activated if the DR definition file defines their initial status as "active."

To dynamically reconfigure an NCP, enter:

Operation	Operands
{VARY | V}	NET,DRDS,ID=drname

DRDS
specifies that an NCP major node is to be dynamically reconfigured.

ID=drname
specifies the name of a dynamic reconfiguration file.

VARY INACT Command

The VARY INACT command is used to deactivate ACF/VTAM resources. The different resource types that can be deactivated are specified in the table below.

Caution: TSO/VTAM users should never use this command to deactivate a TSO user address space application name while TSO/VTAM is operating.

Operation	Operands
{VARY | V}	NET,INACT,ID=name [,CDLINK=ACT | <u>INACT</u>] [,FINAL] [,I | F | R] [,RMPO]

The following table indicates each resource type for which the command is valid and which operands can be used on the command. A bullet (•) indicates that the operand applies to that resource. An I, F, or R in the table indicates what value is subsituted if an F or R operand is specified for a resource to which it does not apply.

V NET, INACT,

	Application Program Minor Node	Application Program Major Node	Local SNA Major Node	Local SNA Physical Unit	Local SNA Logical Unit	Local Non-SNA Major Node	Local Non-SNA Minor Node	NCP	Nonswitched Line	Switched Line	Link Station	Physical Unit	Logical Unit	Switched Major Node	Switched Physical Unit	Switched Logical Unit	Path Definition Set	CDRM Major Node	CDRM Minor Node	CDRSC Major Node	CDRSC Minor Node
ID=	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CDLINK=								•													
FINAL			•									•		•							
I	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•
F	•	•	I	•	•	I	•	•	•	•	•	•	•	I	R	•		•	•	•	•
R	F	F	I	•	F	I	F	•	F	F	•	•	F	I	•	F		F	F	F	F
RMPO								•													

INACT

specifies that the resource specified in the ID operand, and all of its subordinate resources, is to be deactivated (with the exception of same-domain cross-subarea links and link stations within an NCP to be deactivated). For normal deactivation, do not specify I, F, or R. Normal deactivation does not break existing sessions but does prevent the establishment of new sessions with nodes within the scope of this command.

Refer to Chapter 2 for special considerations involving the deactivation of links and link stations.

ID=name

specifies the name of any active major or minor node that is to be deactivated.

CDLINK=ACT | INACT

applies only to the deactivation of an NCP. It specifies whether active cross-domain links and link stations are to remain active after the NCP major node is deactivated.

This option is effective only on the VARY INACT or VARY REL command which begins the deactivation of an NCP. For example, if a second VARY INACT (perhaps with the I operand specified) is entered before the first VARY INACT command completes, CDLINK does not apply to the second command and is ignored if specified.

Refer to Chapter 2 for special considerations involving the deactivation of links and link stations.

CDLINK=ACT

specifies that active cross-domain links and link stations are to remain active after the NCP major node is deactivated, so that sessions routing information through the NCP over such links can continue without disruption.

CDLINK=INACT

specifies that cross-domain links and link stations are to be deactivated as part of the NCP deactivation. Any session traffic over such links might be disrupted, depending on whether such links and link stations are also owned by some other host. Refer to the descriptions of links and link stations in Chapter 2 for a discussion of how shared ownership affects the results of deactivating a link or link station.

CDLINK=INACT is the default value.

FINAL

specifies that the physical unit specified in the ID operand is no longer required and that there are no immediate plans to reactivate it. The actual effects of this operand are device-dependent, and could include such functions as automatic power-off. See the applicable component description manual for the specific effects of a DACTPU type X'01' command on a particular device. For physical units in a local SNA or switched major node, FINAL is meaningful only if the physical unit is fully active prior to beginning the deactivation.

I | F | R

specifies the type of deactivation (other than normal deactivation). If neither I, F, nor R is specified, normal deactivation occurs.

I

specifies that the specified resource and applicable subordinate resources are to be deactivated *immediately*.

If I is specified, sessions involving the affected resources are disrupted, but ACF/VTAM waits for application programs being deactivated, or application programs in session with resources being deactivated, to formally end their sessions (that is, issue CLSDST) before completing the deactivation.

The I operand can be specified on a VARY INACT command entered while a normal deactivation is in progress.

F

specifies that the specified resource and applicable subordinate resources are to undergo *forced* deactivation. This type of deactivation might be advisable for resources that do not respond to normal or immediate (I) deactivation requests, or that are preventing completion of an ACF/VTAM HALT command. A forced deactivation instructs ACF/VTAM to deactivate its internal representations of the applicable resources and to send appropriate deactivation commands to the resources or their superior nodes, without waiting for responses to these commands. Therefore, a forced deactivation of a resource could result in a mismatch between ACF/VTAM's record of the status of a resource and the actual status of the resource in the network.

If F is specified, sessions involving the resources are disrupted, and ACF/VTAM might have to wait (depending on how a given application program is coded) for application programs being deactivated, or application programs in session with resources being deactivated, to formally end their sessions (that is, issue CLSDST) before completing the deactivation.

The F operand can be specified on a VARY INACT command entered while a normal or immediate deactivation or an ACF/VTAM halt is in progress.

R

specifies that the specified resource and applicable subordinate resources are to undergo *forced* deactivation and subsequent *reactivation*. This type of deactivation and reactivation might be advisable for resources that are not responding to ACF/VTAM commands, but that the operator desires to remain active. A forced reactivation instructs ACF/VTAM to deactivate its internal representations of the applicable resources and to send appropriate deactivation commands to the resources or their superior nodes, waiting for responses before beginning reactivation. If any of the resources still do not respond, a VARY INACT command with the F operand should be entered to force deactivation of those resources.

If R is specified, sessions involving the resources are disrupted, and ACF/VTAM might have to wait (depending on how a given application program is coded) for application programs being deactivated, or application programs in session with resources being deactivated, to formally end their sessions (that is, issue CLSDST) before completing the deactivation and beginning reactivation.

Any type of deactivation request (normal, immediate, or forced) can be entered while a forced reactivation is in progress, if termination of the reactivation is desired. As previously stated, forced deactivation might be the only effective deactivation method if a resource fails to respond to the forced reactivation.

RMPO

applies only to an NCP major node and specifies that the communication controller in which the NCP is running is to be automatically powered-off at the completion of the deactivation. The communication controller must support the remote power off feature for this operand to be effective.

VARY INOP Command

The VARY INOP command can be used to terminate:

- A manual dial-out operation, if the ACF/VTAM operator is unable to complete the call

- A session request for a channel-attached SNA logical unit, if its physical unit is not to be made available on the host channel

Terminating a Manual Dial Operation: A physical unit in a switched major node can be dialed either automatically or manually to establish a session with a logical unit. For manual dialing, ACF/VTAM issues a message containing the following information:

- The name of the line that ACF/VTAM will try to use to make the connection. The line must be a switched line with dial-out capability.

- The telephone number that the ACF/VTAM operator is to dial. This number is the number specified in the DIALNO operand of the appropriate PATH statement associated with the physical unit that the operator is dialing.

After receiving this information, the ACF/VTAM operator must try to make the connection by dialing the specified telephone number. If the operator is unable to complete the connection, the operator should enter the VARY INOP command either to ask ACF/VTAM to search for an alternate path or to ask ACF/VTAM to terminate the session request without a search for an alternate path.

Terminating a Session Request for a Channel-Attached Logical Unit: If ACF/VTAM needs the ACF/VTAM operator's assistance in creating a connection to a physical unit in a local SNA major node, ACF/VTAM displays the message IST680I (OS/VS) or 5G80I (VSE). This message indicates that a connection request was denied because the physical unit is offline. The connection request remains pending and the operator should either allow the connection request to complete by making the device available on the line, or disallow the connection request by entering a VARY INOP command for the physical unit.

Command Syntax:

Operation	Operands
{VARY | V}	NET,INOP $\begin{cases} \text{,ID=line name[,END]} \\ \text{,ID=physical unit name} \end{cases}$

INOP
specifies that this is either a manual dial-out operation for a switched physical unit or a session request for a channel-attached logical unit.

ID=line name

applies only for a connection request to a switched physical unit, and specifies the name of the line used to attempt the manual dial connection. This name is included in the ACF/VTAM message requesting manual dialing.

ID=physical unit name

applies only for a channel-attached physical unit, and specifies the name of that physical unit. This name is included in the ACF/VTAM message indicating that the connection request was denied.

END

applies only for a connection request to a switched physical unit. It specifies that there is to be no search for an alternate line. If END is not specified, ACF/VTAM searches for another appropriate line to the physical unit.

VARY LOGON Command

The VARY LOGON command is used to change an existing automatic logon specification or to create an automatic logon specification where one does not exist. This command applies to any device-type logical unit, whether channel-attached or link-attached. Neither the logical unit nor the application program to receive the automatic logon has to be active when the VARY LOGON command is issued. Their respective major nodes, however, must be active. If the application program is located in another domain, the application program major node in the other domain must also be active.

An automatic logon specification remains in effect until another VARY LOGON command (or any other VARY command with the LOGON operand) is entered, or until the major node containing the logical unit is deactivated. Any automatic logon request made as a result of this specification might be accepted or rejected by the application program.

The VARY LOGON command only specifies an application program session partner for automatic logon (when the specified logical unit becomes available for a session); it does not activate the logical unit. To activate the logical unit (or a resource to which the logical unit is subordinate) and change the automatic logon specification at the same time, use the VARY ACT command with the LOGON operand.

Also see the VARY ACQ and VARY ACT commands with the LOGON operand.

To change the automatic logon specification for a logical unit or a group of logical units, enter:

Operation	Operands
{VARY | V}	NET,LOGON=application program name or cdrsc name, ID=name [,LOGMODE=logon mode name]

LOGON=application program name or cdrsc name
  specifies the name of an application program to which any logical units within the scope of this command are to be logged on. If the application program is in this domain, the name must be that of an application program minor node within an active application program major node. If the application program is located in another domain, the name must be that of a CSRSC minor node within an active CDRSC major node.

  A logical unit not already owned by an application program can be logged on to the Teleprocessing Online Test Executive Program (TOLTEP) for testing if ISTOLTEP is specified as the application program name.

ID=name
  specifies the name of a device-type logical unit or the name of a resource with subordinate device-type logical units. (This command does not apply to CDRSCs or CDRSC major nodes.) Only logical units are affected by VARY LOGON commands. If another resource type is specified, the logical units affected are those subordinate to the resource that is specified on the command.

LOGMODE=logon mode name
specifies the logon mode name to be used for any logon initiated for a logical unit as a result of this command. This logon mode name also becomes the logon mode name for all future automatic logons performed by ACF/VTAM, for logical units within the scope of this command, to their controlling application programs (if any).

If LOGMODE is not specified, the LOGMODE value specified in any previous command applicable to a logical unit also within the scope of this current VARY LOGON command is used. If no LOGMODE value was ever specified for a given logical unit within the scope of this command, the logical unit's default value is used.

Also see the VARY ACQ and VARY ACT commands with the LOGON operand.

VARY PATH Command

This command is used to modify the availability of a dial-out path to a specific switched physical unit or a group of dial-out paths within a switched major node.

A physical unit in a switched major node can be dialed through one or more dial-out paths associated with the physical unit. Switched path control is initially established in a switched major node definition by the USE operand of the PATH statement associated with a physical unit. Unless USE=NO has been specified, the path is automatically enabled for use by ACF/VTAM when the physical unit is activated.

Note: *The PATH statement refered to in this command description is in the switched major node definition; do not confuse it with the PATH macro instructions used to define a path definition set.*

Dial-out path usage can be altered by enabling or disabling:

- A single dial-out path to the physical unit (represented by a PID)

- A logical group of dial-out paths in the same switched major node (represented by a GID)

To modify the availabilty of a dial-out path, enter:

Operation	Operands
{VARY | V}	NET,PATH=USE | NOUSE { ,PID=n,ID=physical unit name } { ,GID=n,ID=switched major node name }

PATH=USE
  specifies that one or more paths identified by the PID or GID operand are to be enabled (changed from unusable to usable), if they are not already enabled.

PATH=NOUSE
  specifies that one or more paths identified by the PID or GID operand are to be disabled (changed from usable to unusable), if they are not already disabled. If the path is currently in use, PATH=NOUSE does not take effect until after the existing dial connection is broken.

GID=n
  specifies the group identifier of the dial-out paths to be made usable or unusable. The group identifier is defined by the GID operand of the PATH statements in a switched major node definition. This value must be a decimal integer in the range 0 through 255.

PID=n
  specifies the path identifier of the dial-out path to be made usable or unusable. This value must be a decimal integer in the range 0 through 255.

  The path identifier is defined by the PID operand of a PATH statement. This PATH statement must be associated with the physical unit specified in the ID operand of this command. (This PATH statement is in the switched

major node definition; do not confuse it with the PATH macro instructions
used to define a path definition set.)

ID=physical unit name | switched major node name
specifies the name of the physical unit in a switched major node (if the PID
operand is specified) or the name of the switched major node (if the GID
operand is specified) for which dial-out path status is to be changed.

VARY REL Command

The VARY REL command is used to release a previously-acquired NCP, or to release a physical unit attached by a nonswitched line to an NCP (whether or not the physical unit was previously acquired).

The VARY REL command is usually applied to a previously-acquired NCP or physical unit as part of a backup and recovery procedure in a multiple-domain network. A physical unit can also be released as part of a switched network backup procedure in either a single- or multiple-domain network. The purpose of the VARY REL is to:

1. Release ownership of NCP resources that are normally owned by another host (if the NCP was activated prior to being acquired). This kind of release requires that the Multisystem Networking Facility be installed.

2. Release ownership of all resources within an NCP, including the NCP itself (if the NCP was acquired without having been previously activated). This kind of release requires that the Multisystem Networking Facility be installed.

3. Release ownership of an individual physical unit and its logical units.

Releasing resources within an NCP makes them unknown to ACF/VTAM until the NCP is reacquired; releasing a physical unit makes it unusable by the releasing host and makes its logical units unknown until the physical unit is reacquired. Releasing an NCP that had not been previously active (case 2 above) also results in deactivation of the NCP. (In this case there is no functional difference between the VARY REL and VARY INACT commands.) See Chapter 3 for a description of possible backup and recovery procedures that use the VARY REL command.

As part of a switched network backup procedure, the VARY REL command can be entered for a physical unit that was not previously acquired. The purpose of the VARY REL command is to make the physical unit's logical units unknown to ACF/VTAM so that a corresponding switched physical unit definition (representing the same physical device with a different physical unit name but with the same logical unit names) can be activated. See Chapter 3 for a description of the switched network backup procedure.

To release an NCP or a physical unit, enter:

Operation	Operands
{VARY | V}	NET,REL,ID=name [,CDLINK=ACT | INACT] [,I]

REL
 specifies that the resource specified by the ID operand is to be released.

ID=name
 specifies the name of the NCP or physical unit to be released.

CDLINK=ACT | <u>INACT</u>

applies only to an NCP being released. It specifies whether any active cross-domain links and link stations are to remain active (in the NCP--not with respect to ACF/VTAM) after they are released. That is, the CDLINK operand specifies whether ACF/VTAM is to send deactivation commands to cross-domain links and link stations when the internal representations of these resources are deactivated as part of the VARY REL processing.

For an NCP that was activated prior to being acquired, the NCP remains active after the VARY REL completes, so even though ACF/VTAM considers such links and link stations to be inactive, the NCP still considers them to be owned by ACF/VTAM. Therefore, specifying CDLINK=ACT in an environment of shared link and link station ownership might provide no benefits (because the shared ownership prevents traffic disruption on the link), but could cost the ability of some other host to become a shared owner (because the share count is one closer to its limit than it need be). See Chapter 2 for details of special considerations and cautions that might be applicable to deactivation of cross-domain links and link stations.

For an NCP acquired without having been previously activated, this option is effective only on the first command (whether VARY INACT or VARY REL) applied to the NCP. Any subsequent CDLINK specifications are ignored.

CDLINK=ACT

specifies that active cross-domain links and link stations are to remain active after they are released, so that sessions routing information through the NCP over such links can continue without disruption.

CDLINK=INACT

specifies that cross-domain links and link stations within the scope of the release are to be deactivated as part of the NCP release processing. Any session traffic over such links might be disrupted (depending on whether such links and link stations are also owned by some other host). Refer to the description of links and link stations in Chapter 2 for a discussion of how shared ownership affects the results of deactivating a link or link station.

CDLINK=INACT is the default value.

I

specifies *immediate* release. If I is not specified, *normal* release occurs. Normal release does not break existing sessions, but does prevent the establishment of new sessions with nodes within the scope of this command. If I is specified, sessions involving the resources being released are disrupted, but ACF/VTAM waits for application programs in session with these resources to formally end their sessions (that is, issue CLSDST) before completing the release processing.

The I operand can be specified on a VARY REL command entered while a normal release is in progress.

VARY TERM Command

The VARY TERM command terminates a session or group of sessions. The command can identify one or several sessions for termination. It can identify:

- A single session by its session identifier

- All of the sessions for which a specified logical unit is the primary session partner

- All of the sessions for which a specified logical unit is the secondary session partner

- All of the sessions between a specified pair of logical units having a specified primary/secondary relationship as session partners

- All of the sessions for which a specified logical unit is a session partner (without regard to its primary or secondary status)

- All of the sessions between a specified pair of logical units (without regard to their primary/secondary relationship as session partners)

Operation	Operands
{VARY | V}	NET,TERM, (,LU1=LU name[,LU2=LU name]) ,PLU=primary LU name[,SLU=secondary LU name]) ,SID=session identifier (,SLU=secondary LU name[,PLU=primary LU name] [,NOTIFY=YES | NO] [,SCOPE=ACT | ALL | Q] [,TYPE=COND | UNCOND | FORCE]

TERM
specifies that a session or group of sessions is to be terminated. The TERM operand is a positional parameter and must immediately follow the NET operand.

LU1=LU name
specifies the name of a logical unit whose sessions are to be terminated.

If specified with the LU2 operand, only those sessions involving both specified logical units are to be terminated.

LU2=LU name
specifies the name of a logical unit whose sessions are to be terminated.

If specified with the LU1 operand, only those sessions involving both specified logical units are to be terminated.

PLU=primary LU name
specifies the name of the logical unit whose sessions as the primary session partner are to be terminated.

If specified with the SLU operand, only those sessions involving both specified logical units in the specified primary/secondary relationship are to be terminated.

SID=session identifier
specifies the ACF/VTAM session identifier for the particular session to be terminated. The session identifier supplied by ACF/VTAM in response to a DISPLAY ID=application program name,EVERY command (where the application program can be in this domain [application program minor node] or another domain [CDRSC minor node]).

SLU=secondary LU name
specifies the name of the logical unit whose sessions as the secondary session partner are to be terminated.

If specified with the PLU operand, only those sessions involving both specified logical units in the specified primary/secondary relationship are to be terminated.

NOTIFY=YES | NO
specifies whether ACF/VTAM is to send a notification message to the operator when all affected sessions have ended.

NOTIFY=YES
specifies that ACF/VTAM is to send a notification message to the operator when all affected sessions have ended.

NOTIFY=YES is the default value.

NOTIFY=NO
specifies that no message is to be written when all affected sessions have ended.

SCOPE=ACT | ALL | Q
specifies the scope of the command.

SCOPE=ACT
specifies that only active sessions are to be terminated.

Note that the termination of an active session between a device-type logical unit and its controlling application program (if any) terminates the session but does not alter the basic controller relationship between them. The controller session can be reestablished with a VARY LOGON command or by a specific session request from the application program. Deactivation and reactivation of the logical unit (including error recovery procedures), or use of the logical unit by another application program, also results in the eventual re-establishment of the logical unit's session with its controlling application program.

SCOPE=ACT is the default value.

SCOPE=ALL
specifies that all sessions are to be terminated, whether active or queued.

SCOPE=Q
specifies that only queued sessions are to be terminated.

If a queued session between a device-type logical unit and its controlling application program is terminated, the session remains queued, but the automatic logon does not take place without some further action involving the session partners. See the discussion about re-establishing

the controller session under SCOPE=ACT for some of the actions that can trigger the automatic logon.

TYPE=COND | UNCOND | FORCE
specifies the type of session termination to be performed.

TYPE=COND
specifies conditional termination.

If this command applies to active sessions, they are not disrupted, but application programs involved in such sessions are notified of the operator's request for termination.

If this command applies to queued sessions, they are terminated.

TYPE=UNCOND
specifies unconditional termination.

If this command applies to active sessions, they are disrupted, application programs involved in such sessions are notified of the disruption, and ACF/VTAM waits for the application programs to formally end their sessions (that is, issue CLSDST) before completing the termination.

If this command applies to queued sessions, they are terminated.

For cross-domain sessions, if no SSCP-to-SSCP session exists, specifying TYPE=UNCOND is effectively the same as TYPE=FORCE.

TYPE=UNCOND is the default value.

TYPE=FORCE
specifies forced termination.

If this command applies to active sessions, they are disrupted, and application programs involved in such sessions are notified of the disruption; ACF/VTAM might have to wait (depending on how a given application program is coded; see *ACF/VTAM Programming*) for the application programs to formally end their sessions (that is, issue CLSDST) before completing the termination.

If this command applies to queued sessions, they are terminated.

Note: *Forced termination of a session involving a device-type logical unit causes the deactivation and reactivation of the logical unit.*

Appendix A. Examples of DISPLAY Command Output

This appendix contains sample output of ACF/VTAM DISPLAY commands.
The samples are organized alphabetically by command. (This is the same order
as they appear in Chapter 4.) For an explanation of the messages in the display
output, refer to *ACF/VTAM Messages and Codes*.

With one exception (D NET,BFRUSE), the samples shown apply to OS/VS
systems and VSE systems. For each message in these display samples, the
OS/VS message identifier is given first, followed by the equivalent VSE
message identifier, and then the message text. For those messages that are for
OS/VS only, the VSE column is blank, and for those messages that are for VSE
only, the OS/VS column is blank.

For the D NET,BFRUSE command, separate examples are given for OS/VS
and VSE systems.

Displaying All Application Programs (D NET,APPLS)

d net,appls

```
IST097I 5A97I  DISPLAY  ACCEPTED
IST350I 5D50I  VTAM DISPLAY - DOMAIN TYPE= APPL MAJ NODES/NAMES
IST089I 5A89I  VTAMSEG  TYPE- APPL SEGMENT      , ACTIV
IST360I 5D60I  APPLICATIONS:
IST060I 5A80I  THISHOST ACTIV       ISTOLTEP ACTIV       ISTATA00 CONCT
IST080I 5A80I  ISTNOP   ACTIV       VTAMTERM NEVAC
IST069I 5A89I  APPLIST  TYPE= APPL SEGMENT      , ACTIV
IST360I 5D60I  APPLICAIIONS:
IST080I 5A80I  VSPC     CONCT       DBDCCICS CONCT       POWER    CONCT
IST080I 5A80I  POAPPL66 CONCI       POAPPL1  CCNCT       PCAFPL2  CCNCT
IST080I 5A80I  APPL1    CONCT       TSO      ACTIV       TSOC001  ACTIV
IST080I 5A80I  TSOC002  CONCI       TSO00003 CCNCT       TSOC004  CONCT
IST080I 5A80I  TSO00005 CONCT       TSO0006  CONCT       TSO0C07  CONCT
IST314I 5D14I  END
```

Displaying ACF/VTAM Buffer Usage (D NET,BFRUSE)

d net,bfruse (in OS/VS)

```
IST097I  DISPLAY  ACCEPTED
IST350I  VTAM DISPLAY - DOMAIN TYPE= BUFFER PCCL DATA
IST632I  BUFF  BUFF  CURR   CURR   MAX    MAX   TIMES  EXP/CONT    EXP
IST633I   ID   SIZE  TOTAL  AVAIL  TOTAL  USED  EXP    THRESHOLC   INCR
IST356I  IO00  00175 00064  00054  0C064  00016 C000U  00006/----- 00022
IST356I  PPC0  C0000 00C00  00000  00000  00000 00000     N/A      N/A
IST356I  LP00  01016 00064  00063  00064  00005 C0000  00022/----- 00004
IST356I  WP00  00152 00160  00142  00160  00018 00000  00001/----- 00025
IST356I  NP00  00000 0C000  00000  0C000  00000 00003     N/A      N/A
IST356I  LFC0  00120 00100  00100  00100  00000 00000  00033/----- 00032
IST356I  CRPL  00116 00200  00197  00200  00004 0000J  00004/----- 00032
IST356I  UECB  00112 C0050  00050  00050  00004 C0000  00017/----- 00034
IST356I  SF00  00072 C0060  00051  00060  00009 000UJ  00001/----- 00051
IST356I  SP00  00000 00C00  00000  00000  00000 00000     N/A      N/A
IST356I  AP00  00000 00000  00000  00C00  00C00 C000U     N/A      N/A
IST449I  CSALIMIT = NOLIMIT ,CURRENT = 000389K ,MAXIMUM = 000394K
IST314I  END
```

d net,bfruse (in VSE)

```
5A97I DISPLAY ACCEPTED
5D50I VTAM DISPLAY - DOMAIN TYPE= BUFFER POOL DATA
5D32I BUFF   BUFF  CURR   CURR   MAX    MAX    TIMES   EXP/CONT       EXP
5D33I ID     SIZE  TOTAL  AVAIL  TOTAL  USED   EXP     THRESHOLD      INCR
5D56I VF     02048 00006P 00001P N/A    00005P N/A     N/A            N/A
5D56I VP     02048 00140P 00031P N/A    00124P N/A     N/A            N/A
5D56I SF     00356 00010  00007  00010  00005  00000   00001/-----    00005
5D56I LF     00175 00030  00021  00052  00045  00007   00003/00025    00011
5D56I SP     00100 00025  00025  00025  00000  00000   00001/-----    00018
5D56I LP     01016 00015  00013  00015  00007  00000   00001/-----    00002
5D56I AP     00000 00000  00000  00000  00000  00000   N/A            N/A
5D56I WP     00152 00010  00008  00010  00003  00000   00001/-----    00012
5D56I PP     00000 00000  00000  00000  00000  00000   N/A            N/A
5D56I NP     00000 00000  00000  00000  00000  00000   N/A            N/A
5D56I UP     00064 00026  00026  00026  00000  00000   00001/-----    00026
5D14I END
```

Displaying All CDRMs (D NET,CDRMS)

d net,cdrms

```
IST097I 5A97I  DISPLAY ACCEPTED
IST350I 5D50I  VTAM DISPLAY - DOMAIN TYPE= CROSS-DOM. RSRC MGR
IST089I 5A89I  CDRMSEG  TYPE= CDRM SEGMENT     , ACTIV
IST462I 5E82I  THISHOST ACTIV ,SUBAREA = 001
IST482I 5E82I  TWINHOST NEVAC ,SUBAREA = 005
IST482I 5E82I  CROSHOST ACTIV ,SUBAREA = 009
IST482I 5E82I  FARHOST  ACTIV ,SUBAREA = 013
IST482I 5E82I  NETHOST  NEVAC ,SUBAREA = 048
IST314I 5D14I  END
```

Displaying All CDRSCs (D NET,CDRSCS)

d net,cdrscs

```
IST097I 5A97I  DISPLAY ACCEPTED
IST350I 5D50I  VTAM DISPLAY - DOMAIN TYPE= CROSS-DOM. RESOURCES
IST089I 5A89I  CDRSCSEG TYPE= CDRSC SEGMENT     , ACTIV
IST483I 5E83I  A1SUBA5  ACTIV       ,CDRM = TWINHOST
IST483I 5E83I  A2SUBA5  ACTIV       ,CDRM = TWINHOST
IST483I 5E83I  A3SUBA5  ACTIV       ,CDRM = TWINHOST
IST483I 5E83I  A4SUBA9  ACTIV       ,CDRM = CROSHOST
IST483I 5E83I  A5SUBA9  ACTIV       ,CDRM = CROSHOST
IST483I 5E83I  A6SUBA9  ACTIV       ,CDRM = CROSHOST
IST483I 5E83I  A7SUBA13 ACTIV       ,CDRM = FARHOST
IST483I 5E83I  A8SUBA13 ACTIV       ,CDRM = FARHOST
IST483I 5E83I  R1SUBA10 ACTIV       ,CDRM = CROSHOST
IST483I 5E83I  APPL8    ACTIV--S--  ,CDRM = THISHOST
IST483I 5E83I  APPL9    ACTIV--S--  ,CDRM = THISHOST
IST483I 5E83I  ,NETAPPL4 ACTIV      ,CDRM = NETHOST
IST483I 5E83I  APLMDSEC ACTIV       ,CDRM = NETHOST
IST314I 5D14I  END
```

Displaying All Physical Units (D NET,CLSTRS)

d net,clstrs

```
IST097I 5A97I  DISPLAY  ACCEPTED
IST350I 5D50I  VTAM DISPLAY - DOMAIN TYPE= CLUSTERS/PHYS UNITS
IST089I 5A89I  ISTPUS    TYPE= PU_T4/5 MAJ NODE  , ACTIV
IST089I 5A89I  NCP1      TYPE= PU_T4/5 MAJ NODE  , ACTIV
IST089I 5A89I  C3270A    TYPE= PHYSICAL UNIT     , ACTIV
IST089I 5A89I  C3275A    TYPE= PHYSICAL UNIT     , ACTIV
IST089I 5A89I  NDSBSYOO  TYPE= PHYSICAL UNIT     , ACTIV
IST089I 5A89I  PU1       TYPE= PHYSICAL UNIT     , ACTIV
IST089I 5A89I  CCJ13     TYPE= PHYSICAL UNIT     , ACTIV
IST089I 5A89I  PU13271R  TYPE= PHYSICAL UNIT     , ACTIV
IST089I 5A89I  NTOPU1    TYPE= PHYSICAL UNIT     , NEVAC----T
IST089I 5A89I  SWNDIAL   TYPE= SW SNA MAJOR NODE , ACTIV
IST089I 5A89I  SWITCHPU  TYPE= PHYSICAL UNIT     , CONCT
IST089I 5A89I  NET1PU2   TYPE= PHYSICAL UNIT     , CONCT
IST089I 5A89I  NET1PU7   TYPE= PHYSICAL UNIT     , NEVAC
IST089I 5A89I  NET1PU9   TYPE= PHYSICAL UNIT     , CONCT
IST089I 5A89I  NET1NTO   TYPE= PHYSICAL UNIT     , CONCT----T
IST089I 5A89I  LCL3790A  TYPE= LCL SNA MAJ NODE  , ACTIV
IST089I 5A89I  PU11      TYPE= PHYSICAL UNIT     , ACTIV        ,CUA=0B8
IST314I 5D14I  END
```

Displaying an Application Program (D NET,ID=applname)

d net,id=appl1,e

```
IST097I 5A97I  DISPLAY  ACCEPTED
IST075I 5A75I  VTAM DISPLAY - NODE TYPE= APPL
IST486I 5E86I  NAME- APPL1    ,STATUS= ACTIV        ,DESIRED STATE=ACTIV
IST654I 5G54I  I/O TRACE= OFF ,BUFFER TRACE= OFF
IST271I         JOBNAME = TESTCASE STEPNAME = TESTCASE
IST171I 5B71I  ACTIVE SESSIONS = 0005 SESSION REQUESTS = 0001
IST206I 5C06I  SESSIONS:
IST634I 5G34I  NAME       STATUS      SESS ID         SEND  RECV  VRN TP
IST635I 5G35I  APPL2      ACTIV-SEC   02010561D333340E 0000 0000   0   0
IST635I 5G35I  A8SUBA13   ACTIV-SEC   1A01000000000002 0000 0000   0   0
IST635I 5G35I  LU1        ACTIV-SEC   02010561DE60BB30 0000 0000   0   0
IST635I 5G35I  L2SUBA10   ACTIV-SEC   02010561E4BDFC8C 0000 0000   0   0
IST635I 5G35I  A5SUBA9    ACTIV-PRI   1201000000000003 0000 0000   0   0
IST635I 5G35I  L4SUBA10   QUE/C-SEC   020106E19E07D9BD
IST314I 5D14I  END
```

Displaying a CDRM Major Node (D NET,ID=cdrmset)

d net,id=cdrmseg,e

```
IST097I 5A97I  DISPLAY  ACCEPTED
IST075I 5A75I  VTAM DISPLAY - NODE TYPE= CDRM SEGMENT
IST486I 5E86I  NAME= CDRMSEG  ,STATUS= ACTIV        ,DESIRED STATE=ACTIV
IST477I 5E77I  CDRMS:
IST482I 5E82I  THISHOST ACTIV ,SUBAREA = 001
IST482I 5E82I  TWINHOST NEVAC ,SUBAREA = 005
IST482I 5E82I  CROSHOST ACTIV ,SUBAREA = 009
IST482I 5E82I  FARHOST  ACTIV ,SUBAREA = 013
IST482I 5E82I  NETHOST  NEVAC ,SUBAREA = 048
IST314I 5D14I  END
```

Displaying a Host CDRM (D NET,ID=host cdrm)

d net,id=thishost,e

```
IST097I 5A97I  DISPLAY  ACCEPTED
IST075I 5A75I  VTAM DISPLAY - NODE TYPE= CDRM
IST486I 5E86I  NAME= THISHOST ,STATUS= ACTIV          ,DESIRED STATE= ACTIV
IST654I 5G54I  I/O TRACE= OFF ,BUFFER TRACE= OFF
IST476I 5E76I  CDRM TYPE = HOST      ,SUBAREA = 001
IST388I 5D88I  DYNAMIC CDRSC DEFINITION SUPPORT = YES
IST171I 5B71I  ACTIVE SESSIONS = 0002 SESSION REQUESTS = 0000
IST477I 5E77I  CDRMS:
IST634I 5G34I  NAME        STATUS      SESS ID        SEND  RECV  VRN TP
IST635I 5G35I  CROSHOST    ACTIV                                  0   0
IST635I 5G35I  FARHOST     ACTIV                                  0   0
IST314I 5D14I  END
```

Displaying an External CDRM (D NET,ID=ext cdrm)

d net,id=croshost,e

```
IST097I 5A97I  DISPLAY ACCEPTED
IST075I 5A75I  VTAM DISPLAY - NODE TYPE= CDRM
IST486I 5E86I  NAME= CROSHOST ,STATUS= ACTIV          ,DESIRED STATE=ACTIV
IST654I 5G54I  I/O TRACE= OFF ,BUFFER TRACE= OFF
IST476I 5E76I  CDRM TYPE = EXTERNAL ,SUBAREA = 009
IST369I 5D89I  PREDEFINITION OF CDRSC = OPT
IST478I 5E78I  CDRSCS:
IST080I 5A80I  A4SUBA9 ACTIV       A5SUBA9  ACTIV       A6SUBA9  ACTIV
IST080I 5A80I  L1SUBA10 ACTIV      L2SUBA10 ACTIV       L3SUBA10 ACTIV
IST314I 5D14I  END
```

Displaying a CDRSC Major Node (D NET,ID=cdrsc set)

d net,id=cdrscseg,e

```
IST097I 5A97I  DISPLAY  ACCEPTED
IST075I 5A75I  VTAM DISPLAY - NODE TYPE= CDRSC SEGMENT
IST486I 5E86I  NAME= CDRSCSEG ,STATUS= ACTIV          ,DESIRED STATE=ACTIV
IST478I 5E78I  CDRSCS:
IST483I 5E83I  CDRSC1     ACTIV       ,CDRM = TWINHOST
IST483I 5E83I  A2SUBA5    ACTIV       ,CDRM = TWINHOST
IST483I 5E83I  A3SUBA5    ACTIV       ,CDRM = TWINHOST
IST483I 5E83I  A4SUBA9    ACTIV       ,CDRM = CROSHOST
IST483I 5E83I  A5SUBA9    ACTIV       ,CDRM = CROSHOST
IST483I 5E83I  A6SUBA9    ACTIV       ,CDRM = CROSHOST
IST483I 5E83I  A7SUBA13   ACTIV       ,CDRM = FARHOST
IST483I 5E83I  A8SUBA13   ACTIV       ,CDRM = FARHOST
IST483I 5E83I  L1SUBA10   ACTIV       ,CDRM = CROSHOST
IST483I 5E83I  L2SUBA10   ACTIV       ,CDRM = CROSHOST
IST483I 5E83I  R1SUBA10   ACTIV       ,CDRM = CROSHOST
IST483I 5E83I  L4SUBA14   ACTIV       ,CDRM = FARHOST
IST483I 5E83I  L5SUBA14   ACTIV       ,CDRM = FARHOST
IST483I 5E83I  L6SUBA14   ACTIV       ,CDRM = FARHOST
IST483I 5E83I  APPL8      ACTIV--S--  ,CDRM = THISHOST
IST483I 5E83I  APPL9      ACTIV--S--  ,CDRM = THISHOST
IST483I 5E83I  NETLU1     ACTIV       ,CDRM = NETHOST
IST483I 5E83I  NETLU2     ACTIV       ,CDRM = NETHOST
IST483I 5E83I  NETAPPL1   ACTIV       ,CDRM = NETHOST
IST483I 5E83I  NETAPPL4   ACTIV       ,CDRM = NETHOST
```

Displaying a Dynamically-Created CDRSC Major Node (D NET,ID=ISTCDRDY)

d net,id=istcdrdy,e

```
IST097I 5A97I  DISPLAY ACCEPTED
IST075I 5A75I  VTAM DISPLAY - NODE TYPE= CDRSC SEGMENT
IST486I 5E86I  NAME= ISTCDRDY ,STATUS= ACTIV          ,DESIRED STATE=ACTIV
IST478I 5E78I  CDRSCS:
IST172I 5B72I  NO CDRSCS          EXIST
IST314I 5D14I  END
```

Displaying a CDRSC Minor Node (D NET,ID=cdrscname)

d net,id=cdrsc1,e

```
IST097I 5A97I  DISPLAY ACCEPTED
IST075I 5A75I  VTAM DISPLAY - NODE TYPE= CDRSC
IST486I 5E86I  NAME= CDRSC1    ,STATUS= ACTIV         ,DESIRED STATE=ACTIV
IST479I 5E79I  CDRM NAME = TWINHOST
IST171I 5B71I  ACTIVE SESSIONS = 0000 SESSION REQUESTS = 0000
IST206I 5C06I  SESSIONS:
IST172I 5B72I  NO SESSIONS        EXIST
IST314I 5D14I  END
```

Displaying a PU__T4/5 (D NET,ID=pu4/5 name)

Displaying the Host Physical Unit (D NET,ID=ISTPUS)

d net,id=istpus,e

```
IST097I 5A97I  DISPLAY ACCEPTED                •
IST075I 5A75I  VTAM DISPLAY - NODE TYPE= PU_T4/5
IST486I 5E86I  NAME= ISTPUS    ,STATUS= ACTIV         ,DESIRED STATE=ACTIV
IST484I 5E84I  SUBAREA = 001
IST654I 5G54I  I/O TRACE= OFF ,BUFFER TRACE= OFF
IST170I 5B70I  LINES:
IST080I 5A80I  OCF-L     ACTIV----I
IST314I 5D14I  END
```

Displaying an NCP (D NET,ID=ncpname)

d net,id=ncploc1,e

```
IST097I 5A97I  DISPLAY ACCEPTED
IST075I 5A75I  VTAM DISPLAY - NODE TYPE= PU_T4/5
IST486I 5E86I  NAME= NCPLOC1   ,STATUS= ACTIV         ,DESIRED STATE=ACTIV
IST247I 5C47I  LOAD/DUMP PROCEDURE STATUS = RESET
IST484I 5E84I  SUBAREA = 107        '
IST391I 5D91I  ADJ LINK STATION = OCF-S     LINE = OCF-L    ,NODE =ISTPUS
IST654I 5G54I  I/O TRACE= OFF ,BUFFER TRACE= OFF
IST077I 5A77I  SIO= 00000538 CUA= OCF
IST675I 5G75I  VR = 6 , TP = 2
IST170I 5B70I  LINES:
IST080I 5A80I  L1D33     ACTIV      L1D56      ACTIV       LSDLC1   ACTIV
IST080I 5A80I  LSDLC2    ACTIV      L13A       ACTIV----E  EAKUPLIN NEVAC
IST080I 5A80I  L12B      ACTIV----E L12C       NEVAC       L12D     NEVAC
IST080I 5A80I  LSDLC31   ACTIV      L1A22      ACTIV----E  NTCLN01  NEVAC----T
IST080I 5A80I  NTOLN02   NEVAC----T NTOLN03    NEVAC----T  LSDLC40  ACTIV
IST314I 5D14I  END
```

d net,id=ncpcrs3,e

```
IST097I 5A97I  DISPLAY  ACCEPTED
IST075I 5A75I  VTAM DISPLAY - NODE TYPE= PU_T4/5
IST486I 5E86I  NAME= NCPCRS3  ,STATUS= ACTIV         ,DESIRED STATE=ACTIV
IST247I 5C47I  LOAD/DUMP PROCEDURE STATUS = RESET
IST484I 5E84I  SUBAREA = 010
IST391I 5D91I  ADJ LINK STATION = LS13A     LINE = L13A     ,NODE = NCPLOC1
IST654I 5G54I  I/O TRACE= OFF ,BUFFER TRACE= OFF
IST675I 5G75I  VR =  0 , TP =  0
IST170I 5B70I  LINES:
IST080I 5A80I  L3D55     ACTIV     CSDLC1    ACTIV     L31A      ACTIV----E
IST080I 5A80I  L32A      ACTIV----E L32B      ACTIV----E L35A     ACTIV----E
IST314I 5D14I  END
```

Displaying a Link (D NET,ID=link name)

Displaying a Peripheral Link (SDLC) (d net,id=11d05,e)

d net,id=11d05,e

```
IST097I 5A97I  DISPLAY  ACCEPTED
IST075I 5A75I  VTAM DISPLAY - NODE TYPE= LINE
IST486I 5E86I  NAME= L1D05  ,STATUS= ACTIV          ,DESIRED STATE=ACTIV
IST067I 5A87I  LINE TYPE= LEASED     LINE GROUP= GROUP5
IST134I 5B34I  MAJNOD= NCPLCC1
IST655I 5G55I  LINE TRACE STATUS = TRRES TG TRACE STATUS = TRRES
IST084I 5A84I  NETWORK NODES:
IST080I 5A80I  C3270A    ACTIV     CT3277A   ACTIV     CT3277B   ACTIV
IST080I 5A80I  CT3277C   ACTIV     C3275A    ACTIV     CT3275A   ACTIV
IST314I 5D14I  END
```

Displaying a Cross-Subarea Link (SDLC)

d net,id=112a,e

```
IST097I 5A97I  DISPLAY  ACCEPTED
IST075I 5A75I  VTAM DISPLAY - NODE TYPE= LINE
IST486I 5E86I  NAME= L12A    ,STATUS= ACTIV          ,DESIRED STATE=ACTIV
IST087I 5A87I  LINE TYPE= LEASED      LINE GROUP= GROUP21
IST134I 5B34I  MAJNOD= NCPLCC1
IST655I 5G55I  LINE TRACE STATUS = TRRES TG TRACE STATUS = TRRES
IST396I 5D96I  LINENAME STATUS      LNKSTA    STATUS    CTG GTG ADJNODE  ADJSA
IST397I 5D97I  L12A       ACTIV----E LS12A     ACTIV----E  1   1 NCPLR2    106
IST314I 5D14I  END
```

Displaying a Cross-Subarea Link (Channel)

d net,id=0cf-l,e

```
IST097I 5A97I  DISPLAY  ACCEPTED
IST075I 5A75I  VTAM DISPLAY - NODE TYPE= LINE
IST486I 5E86I  NAME= 0CF-L    ,STATUS= ACTIV          ,DESIRED STATE=ACTIV
IST087I 5A87I  LINE TYPE= LEASED      LINE GROUP= ISTGROUP
IST134I 5B34I  MAJNOD= ISTPUS
IST655I 5G55I  LINE TRACE STATUS = TRRES TG TRACE STATUS = TRRES
IST396I 5D96I  LINENAME STATUS      LNKSTA    STATUS    CTG GTG ADJNODE  ADJSA
IST397I 5D97I  0CF-L      ACTIV----I 0CF-S     ACTIV----I  1   1 NCPLOC1   107
IST314I 5D14I  END
```

Displaying a Link Station (D NET,ID=link station)

Displaying a Channel Link Station

d net,id=0cf-s,e

```
ISTC97I 5A97I  DISPLAY  ACCEPTED
ISTG75I 5A75I  VTAM DISPLAY - NODE TYPE= LINK STATION
IST486I 5E86I  NAME= OCF-S    ,STATUS= ACTIV          ,DESIRED STATE=ACTIV
IST081I 5A81I  LINE NAME= OCF-L   , LINE GROUP= ISTGROUP , MAJNOD= IS TPUS
IST396I 5D96I  LINENAME STATUS    LNKSTA     STATUS    CTG GTG ADJNODE  ADJSA
IST397I 5D97I  OCF-L    ACTIV----I OCF-S     ACTIV----I  1   1 NCPLOC1  107
IST314I 5D14I  END
```

Displaying an SDLC Link Station

d net,id=ls13a,e

```
IST097I 5A97I  DISPLAY  ACCEPTED
IST075I 5A75I  VTAM DISPLAY - NODE TYPE= LINK STATION
IST486I 5E86I  NAME= LS13A   ,STATUS= ACTIV          ,DESIRED STATE=ACTIV
IST081I 5A81I  LINE NAME= L13A    , LINE GROUP= CDGRP01 , MAJNOD= NCPLOC1
IST396I 5D96I  LINENAME STATUS    LNKSTA     STATUS    CTG GTG ADJNODE  ADJSA
IST397I 5D97I  L13A     ACTIV----E LS13A     ACTIV----E  1   1 NCPCRS3  010
IST314I 5D14I  END
```

Displaying a Logical Unit (D NET,ID=luname)

d net,id=lu1,e

```
IST097I 5A97I  DISPLAY  ACCEPTED
IST075I 5A75I  VTAM DISPLAY - NODE TYPE= LOGICAL UNIT
IST486I 5E86I  NAME= LU1     ,STATUS= ACTIV          ,DESIRED STATE=ACTIV
IST081I 5A81I  LINE NAME= LINE1   , LINE GROUP= GROUP20 , MAJNOD= NCP1
IST135I 5B35I  PHYSICAL UNIT= PU1       ,
IST082I 5A82I  DEVTYPE= LU  , ALLOC TO= APPL1   ,CONTROLLING APPL=
IST654I 5G54I  I/O TRACE= OFF ,BUFFER TRACE= OFF
IST675I 5G75I  VR =  0 , TP =  0
IST314I 5D14I  END
```

Displaying a Physical Unit (D NET,ID=puname)

d net,id=pu1,e

```
IST097I 5A97I  DISPLAY  ACCEPTED
IST075I 5A75I  VTAM DISPLAY - NODE TYPE= PHYSICAL UNIT
IST486I 5E86I  NAME= PU1     ,STATUS= ACTIV          ,DESIRED STATE=ACTIV
IST081I 5A81I  LINE NAME= LINE1   , LINE GROUP= GROUP20 , MAJNOD= NCP1
IST654I 5G54I  I/O TRACE= OFF ,BUFFER TRACE= OFF
IST355I 5D55I  LOGICAL UNITS:
IST080I 5A80I  FAJEFF01 ACTIV         LU1       ACT/S    CTJ10LU2 ACTIV
IST080I 5A80I  CTJ10LU3 ACTIV         SNUBULU1 ACTIV     SNUBULU2 NEVAC
IST080I 5A80I  CTJ10LU4 ACTIV         CTJ10LU5 ACTIV
IST314I 5D14I  END
```

Displaying a Switched Major Node (D NET,ID=sw node)

d net,id=swndial,e

```
IST097I 5A97I  DISPLAY  ACCEPTED
IST075I 5A75I  VTAM DISPLAY - NODE TYPE= SW SNA MAJ NODE
IST486I 5E86I  NAME= SWNDIAL  ,STATUS= ACTIV          ,DESIRED STATE=ACTIV
IST084I 5A84I  NETWORK NODES:
IST089I 5A89I  SWITCHPU TYPE= PHYSICAL UNIT    , CONCT
IST089I 5A89I  PU1RTS1  TYPE= LOGICAL UNIT     , CONCT
IST089I 5A89I  PU1RTS2  TYPE= LOGICAL UNIT     , CONCT
IST089I 5A69I  PU1RTS3  TYPE= LOGICAL UNIT     , CONCT
IST089I 5A89I  NET1PU2  TYPE= PHYSICAL UNIT    , CONCT
IST089I 5A89I  PU2RTS2  TYPE= LOGICAL UNIT     , CONCT
IST089I 5A89I  SNUBULU1 TYPE= LOGICAL UNIT     , RESET
IST089I 5A89I  SNUBULU2 TYPE= LOGICAL UNIT     , RESET
IST089I 5A89I  NET1PU7  TYPE= PHYSICAL UNIT    , NEVAC
IST089I 5A89I  PU7LU1   TYPE= LOGICAL UNIT     , NEVAC
IST089I 5A89I  PU7LU3   TYPE= LOGICAL UNIT     , NEVAC
IST089I 5A89I  PU7LU4   TYPE= LOGICAL UNIT     , NEVAC
IST089I 5A89I  NET1NTO  TYPE= PHYSICAL UNIT    , CONCT----T
IST089I 5A89I  NTOLU30  TYPE= LOGICAL UNIT     , CONCT----T
IST089I 5A89I  NET2NTO  TYPE= PHYSICAL UNIT    , CONCT----T
IST089I 5A89I  NTOLU31  TYPE= LOGICAL UNIT     , CONCT----T
IST314I 5D14I  END
```

Displaying a Local Non-SNA Major Node (D NET,ID=non-sna node)

d net,id=lcl3270,e

```
IST097I 5A97I  DISPLAY  ACCEPTED
IST075I 5A75I  VTAM DISPLAY - NODE TYPE= LCL 3270 MAJ NODE
IST486I 5E86I  NAME= LCL3270  ,STATUS= ACTIV          ,DESIRED STATE=ACTIV
IST355I 5D55I  LOGICAL UNITS:
IST089I 5A89I  L3270A    TYPE= LOGICAL UNIT    , ACTIV     ,CUA=3E0
IST089I 5A89I  L3270B    TYPE= LOGICAL UNIT    , NEVAC     ,CUA=3E1
IST089I 5A89I  L3270C    TYPE= LOGICAL UNIT    , NEVAC     ,CUA=3E2
IST089I 5A89I  L3284A    TYPE= LOGICAL UNIT    , NEVAC     ,CUA=3E5
IST314I 5D14I  END
```

Displaying a Local SNA Major Node (D NET,ID=Local sna node)

d net,id=lcl3790a,e

```
IST097I 5A97I  DISPLAY  ACCEPTED
IST075I 5A75I  VTAM DISPLAY - NODE TYPE= LCL SNA MAJ NODE
IST486I 5E86I  NAME= LCL3790A ,STATUS= ACTIV          ,DESIRED STATE=ACTIV
IST084I 5A84I  NETWORK NODES:
IST089I 5A89I  PU11      TYPE= PHYSICAL UNIT    , ACTIV    ,CUA=0B8
IST089I 5A89I  LU112     TYPE= LOGICAL UNIT     , ACTIV
IST089I 5A89I  LU113     TYPE= LOGICAL UNIT     , NEVAC
IST089I 5A89I  LU114     TYPE= LOGICAL UNIT     , NEVAC
IST089I 5A89I  LU111     TYPE= LOGICAL UNIT     , ACTIV
IST314I 5D14I  END
```

Displaying All Lines (D NET,LINES)

d net,lines

```
IST097I 5A97I  DISPLAY  ACCEPTED
IST350I 5D50I  VTAM DISPLAY - DOMAIN TYPE= LINES
IST354I 5D54I  PU T4/5 MAJOR NODE = ISTPUS
IST170I 5B70I  LINES:
IST080I 5A80I  OCF-L     ACTIV----I
IST354I 5D54I  PU T4/5 MAJOR NODE = NCP1
IST170I 5B70I  LINES:
IST080I 5A80I  L1A01     NEVAC      L1A02     NEVAC      L1D05     ACTIV
IST080I 5A80I  L1D34     ACTIV      L1A07     NEVAC      L2A09     NEVAC
IST080I 5A80I  L1D11     ACTIV      DLMTA01   NEVAC      DLSS02    NEVAC
IST080I 5A80I  DLSS04    NEVAC      DLSS05    NEVAC      L1D55     ACTIV
IST080I 5A80I  L1D33     ACTIV      L1D56     ACTIV      LINE1     ACTIV
IST080I 5A80I  LSDLC2    ACTIV      L13A      ACTIV----E BAKUPLIN  NEVAC
IST080I 5A80I  L14A      ACTIV----E BAKLIN2   ACTIV----E L12A      ACTIV----E
IST080I 5A80I  L12B      ACTIV----E L12C      NEVAC      L12D      NEVAC
IST080I 5A80I  L15A      ACTIV----E L15B      ACTIV----E L15C      NEVAC
IST080I 5A80I  LSDLC6    ACTIV      LSDLC7    ACTIV      LSDLC8    ACTIV
IST080I 5A80I  LINE18    ACTIV      LSDLCT1   ACTIV      LSDLC9    ACTIV
IST080I 5A80I  LINE1C    ACTIV      LINE11    ACTIV      LINE12    ACTIV
IST080I 5A80I  LINE13    ACTIV      LINE14    ACTIV      LSDLC21   ACTIV
IST080I 5A80I  LSDLC22   ACTIV      LSDLC23   ACTIV      LSDLC     ACTIV
IST080I 5A80I  LSDLC32   ACTIV      LSDLC33   ACTIV      LSDLC61   ACTIV
IST080I 5A80I  LSDLC31   ACTIV      L1A22     ACTIV----E NTOLN01   NEVAC----T
IST080I 5A80I  NTOLNC2   NEVAC----T NTOLN03   NEVAC----T LSDLC40   ACTIV
IST080I 5A80I  LSDLC41   ACTIV      LSDLC50   ACTIV      LSDLC51   ACTIV
IST314I 5D14I  END
```

Displaying All Major Nodes (D NET,MAJNODES)

d net,majnodes

```
IST097I 5A97I  DISPLAY  ACCEPTED
IST350I 5D50I  VTAM DISPLAY - DOMAIN TYPE= MAJOR NODES
IST089I 5A89I  VTAMSEG  TYPE= APPL SEGMENT      , ACTIV
IST089I 5A89I  ISTPUS   TYPE= PU_T4/5 MAJ NODE  , ACTIV
IST089I 5A89I  APPLIST  TYPE= APPL SEGMENT      , ACTIV
IST089I 5A89I  RMDK3    TYPE= CDRM SEGMENT      , ACTIV
IST089I 5A89I  ISTCDRDY TYPE= CDRSC SEGMENT     , ACTIV
IST089I 5A89I  RSDK3    TYPE= CDRSC SEGMENT     , ACTIV
IST089I 5A89I  SWNDIAL  TYPE= SW SNA MAJ NODE   , ACTIV
IST089I 5A89I  LCL3270  TYPE= LCL 3270 MAJ NODE , ACTIV
IST089I 5A89I  LCL3790A TYPE= LCL SNA MAJ NODE  , ACTIV
IST089I 5A89I  NCPLCC1  TYPE= PU_T4/5 MAJ NODE  , ACTIV
IST089I 5A89I  NCPCRS3  TYPE= PU_T4/5 MAJ NODE  , ACTIV
IST089I 5A89I  NCPLR2   TYPE= PU_T4/5 MAJ NODE  , PAPU1
IST314I 5D14I  END
```

Displaying the Storage of an NCP (D NET,NCPSTOR)

d net,ncpstor,id=ncp1,addr=256,length=256

```
IST097I 5A97I  DISPLAY ACCEPTED
IST244I 5C44I  NCP STORAGE FOR ID = NCP1
IST245I 5C45I  000256            C940 A6969584 85994089
IST245I 5C45I  000260       86408195 A8969585 40A68993 93409985
IST245I 5C45I  000270       818440A3 8889A26F 40404040 40404040
IST245I 5C45I  000256       40404040 4040C940 A6969584 85994089
IST245I 5C45I  000260       86408195 A8969585 40A68993 93409985
IST245I 5C45I  000270       818440A3 8889A26F 40404040 40404040
IST245I 5C45I  000256       40404040 4040C940 A6969584 85994089
IST245I 5C45I  000260       86408195 A8969585 40A68993 93409985
IST245I 5C45I  000270       818440A3 8889A26F 40404040 40404040
IST245I 5C45I  000256       40404040 4040C940 A6969584 85994089
IST245I 5C45I  000260       86408195 A8969585 40A68993 93409985
IST245I 5C45I  000270       818440A3 8889A26F 40404040 40404040
IST245I 5C45I  000256       40404040 4040C940 A6969584 85994089
IST245I 5C45I  000260       86408195 A8969585 40A68993 93409985
IST245I 5C45I  000270       818440A3 8889A26F 40404040 40404040
IST245I 5C45I  000340       6F6F6F6F 6F6F6F6F 6F6F6F6F 6F6F6F6F
IST245I 5C45I  000350       6F6F6F6F 6F6F
IST314I 5D14I  END
IST241I 5C41I  NCPSTOR COMMAND COMPLETE FOR ID = NCP1
```

Displaying Nodes in a Pending State (D NET,PENDING)

d net,pending

```
IST097I 5A97I  DISPLAY ACCEPTED
IST350I 5D50I  VTAM DISPLAY - DOMAIN TYPE= PENDING
IST080I 5A80I  LS12A     PCTD1         LS12B     PCTD1
IST080I 5A80I  NCPCRS3   PCTD1
IST080I 5A80I  NCPLR2    PAPU1
IST314I 5D14I  END
```

Displaying Information on Switched Paths (D NET,PATHS)

d net,paths,id=switchpu

```
IST097I 5A97I  DISPLAY ACCEPTED
IST148I 5B48I  DIAL OUT PATH INFORMATION FOR PHYSICAL UNIT SWITCHPU
IST149I 5B49I  LINE GRP         TELE NO | LINE            PID GID CNT
IST168I 5B68I  GROUP62             PU1PATH1-7890          001 001 003 AVA MAN
IST168I 5B68I  GROUP62             PU1PATH2-555-7890      002 002 003 AVA MAN
IST168I 5B68I  GROUP62          PU1PATH3-1-123-555-7890   004 004 010 NAV MAN
IST314I 5D14I  END
```

Displaying the Current Routing Table (D NET,PATHTAB)

d net,pathtab

```
IST097I 5A97I   DISPLAY  ACCEPTED
IST350I 5D50I   VTAM DISPLAY - DOMAIN TYPE= PATH TABLE CONTENTS
IST516I 5F16I   DESTSUB-ADJSUB-ER- ER STATUS-VR(S)
IST517I 5F17I   001     001      0   ACTIV3    0
IST517I 5F17I   005     107      0   INOP      0
IST517I 5F17I   009     107      0   MIGR      0
IST517I 5F17I   010     107      5   PDEFO
IST517I 5F17I   010     106      5   INOP      3
IST517I 5F17I   010     107      3   INACT     6
IST517I 5F17I   010     107      0   ACTIV3    0
IST517I 5F17I   013     107      0   MIGR      0
IST517I 5F17I   014     106      5   INOP      3
IST517I 5F17I   014     107      0   ACTIV3    0
IST517I 5F17I   048     106      4   INOP      4
IST517I 5F17I   048     107      3   INOP      3
IST517I 5F17I   048     106      2   INOP      2
IST517I 5F17I   048     107      1   INOP      1
IST517I 5F17I   049     106      4   INOP      4
IST517I 5F17I   049     107      3   INOP      3
IST517I 5F17I   049     106      2   INOP      2
IST517I 5F17I   049     107      1   INOP      1
IST517I 5F17I   106     107      5   PDEFO
IST517I 5F17I   106     106      5   INOP      3
IST517I 5F17I   106     107      3   INACT     6
IST517I 5F17I   106     107      0   INACT     0
IST517I 5F17I   107     107      7   PDEFO
IST517I 5F17I   107     107      6   PDEFO
IST517I 5F17I   107     107      5   PDEFO
IST517I 5F17I   107     107      4   PDEFO
IST517I 5F17I   107     107      2   PDEFO
IST517I 5F17I   107     107      1   PDEFO
IST517I 5F17I   107     106      5   INOP      3
IST517I 5F17I   107     107      3   ACTIV3    6
IST517I 5F17I   107     107      0   ACTIV3    0
IST314I 5D14I   END
```

Displaying Routes to a Destination Subarea (D NET,ROUTE)

d net,route,destsub=1

```
IST097I 5A97I   DISPLAY  ACCEPTED
IST535I 5F35I   ROUTE DISPLAY   1 TO SA =    1
IST536I 5F36I   VR TP   STATUS    ER   ADJSUB   STATUS
IST537I 5F37I   0  0    ACTIV     0        1    ACTIV3
IST537I 5F37I   0  1    ACTIV     0        1    ACTIV3
IST537I 5F37I   0  2    ACTIV     0        1    ACTIV3
IST314I 5D14I   END
```

Testing a Route to a Destination Subarea (D NET,ROUTE,TEST=YES)

d net,route,destsub=10,test=yes

```
IST097I 5A97I   DISPLAY ACCEPTED
IST535I 5F35I   ROUTE DISPLAY   8 TO SA =   10
IST536I 5F36I   VR TP    STATUS    ER   ADJSUB    STATUS
IST537I 5F37I   0   0    INACT     0    107       ACTIVJ
IST537I 5F37I   0   1    INACT     0    107       ACTIVJ
IST537I 5F37I   0   2    INACT     0    107       ACTIVJ
IST537I 5F37I                      1              UNDEF
IST537I 5F37I                      2              UNDEF
IST537I 5F37I   6   0    INACT     3    107       INOP
IST537I 5F37I   6   1    INACT     3    107       INOP
IST537I 5F37I   6   2    INACT     3    107       INOP
IST537I 5F37I                      4              UNDEF
IST537I 5F37I                      5    107       PDEFO
IST537I 5F37I   3   0    INACT     5    106       INOP
IST537I 5F37I   3   1    INACT     5    106       INOP
IST537I 5F37I   3   2    INACT     5    106       INOP
IST537I 5F37I                      6              UNDEF
IST537I 5F37I                      7              UNDEF
IST314I 5D14I   END
IST538I 5F38I   ROUTE TEST     8 IN PROGRESS
IST533I 5F33I   ER 5 FAILED        ROUTE TEST    8  FROM SA =     1 TO SA =   10
IST534I 5F34I                      ERLENGTH =    0  ADJSUB  = 106      TG =   1
IST572I 5F72I          REJECTING SA =    1 ADJACENT TO SA = 106 VIA TG =    1
IST573I 5F73I                      A REQUIRED TG IS INACTIVE,  ER MASK  = FF00
IST533I 5F33I   ER 3 FAILED        ROUTE TEST    8  FROM SA =     1 TO SA =   1C
IST534I 5F34I                      ERLENGTH =    0  ADJSUB  = 107      TG =   1
IST572I 5F72I          REJECTING SA = 149 ADJACENT TO SA =   10 VIA TG =    1
IST573I 5F73I                      A REQUIRED TG IS INACTIVE,  ER MASK = FF00
IST533I 5F33I   ER 0 SUCCEEDED IN ROUTE TEST    8  FROM SA =     1 TO SA =   10
IST534I 5F34I                      ERLENGTH =    2  ADJSUB  = 107      TG =   1
IST533I 5F33I   ER 5 SUCCEEDED IN ROUTE TEST    8  FROM SA =     1 TO SA =   10
IST534I 5F34I                      ERLENGTH =    2  ADJSUB  = 107      TG =   1
```

Displaying All Link Stations (D NET,STATIONS)

d net,stations

```
IST097I 5A97I   DISPLAY   ACCEPTED
IST350I 5D50I   VTAM DISPLAY - DOMAIN TYPE= STATIONS
IST393I 5D93I   PU T4/5 MAJOR NODE: NAME = ISTPUS   ,SUBAREA = 001
IST396I 5D96I   LINENAME STATUS    LNKSTA    STATUS      CTG GTG ADJNODE  ADJSA
IST397I 5D97I   OCD-L    ACTIV----I OCD-S    ACTIV----I   1   1 NCPLR2   106
IST397I 5D97I   OCF-L    ACTIV----I OCF-S    ACTIV----I   1   1 NCPLOC1  107
IST393I 5D93I   PU T4/5 MAJOR NODE: NAME = NCPLOC1  ,SUBAREA = 107
IST396I 5D96I   LINENAME STATUS    LNKSTA    STATUS      CTG GTG ADJNODE  ADJSA
IST397I 5D97I   L13A     ACTIV----E LS13A    ACTIV----E   1   1 NCPCRS3  010
IST397I 5D97I   L14A     ACTIV----E LS14A    ACTIV----E   2   2 NCPFAR4  014
IST397I 5D97I   L15A     ACTIV----E LS15A    ACTIV----E   1   1 NCPNET5  049
IST393I 5D93I   PU T4/5 MAJOR NODE: NAME = NCPLR2   ,SUBAREA = 106
IST396I 5D96I   LINENAME STATUS    LNKSTA    STATUS      CTG GTG ADJNODE  ADJSA
IST397I 5D97I   L21A     ACTIV----E LS21A    PCTD1        1   1          107
IST397I 5D97I   L23A     ACTIV----E LS23A    ACTIV----E   3   3 NCPCRS3  010
IST314I 5D14I   END
```

Displaying All Terminals (D NET,TERMS)

d net.terms

```
IST097I 5A97I  DISPLAY  ACCEPTED
IST350I 5D50I  VTAM DISPLAY - DOMAIN TYPE= LOGICAL UNITS/TERMS
IST354I 5D54I  PU T4/5 MAJOR NODE = ISTPUS
IST146I 5B46I  LINE NAME: OCF-L     STATUS: ACTIV
IST359I 5D59I  ATTACHMENT = LEASED
IST354I 5D54I  PU T4/5 MAJOR NODE = NCP1
IST146I 5B46I  LINE NAME: L1D05     STATUS: ACTIV
IST359I 5D59I  ATTACHMENT = LEASED
IST069I 5A89I  C3270A    TYPE= PHYSICAL UNIT     , ACTIV
IST355I 5D55I  LOGICAL UNITS:
IST060I 5A80I  CT3277A  ACTIV        CT3277B  ACTIV        CT3277C  ACTIV
IST089I 5A89I  C3275A    TYPE= PHYSICAL UNIT     , ACTIV
IST355I 5D55I  LOGICAL UNITS:
IST080I 5A80I  CT3275A  ACTIV
IST146I 5B46I  LINE NAME: DLMTA01 STATUS: NEVAC
IST359I 5D59I  ATTACHMENT = SWITCHED
IST146I 5B46I  LINE NAME: L1D55     STATUS: ACTIV
IST359I 5D59I  ATTACHMENT = LEASED
IST089I 5A89I  C3270D    TYPE= PHYSICAL UNIT     , ACTIV
IST355I 5D55I  LOGICAL UNITS:
IST080I 5A80I  CT3277D  ACTIV        CT3277E  ACTIV        CT3277F  ACTIV
IST080I 5A80I  CT3277G  NEVAC
IST089I 5A89I  C3275D    TYPE= PHYSICAL UNIT     , ACTIV
IST355I 5D55I  LOGICAL UNITS:
IST080I 5A80I  CT3275D  ACTIV
IST146I 5B46I  LINE NAME: LINE1     STATUS: ACTIV
IST359I 5D59I  ATTACHMENT = LEASED
IST089I 5A89I  PU1       TYPE= PHYSICAL UNIT     , ACTIV
IST355I 5D55I  LOGICAL UNITS:
IST080I 5A80I  PAJEFF01 ACTIV        LU1      ACT/S       CTJ10LU2 ACTIV
IST080I 5A80I  CTJ10LU3 ACTIV        SNUBULU1 ACTIV       SNUBULU2 NEVAC
IST080I 5A80I  CTJ10LU4 ACTIV        CTJ10LU5 ACTIV
IST146I 5B46I  LINE NAME: LSDLC2     STATUS: ACTIV
IST359I 5D59I  ATTACHMENT = LEASED
IST069I 5A89I  CCJ13     TYPE= PHYSICAL UNIT     , ACTIV
IST355I 5D55I  LOGICAL UNITS:
IST080I 5A80I  PAJEFF02 ACTIV        CTJ13LU1 ACTIV       CTJ13LU2 ACTIV
IST080I 5A80I  CTJ13LU3 ACTIV
IST089I 5A89I  LAN5520 TYPE= PHYSICAL UNIT     , NEVAC
IST355I 5D55I  LOGICAL UNITS:
IST080I 5A80I  LU15520  NEVAC
IST089I 5A89I  ADRPU     TYPE= PHYSICAL UNIT     , NEVAC
IST355I 5D55I  LOGICAL UNITS:
IST080I 5A80I  ADDRLU01 NEVAC        ADDRLU02 NEVAC       ADDRLU03 NEVAC
IST080I 5A80I  ADDRLU04 NEVAC        ADDRLU05 NEVAC       ADDRLU06 NEVAC
IST146I 5B46I  LINE NAME: L13A      STATUS: ACTIV
IST359I 5D59I  ATTACHMENT = LEASED
IST146I 5B46I  LINE NAME: BAKUPLIN STATUS: NEVAC
IST359I 5D59I  ATTACHMENT = LEASED
IST146I 5B46I  LINE NAME: LSDLC6    STATUS: ACTIV
IST359I 5D59I  ATTACHMENT = LEASED
IST089I 5A89I  PU1RTS1A TYPE= PHYSICAL UNIT     , ACTIV
IST355I 5D55I  LOGICAL UNITS:
IST080I 5A80I  RTS1LU1  ACTIV
IST353I 5D53I  SWITCHED SNA MAJOR NODE: NAME = SWNDIAL
IST089I 5A89I  SWITCHPU TYPE= PHYSICAL UNIT     , CONCT
IST355I 5D55I  LOGICAL UNITS:
IST080I 5A80I  PU1RTS1  CONCT        PU1RTS2  CONCT       PU1RTS3  CONCT
IST089I 5A89I  NET1PU2  TYPE= PHYSICAL UNIT     , CONCT
IST355I 5D55I  LOGICAL UNITS:
IST080I 5A80I  PU2RTS2  CONCT        SNUBULU1 RESET       SNUBULU2 RESET
IST089I 5A89I  NET1NTO  TYPE= PHYSICAL UNIT     , CONCT----T
IST355I 5D55I  LOGICAL UNITS:
IST080I 5A80I  NTOLU30  CONCT----T
IST089I 5A89I  NET2NTO  TYPE= PHYSICAL UNIT     , CONCT----T
IST355I 5D55I  LOGICAL UNITS:
IST080I 5A80I  NTOLU31  CONCT----T
IST351I 5D51I  LOCAL 3270 MAJOR NODE: NAME = LCL3270
IST089I 5A89I  L3270A    TYPE= LOGICAL UNIT     , ACTIV       ,CUA=3E0
IST089I 5A89I  L3270B    TYPE= LOGICAL UNIT     , NEVAC       ,CUA=3E1
IST089I 5A89I  L3284A    TYPE= LOGICAL UNIT     , NEVAC       ,CUA=3E5
IST352I 5D52I  LOCAL SNA MAJOR NODE: NAME = LCL3790A
IST089I 5A89I  PU11      TYPE= PHYSICAL UNIT     , ACTIV       ,CUA=0B8
IST355I 5D55I  LOGICAL UNITS:
IST080I 5A80I  LU112    ACTIV        LU113    NEVAC       LU114    NEVAC
IST080I 5A80I  LU111    ACTIV
IST314I 5D14I  END
```

Displaying a TSO User ID (D NET,U) (MVS Only)

d net,u,id=user01,e

```
IST097I      DISPLAY  ACCEPTED
IST075I      VTAM DISPLAY - NODE TYPE= TSO USERID
IST466I      NAME= USER01   ,STATUS= ACTIV              ,DESIRED STATE=N/A
IST576I      TSO TRACE = OFF
IST262I      APPLNAME = TSO0001  , STATUS = ACTIV
IST262I      LUNAME   = L3270A   , STATUS = ACTIV
IST314I      END
```

Appendix B. Incompatibilities with ACF/VTAM Release 2

ACF/VTAM Release 3 has the following operational incompatibilities with ACF/VTAM Release 2:

- ACF/VTAM no longer supports an NCP deactivation hierarchy; that is, deactivation of an NCP does not imply deactivation of any other NCP. (In ACF/VTAM Release 2, deactivation of a "local" NCP implied the deactivation of an attached "remote" NCP.) However, the deactivation of an NCP could disrupt one or more sessions with other NCPs, depending on the topology of the network, whether any links and link stations are automatically deactivated along with the NCP, and the particular routes carrying sessions. For disrupted SSCP sessions, if another virtual route is not available, session recovery remains pending until a route becomes available or until the operator deactivates the disrupted NCP. The operator is informed of both the original disruption and the pending route request.

- The CDLINK operand of the VARY and HALT commands is no longer unconditionally applied to the link between two NCPs channel-attached to the same host. It applies only if such a link is a true cross-domain link at the time the command containing the CDLINK operand is entered (that is, if one of the NCPs is not active to the host).

- ACF/VTAM attempts to leave active the same-domain cross-subarea links between two NCPs being concurrently deactivated. Therefore, all same-domain non-channel cross-subarea links are left active across an ACF/VTAM halt. In the non-halt case, because two deactivation commands cannot be entered at exactly the same time, and because the exact timing of the execution of two deactivations cannot be predicted, different results might be obtained in the final status of same-domain links between two NCPs being concurrently deactivated. Specifically, a same-domain link could become a cross-domain link as one deactivation progresses. By the time the second deactivation is ready to process the link, it is processed according to the CDLINK specification.

- ACF/VTAM's recovery of NCPs in single- and multiple-failure situations might result in recoveries pending indefinitely if some or all of the attempted recovery actions fail and no alternate routes are available. Such pending NCP recoveries can be purged by the operator by entering the VARY INACT command for the failing NCPs.

- The REP operand on a VARY ACQ command for an inactive NCP attached through an active SDLC link station is not necessary in ACF/VTAM Release 3 and, if specified, is ignored. Note that REP was prohibited on a VARY ACQ command for an already-active NCP in ACF/VTAM Release 2, and this is continued in ACF/VTAM Release 3.

- The RNAME operand of the VARY ACT command for a link station is not supported in ACF/VTAM Release 3 (except in certain migration situations, described in "Cross-Subarea Link Failures" in Chapter 3). Its use in nonmigration situations results in failure of the command.

- ACF/VTAM Release 2 initiated an immediate reload sequence for activation of an NCP through a "local-to-local" link (that is, activation of another domain's channel-attached NCP through the cross-domain SDLC link connecting the two domains). This was necessary to transmit the

required "remote" NCP load module to the communication controller, regardless of which end of the SDLC link was primary and which was secondary. ACF/VTAM Release 3 no longer automatically performs such a reload sequence, because a "remote" load module in these circumstances is not a requirement with ACF/NCP/VS Release 3. If an operator desires a reload in the manner of ACF/VTAM Release 2 under these conditions, "LOAD=YES" should be specified on the VARY ACT command.

- Deactivation of cross-subarea links is now more consistent with deactivation of other links in ACF/VTAM. Deactivation of a link now always results in the indirect deactivation of all of the link's subordinate resources. For a cross-domain link, this means the subordinate link station. This was not done in ACF/VTAM Release 2 because there was no possibility of multiple connections to NCPs, and deactivation of the link station would have had to imply deactivation of the adjacent NCP. As a result, ACF/VTAM Release 3 operators should exercise the same care with cross-subarea link deactivations as they use for cross-subarea link station deactivations.

- Forced reactivation (VARY INACT,R) of an NCP is changed to apply only to active NCPs and to perform reactivation only for the SSCP-to-NCP session. In ACF/VTAM Release 2, the single link station adjacent to the NCP was also reactivated as part of force reactivate processing. In ACF/VTAM Release 3, the command has no effect on the link stations in adjacent subarea nodes. A forced reactivation command can be entered for a link station that requires reactivation.

  Because forced reactivation of an NCP no longer affects adjacent link stations, the reactivation can no longer result in the dumping or reloading of the NCP's communication controller.

  Forced reactivation for an NCP that was acquired as an inactive NCP attached through an active SDLC link station is changed to be consistent with general forced reactivation processing for an NCP. In ACF/VTAM Release 2, such a forced reactivation was processed as a forced deactivation (VARY INACT,F) and the NCP was deactivated, because this kind of acquired NCP could not be dumped or reloaded if it became necessary during the processing of the command. Because dumping and reloading is never a possibility during forced reactivation of an NCP in ACF/VTAM Release 3, forced reactivation is now the same for all NCPs, regardless of how they are activated or acquired.

- Messages IST284A (in OS/VS) and 5C84A (in VSE) are changed from "OPTION TO RECOVER" to "OPTION TO RELOAD" when a link station fails and AUTOIPL=YES is not specified in the definition of the adjacent NCP. Accordingly, the meaning of the operator reply "NO" is changed. In ACF/VTAM Release 2, such a reply caused deactivation of the NCP (because no recovery was requested). In ACF/VTAM Release 3, this reply means that ACF/VTAM will not attempt to reload the NCP. ACF/VTAM tries to reactivate the affected adjacent link stations, assuming that the NCP has been or is being loaded by another host processor.

Glossary of Terms and Abbreviations

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.

This glossary includes definitions developed by the American National Standards Institute (ANSI) and the International Organization for Standardization (ISO). This material is reproduced from the *American National Dictionary for Information Processing*, copyright 1977 by the Computer and Business Equipment Manufacturers Association, copies of which may be purchased from the American National Standards Institute, 1430 Broadway, New York, New York 10018.

A complete commentary taken from ANSI is identified by an asterisk that appears between the term and the beginning of the commentary; a definition taken from ANSI is identified by an asterisk after the item number for that definition.

The symbol *ISO* at the beginning of a definition indicates that it has been discussed and agreed upon at meetings of the International Organization for Standardization Technical Committee 97/Subcommittee 1 (Data Processing), and has also been approved by ANSI.

Reference Words Used in the Entries
The following reference words are used in this glossary.

Synonymous with. Appears in the commentary of a preferred term and identifies less desirable or less specific terms that have the same meaning.

Synonym for. Appears in the commentary of a less desirable or less specific term and identifies the preferred term that has the same meaning.

Contrast with. Refers to a term that has an opposed or substantively different meaning.

See. Refers to multiple-word terms that have the same last word.

See also. Refers to related terms that have similar (but not synonymous) meanings.

A

ACB. Access method control block.

ACB address space. In ACF/VTAM, the address space in which the ACB is opened. See *associated address space* and *session address space.*

ACB-based macro instruction. In ACF/VTAM, a macro instruction whose parameters are specified by the user in an access method control block.

ACB name. (1) The name of an ACB macro instruction. (2) A name specified in the ACBNAME parameter of an APPL statement. Contrast with *network name.*

Note: *This name allows an ACF/VTAM application program that is used in more than one domain to specify the same application program identification (pointed to by the APPLID parameter of the program's ACB statement) in each copy. ACF/VTAM knows the program by both its ACB name and its network name (the name of the APPL statement). Program users within the domain can request a session using the ACB name or the network name; program users in other domains must use the network name (which must be unique in the network).*

accept. In an ACF/VTAM application program, to accept a CINIT request from an SSCP to establish a session with a logical unit; the application program acts as the primary end of the session. Contrast with *acquire (1).*

Note: *The accept process causes a BIND request to be sent from the primary end of the session to the logical unit that will act as the secondary end of the session, requesting that the session be established and passing session parameters. For example, the session-initiation request that originally caused the SSCP to send the CINIT request may have resulted from a logon by the terminal operator, from a macro instruction issued by an ACF/VTAM application program, or from an ACF/VTAM operator command.*

access method. A technique for moving data between main storage and input/output devices.

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, installation exit routine that collects statistics about session initiation and termination.

ACF. Advanced Communications Function.

ACF/NCP. Advanced Communications Function for the Network Control Program.

ACF/TCAM. Advanced Communications Function for the Telecommunications Access Method.

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 and can now issue ACF/VTAM macro instructions.

ACF/VTAM definition. The process of defining the user application network to ACF/VTAM and modifying IBM-defined characteristics to suit the needs of the user.

ACF/VTAM definition library. The operating system files or data sets that contain the definition statements and start options filed during ACF/VTAM definition.

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

ACF/VTAM operator. A person or program authorized to issue ACF/VTAM operator commands. See *domain operator, program operator,* and *network operator* (2).

ACF/VTAM operator command. A command used to monitor or control an ACF/VTAM domain.

acquire. (1) In ACF/VTAM, the operation in which an authorized ACF/VTAM application program initiates and establishes a session with another logical unit; the application program acts as the primary end of the session. **Note:** *The acquire process causes an Initiate request to be sent to the SSCP which causes the SSCP to return a CINIT request to the application program (the PLU); this in turn causes the PLU to send a BIND request to the SLU.* Contrast with *accept.* (2) In relation to ACF/VTAM resource control, to take over resources (communication controllers or other 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. In ACF/VTAM, pertaining to a major or minor node for which a VARY NET,ACT command has been issued. Also, a major or minor node in a list of major nodes to be activated when ACF/VTAM is started. Contrast with *inactive.*

Note: *For a major node, this makes the node and its minor nodes known to ACF/VTAM. 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 ACF/VTAM operator has given permission for the LU to participate in an LU-LU session.*

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

adjacent subareas. In ACF/VTAM, two subareas connected by one or more links with no intervening nodes. See also *subarea.*

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

Advanced Communications Function for the Network Control Program (ACF/NCP). A program product that provides communication 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, multiple-domain capability.

Advanced Communications Function for the Virtual Telecommunications Access Method Entry (ACF/VTAME). A program product that provides single-domain and multiple-domain data communication capability for 4300 systems that may include communication adapters.

any-mode. In ACF/VTAM: (1) The form of a RECEIVE request that obtains input from any one (unspecified) session. (2) The form of an accept request that completes the establishment of a session by accepting any one (unspecified) queued CINIT request. Contrast with *specific-mode.* See *continue-any mode.* See also *accept.*

application program exit routine. In ACF/VTAM, a user-written exit routine that performs functions for a particular application program and is run as part of the application program. Examples are RPL exit routines, EXLST exit routines, and the TESTCB exit routine. Contrast with *installation exit routine.*

application program identification. The symbolic name by which an application program is identified to ACF/VTAM.

Note: *It is specified in the APPLID parameter of the ACB macro instruction. It corresponds to the ACBNAME parameter in the APPL statement or, if ACBNAME is defaulted, to the name of the APPL statement.*

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

associated address space. In ACF/VTAM, the address space in which RPL-based requests are issued that specify an ACB opened in another address space.

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

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

authorization exit routine. In ACF/VTAM, an optional, installation exit routine that approves or disapproves requests for session initiation.

authorized path. In ACF/VTAM for MVS, a facility that enables an application program to specify that a data transfer or related operation be carried out in a privileged, and more efficient manner.

automatic activation. In ACF/VTAM, the activation of links and link stations in adjacent subarea nodes as a result of channel device name or RNAME specifications related to an activation command naming a subarea node.

automatic deactivation. In ACF/VTAM, the deactivation of links and link stations in adjacent subarea nodes as a result of a deactivation request naming a subarea node.

Note: *Automatic deactivation occurs only for automatically activated links and link stations that have not also been directly or indirectly activated.*

automatic logon. A process by which ACF/VTAM 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 via the VARY NET,LOGON command.*

auxiliary network address. In ACF/VTAM, any network address, except the main network address, assigned to an LU capable of having parallel sessions. Contrast with *main network address.*

available. In ACF/VTAM, 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 half-sessions. It consists of a request/response header (RH) followed by a request/ response unit (RU).

basic mode. In ACF/VTAM Release 1 and in VTAM, a mode of data transfer in which the application program can communicate with non-SNA terminals without using SNA protocols. Contrast with *record mode.*

basic transmission unit (BTU). (1) In SNA, the unit of data and control information passed between path control components. A BTU can consist of one or more path information units (PIUs). See also *blocking of PIUs.* (2) In the network control program, the unit of exchange between the host processor and the communication controller. It consists of control information and may also include data. The control information consists of a basic transmission header (BTH) and a basic device unit (BDU). All data transferred between the processing unit and the communication controller is preceded by a BTH.

begin bracket. In SNA, the value (binary 1) of the begin-bracket indicator in the request header (RH) of the first request in the

first chain of a bracket; the value denotes the start of a bracket. Contrast with *end bracket.* See also *bracket.*

bidder. In SNA, the LU-LU half-session defined at session activation as having to request and receive permission from the other LU-LU half-session to begin a bracket. Contrast with *first speaker.* See also *bracket protocol.*

BIND. A request to activate a session between two logical units.

BIU. Basic information unit.

BIU segment. In SNA, the portion of a basic information unit (BIU) that is contained within a path informatin unit (PIU). It consists of either a request/response header (RH) followed by all or a portion of a request/response unit (RU), or only a portion of an RU.

blocking of PIUs. In SNA, an optional function of path control that combines multiple path information units (PIUs) into a single basic transmission unit (BTU).

Note: *When blocking is not done, a BTU consists of one PIU.*

boundary function. In SNA, (1) A capability of a subarea node to provide protocol support for adjacent peripheral nodes, such as: (a) transforming network addresses to local addresses, and vice versa; (b) performing session sequence numbering for low-function peripheral nodes; and (c) providing session-level pacing support. See also *path control network, network addressable unit.* (2) The component that provides these capabilities.

boundary node. A network node that performs boundary functions. See also *boundary function.*

bracket. In SNA, one or more chains of request units (RUs) and their responses that are exchanged between the two LU-LU half-sessions and that represent a transaction between them. A bracket must be completed before another bracket can be started. Examples of brackets are data base inquiries/replies, update transactions, and remote job entry output sequences to work stations.

bracket protocol. In SNA, a data flow control protocol in which exchanges between the two LU-LU half-sessions are achieved through the use of brackets, with one LU designated at session activation as the first speaker and the other as the bidder. The bracket protocol involves bracket initiation and termination rules. See also *bidder, first speaker.*

BTU. Basic transmission unit.

C

cancel closedown. A closedown in which ACF/VTAM is abnormally terminated either because of an unexpected situation or as the result of an operator command.

CDRM Cross-domain resource manager.

chain. See *RU chain.*

change-direction protocol. In SNA, a data flow control protocol in which the sending logical unit (LU) stops sending normal-flow requests, signals this fact to the receiving LU using the change-direction indicator (in the request header of the last request of the last chain), and prepares to receive requests.

channel-attached. (1) Pertaining to the attachment of devices directly by I/O channels to a computer. Contrast with *link-attached*. (2) Pertaining to devices that are attached to a controlling unit by cables, rather than by communication lines.

channel device name. The symbolic name by which a channel-attached device is identified to the host operating system: sometimes also known as a channel unit address.

character-coded. In ACF/VTAM, pertaining to commands (such as LOGON or LOGOFF) entered by an end user and sent by a logical unit in character form. The character-coded command must be in the syntax defined in the user's unformatted system services definition table. Synonym for *unformatted*. Contrast with *field-formatted*.

CID. Communication identifier.

CINIT. A network services request sent from an SSCP to an LU requesting that LU to establish a session with another LU and to act as the primary end of the session.

ciphertext. Synonym for *enciphered data*.

class of service (COS). In SNA, a designation of the path control network characteristics, such as path security, transmission priority, and bandwidth, that apply to a particular session. The end user designates class of service at session initiation by using a symbolic name that is mapped into a list of virtual routes, any one of which can be selected for the session to provide the requested level of service.

Cleanup. A network services request, sent by an SSCP to an LU, that causes a particular LU-LU session with that LU to be ended immediately (without requiring the participation of either the other LU or its SSCP).

clear data. Data that is not enciphered. Synonymous with *plaintext*.

clear session. A session in which only clear data is transmitted or received. Contrast with *cryptographic session*.

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

cluster controller. A device that can control the input/output operations of more than one device connected to it. A cluster controller 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 3272 Control Unit.

CNM. Communication network management.

command. (1) A request from a terminal for the performance of an operation or the execution of a particular program. (2) In SNA, any field set in the transmission header (TH), request header (RH), and sometimes portions of a request unit, that indicates an action or that begins a protocol; for example: (a) Bind Session (session-control request unit), a command that activates an LU-LU session, (b) the change-direction indicator in the RH of the last RU of a chain, (c) the virtual route reset window indicator in a FID4 transmission header. (3) See also *ACF/VTAM operator command*.

communication adapter. An optional hardware feature, available on certain processors, that permits communication lines to be attached to the processors.

communication common carrier. In the USA, a government-regulated private company that furnishes the general public with telecommunication service facilities; for example, a telephone or telegraph company.

communication control character. *(ISO) Synonym for *transmission control character*.

communication controller. A type of communication control unit whose operations are controlled by one or more programs stored and executed in the unit. Examples are the IBM 3704 and 3705 Communications Controllers.

communication control unit. A communication device that controls the transmission of data over lines in a network. Communication control units include transmission control units (such as the 2702 Transmission Control Unit) and communication controllers (such as the 3705 Communications Controller).

communication identifier (CID). In ACF/VTAM, a key for locating the control blocks that represent a 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. Contrast with *link*.

communication macro instructions. In ACF/VTAM, the set of RPL-based macro instructions used to communicate within a session.

communication management configuration. A technique for configuring a network that allows for the consolidation of many network management functions for the entire network in a single host processor.

communication network management (CNM) application program. An ACF/VTAM application program that is authorized to issue formatted management services request units containing physical-unit-related requests and to receive formatted management services request units containing information from physical units.

configuration restart. In ACF/VTAM, the recovery facility that can be used after a failure or deactivation of a major node, ACF/VTAM, or the host processor to restore the domain to its status at the time of the failure or deactivation.

configuration services. In SNA, one of the types of network services in the system services control point (SSCP) and in the physical unit (PU); configuration services activate, deactivate, and maintain the status of physical units, links, and link stations. Configuration services also shut down and restart network elements and modify path-control routing tables and address-transformation tables. See also *maintenance services, management services, network services, session services,* and *system services control point.*

connected. In ACF/VTAM, pertaining to a PU or LU that has an active physical path to the host processor containing the SSCP that controls the PU or LU.

connection. Synonym for *physical connection.*

connection point manager In SNA, a component of the transmission control layer that: (1) performs session-level pacing of normal-flow requests, (2) checks sequence numbers of received request units, (3) verifies that request units do not exceed the maximum permissible size, (4) routes incoming request units to their destinations within the half-session, and (5) enciphers and deciphers FMD request units when cryptography is selected. The connection point manager coordinates the normal and expedited flows for one half-session.

Note: *The sending connection point manager within a half-session builds the request/response header (RH) for outgoing request/response units, and the receiving connection point manager interprets the request/response headers that precede incoming request/response units.*

continue-any mode. In ACF/VTAM, a state into which a session is placed that allows its input to satisfy a RECEIVE request issued in any-mode. While this state exists, input on the session can also satisfy RECEIVE requests issued in specific-mode. Contrast with *continue-specific mode.*

continue-specific mode. In ACF/VTAM, a state into which a session is placed that allows its input to satisfy only RECEIVE requests issued in specific-mode.

controlling application program. In ACF/VTAM, an application program with which a logical unit (other than a secondary application program) is automatically put in session whenever the logical unit is available. See also *automatic logon.*

converted command. An intermediate form of a character-coded command produced by ACF/VTAM through use of an unformatted system services definition table. The format of a converted command is fixed; the unformatted system services definition table must be constructed in such a manner that the character-coded command (as entered by a logical unit) is converted into the predefined, converted command format. See also *unformatted.*

COS. Class of service.

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

cross-domain keys. In SNA, a pair of cryptographic keys used by a system services control point (SSCP) to encipher the session

cryptography key that is sent to another SSCP and to decipher the session cryptography key that is received from the other SSCP during initiation of cross-domain LU-LU sessions that use session-level cryptography.

cross-domain link. A link physically connecting two domains.

cross-domain LU-LU session. In SNA, a session between logical units (LUs) in different domains. Contrast with *same-domain LU-LU session.*

cross-domain resource. A resource owned by a CDRM in another domain but known by the CDRM in this domain by network name and associated cross-domain resource manager.

cross-domain resource manager (CDRM). In ACF/VTAM, the portion of the system services control point (SSCP) that controls initiation and termination of cross-domain sessions.

cross keys. Synonym for *cross-domain keys.*

cross-subarea. In SNA, pertaining to control or resources involving more than one subarea node.

cross-subarea link. A link between two adjacent subarea nodes.

CRV. Cryptography Verification.

cryptographic. Pertaining to the transformation of data to conceal its meaning.

cryptographic algorithm. A set of rules that specify the mathematical steps required to encipher and decipher data.

cryptographic key. A 64-bit value (containing 56 independent bits and 8 parity bits) that functions with the Data Encryption Standard (DES) algorithm in determining the output of the DES algorithm. See *cross-domain keys, session cryptography key, host master key,* and *secondary logical unit key.*

cryptographic session. A session in which data may be enciphered before it is transmitted and deciphered after it is received. Contrast with *clear session.* See *required cryptographic session* and *selective cryptographic session.*

cryptographic session key. In SNA, deprecated term for session cryptography key.

Cryptography Verification (CRV) request. A request unit sent by the primary logical unit (PLU) to the secondary logical unit (SLU) as part of cryptographic session establishment, to allow the SLU to verify that the PLU is using the correct cryptographic session key.

D

data communication. *The transmission and reception of data.

data encrypting key. A cryptographic key used to encipher and decipher data transmitted in a cryptographic session. Contrast with *key encrypting key.* See *session cryptography key.*

Data Encryption Standard (DES) algorithm. A cryptographic algorithm designed to encipher and decipher data using a 64-bit cryptographic key, as specified in the *Federal Information Processing Standard Publication 46*, January 15, 1977.

data flow control (DFC). In SNA, a request/response unit (RU) category used for requests and responses exchanged between the data flow control layer in one half-session and the data flow control layer in the session partner.

data flow control (DFC) layer. In SNA, the layer within a half-session that (1) controls whether the half-session can send, receive, or concurrently send and receive request units (RUs); (2) groups related RUs into RU chains; (3) delimits transactions via the bracket protocol; (4) controls the interlocking of requests and responses in accordance with control modes specified at session activation; (5) generates sequence numbers; and (6) correlates requests and responses.

data flow control protocol. 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, synonym for *link*.

data link control (DLC) layer. In SNA, the layer that consists of the link stations that schedule data transfer over a link between two nodes and perform error control for the link. Examples of data link control are SDLC for serial-by-bit link connection and data link control for the System/370 channel.

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*.

data traffic reset state. The state usually entered after Bind Session, if Cryptography Verification is used, and after Clear, but prior to Start Data Traffic. While a session is in this state, requests and responses for data and data flow control cannot be sent. Only certain session control requests can be sent.

decipher. To convert enciphered data into clear data. Contrast with *encipher*.

definite response. In SNA, a value in the form-of-response-requested field of the request header. The value directs the receiver of the request to return a response unconditionally, whether positive or negative, to that request. Contrast with *exception response, no response*.

definition statement. The means of describing an element of the network.

delayed-request mode. In SNA, an operational mode in which the sender may continue sending request units on the normal flow after sending a definite-response request chain on that flow, without waiting to receive the response to that chain. Contrast with *immediate-request mode*.

delayed-response mode. In SNA, an operational mode in which the receiver of normal-flow request units can return responses to the sender in a sequence different from that in which the corresponding request units were sent. Contrast with *immediate-response mode*.

Note: *An exception is the response to the DFC request CHASE: all responses to normal-flow request units received before CHASE must be sent before the response to CHASE is sent.*

DES. Data Encryption Standard.

device control character. (ISO) A control character used for the control of ancillary devices associated with a data processing system or data communication system, for example, for switching such devices on or off.

device-type logical unit. In ACF/VTAM, 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 a 3790 application program). See also *peripheral node*.

DFC. Data flow control.

DFSYN response. In ACF/VTAM, a normal-flow response that is treated as a normal-flow request so that it may be received in order with normal-flow requests.

direct activation. In ACF/VTAM, the activation of a resource as a result of an activation command specifically naming the resource.

direct deactivation. In ACF/VTAM, the deactivation of a resource as a result of a deactivation command specifically naming the resource.

disabled. In ACF/VTAM, pertaining to an LU that has indicated to its SSCP that it is temporarily not ready to establish LU-LU sessions. An Initiate request for a session with a disabled LU can specify that the session be queued by the SSCP until the LU becomes enabled. The LU can separately indicate whether this applies to its ability to act as a PLU or an SLU. See also *enabled* and *inhibited*.

disconnection. The termination of a physical connection.

DLC. Data link control.

domain. In SNA, a system services control point (SSCP) and the physical units (PUs), logical units (LUs), links, link stations, and all the associated resources that the SSCP has the ability to control by means of activation requests and deactivation requests.

domain operator. In a multiple-domain network, the person or program that controls the operation of the resources controlled by one system services control point. Contrast with *network operator (2)*.

DRDS. Dynamic reconfiguration data set.

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

dynamic reconfiguration. In ACF/VTAM, the process of changing the network configuration (peripheral PUs and LUs) associated with a boundary node, without regenerating the boundary node's complete configuration tables.

dynamic reconfiguration data set (DRDS). In ACF/VTAM, a data set used for storing definition data that can be applied to a generated communication controller configuration at the operator's request. See also *dynamic reconfiguration*.

E

echo check. *A method of checking the accuracy of transmission of data in which the received data are returned to the sending end for comparison with the original data.

element. (1) A field in the network address. (2) The particular resource within a subarea identified by the element field. See also *subarea*.

element address. In SNA, a value in the element address field of the network address identifying a specific resource within a subarea. See *subarea address*.

emulation mode. The function of a network control program that enables it to perform activities equivalent to those performed by a transmission control unit. Contrast with *network control mode*.

enabled. In ACF/VTAM, pertaining to an LU that has indicated to its SSCP that it is now ready to establish LU-LU sessions. The LU can separately indicate whether this applies to its ability to act as a PLU or an SLU. See also *disabled* and *inhibited*.

encipher. (1) To scramble data or convert it, prior to transmission, to a secret code that masks the meaning of the data to any unauthorized recipient. (2) In ACF/VTAM, to convert clear data into enciphered data. Contrast with *decipher*.

enciphered data. Data that is intended to be illegible to all except those who legitimately possess the means to reproduce the clear data. Synonymous with *ciphertext*.

end bracket. In SNA, the value (binary 1) of the end bracket indicator in the request header (RH) of the first request of the last chain of a bracket; the value denotes the end of the bracket. Contrast with *begin bracket*. See also *bracket*.

end user. In SNA, the ultimate source or destination of application data flowing through an SNA network. An end user may be an application program or a terminal operator.

ER. Explicit route.

exception request (EXR). In SNA, a request that replaces another message unit in which an error has been detected.

Note: *The exception request contains a 4-byte sense field that identifies the error in the original message unit and, except for some path errors, is sent to the destination of the original message unit; if possible, the sense data is returned in a negative response to the originator of the replaced message unit.*

exception response. In SNA, a value in the form-of-response-requested field of a request header: the receiver is requested to return a response only if the request is unacceptable as received or cannot be processed; that is, a negative response, but not a positive one, may be returned. Contrast with *definite response, no response*. See also *negative response*.

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, virtual route selection exit routine, EXLST exit routine,* and *RPL exit routine*.

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

expedited flow. In SNA, a data flow designated in the transmission header (TH) that is used to carry network control, session control, and various data flow control request/response units (RUs); the expedited flow is separate from the normal flow (which carries primarily end-user data) and can be used for commands that affect the normal flow. Contrast with *normal flow*.

Note: *The normal and expedited flows move in both the primary-to-secondary and secondary-to-primary directions. Requests and responses on a given flow (normal or expedited) usually are processed sequentially within the path, but the expedited flow traffic may be moved ahead of the normal-flow traffic within the path at queuing points in the half-sessions and for half-session support in boundary functions.*

explicit route (ER). In SNA, the path control network components, including a specific set of one or more transmission groups, that connect two subarea nodes. An explicit route is identified by an origin subarea address, a destination subarea address, an explicit route number, and a reverse explicit route number. See also *path, route extension, virtual route*.

explicit route length. In SNA, the number of transmission groups in an explicit route.

EXR. Exception request.

external domain. The portion of the total network that is controlled by an SSCP other than the SSCP that controls the portion under discussion.

F

FD. Full duplex.

FDX. Full duplex.

feedback information. In ACF/VTAM, information that is placed in certain RPL fields when an RPL-based macro instruction is completed.

FID. Format identification.

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 *character-coded.*

first speaker. In SNA, the LU-LU half-session defined at sessin activation as: (1) able to begin a bracket without requesting permission from the other LU-LU half-session to do so, and (2) winning contention if both half-sessions attempt to begin a bracket simultaneously. Contrast with *bidder.* See also *bracket protocol.*

flow control. In SNA, the process of managing the rate at which data traffic passes between components of the network. The purpose of flow control is to optimize the rate of flow of message units, with minimum congestion in the network; that is, to neither overflow the buffers at the receiver or at intermediate nodes, nor leave the receiver waiting for more message units. See also *pacing, session-level pacing, virtual route pacing.*

FM. Function management.

FMD. Function management data.

FMH. Function management header.

format identification (FID) field. In SNA, a field in each transmission header (TH) that indicates the format of the TH; that is, the presence or absence of certain fields. Transmission header formats differ in accordance with the types of nodes between which they pass.

Note: *There are six FID types:*

FID0, used for traffic involving non-SNA devices between adjacent subarea nodes when either or both nodes do not support explicit route and virtual route protocols.

FID1, used for traffic between adjacent subarea nodes when either or both nodes do not support explicit route and virtual route protocols.

FID2, used for traffic between a subarea node and an adjacent PU type 2 peripheral node.

FID3, used for traffic between a subarea node and an adjacent PU type 1 peripheral node.

FID4, used for traffic between adjacent subarea nodes when both nodes support explicit route and virtual route protocols.

FIDF, used for certain commands (for example, for transmission group control) sent between adjacent subarea nodes when both nodes support explicit route and virtual route protocols.

formatted system services. A portion of ACF/VTAM 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.*

full duplex (FD, FDX). *Synonym for *duplex.*

function management data (FMD). In SNA, an RU category used for end-user data exchanged between logical units (LUs) and for requests and responses exchanged between network services components of LUs, PUs, and SSCPs.

function management (FM) header. In SNA, one or more headers, optionally present in the leading request units (RUs) of an RU chain, that allow one half-session in an LU-LU session to: (1) select a destination at the session partner and control the way in which the end-user data it sends is handled at the destination, (2) change the destination or the characteristics of the data during the session, and (3) transmit between session partners status or user information about the destination (for example, a program or device).

Note: *FM headers can be used on LU-LU session types 0, 1, 4, and 6.*

function management (FM) profile. In SNA, a specification of various data flow control protocols (such as RU chains and data flow control requests) and FMD options (such as use of FM headers, compression, and alternate codes) supported for a particular session. Each function management profile is identified by a number.

G

generic BIND. In ACF/VTAM, synonym for session activation request.

generic UNBIND. In ACF/VTAM, synonym for session deactivation request.

H

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

half session. In SNA, a component that provides FMD services, data flow control, and transmission control for one of the sessions of a network addressable unit (NAU). See also *primary half-session, secondary half-session.*

host LU. An SNA logical unit located in a host processor, for example, an ACF/VTAM application program. Contrast with *peripheral LU.*

host master key. A cryptographic key used to encipher operational keys that will be used at the host processor.

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

I

ICV. Initial chaining value.

immediate-request mode. In SNA, an operational mode in which the sender stops sending request units (RUs) on a given flow (normal or expedited) after sending a definite-response request chain on that flow until that chain has been responded to. Contrast with *delayed-request mode.* See also *immediate-response mode.*

immediate-response mode. In SNA, an operational mode in which the receiver responds to request units (RUs) on a given normal flow in the order it receives them; that is, in a first-in, first-out sequence. Contrast with *delayed-response mode.* See also *immediate-request mode.*

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

indirect activation. In ACF/VTAM, the activation of a lower-level resource (in the resource hierarchy) as a result of SCOPE or ISTATUS specifications related to an activation command naming a higher-level resource.

indirect deactivation. In ACF/VTAM, the deactivation of a lower-level resource (in the resource hierarchy) as a result of a deactivation command naming a higher-level resource.

inhibited. In ACF/VTAM, pertaining to an LU that has indicated to its SSCP that it is not ready to establish LU-LU sessions. An Initiate request for a session with an inhibited LU will be rejected by the SSCP. The LU can separately indicate whether this applies to its ability to act as a PLU or as an SLU. See also *enabled* and *disabled.*

initial chaining value (ICV). An 8-byte pseudo-random number used to verify that both ends of a cryptographic session have the same cryptographic session key. The initial chaining value is also used as input to the DES algorithm to encipher or decipher data in a cryptographic session. Synonymous with *session seed.*

Initiate. A network services request, sent from an LU to an SSCP, requesting that an LU-LU session be established.

installation exit routine. In ACF/VTAM, a user-written exit routine that can perform functions related to initiation and termination of sessions and is run as part of ACF/VTAM rather than as part of an application program. Examples are the accounting, authorization, logon-interpret, and virtual route selection exit routines. Contrast with *application program exit routine.*

intermediate node. A node that is capable of routing path information units to another subarea and that contains neither the origin NAU, nor the destination NAU, nor any associated boundary function for these NAUs. Contrast with *boundary node.*

interpret table. In ACF/VTAM, a user-defined correlation list that translates an argument into a string of 8 characters. Interpret tables can be used to translate logon data into the name of an application program for which the logon is intended.

K

key encrypting key. A cryptographic key used to encipher and decipher other cryptographic keys. Contrast with *data encrypting key.*

L

line. See *communication line.*

line control. The scheme of operating procedures and control signals by which a data link is controlled. For example, synchronous data link control (SDLC). Synonym for *data link control protocol.*

line group. One or more communication lines of the same type.

link. In SNA, the combination of the link connection and the link stations joining network nodes; for example: (1) a System/370 channel and its associated protocols, (2) a serial-by-bit connection under the control of Synchronous Data Link Control (SDLC). Synonymous with *data link.*

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

link-attached. In ACF/VTAM, pertaining to devices that are physically connected by a communication line. Synonymous with *remote.* Contrast with *channel-attached.*

link connection. In SNA, the physical equipment providing two-way communication between one link station and one or more other link stations; for example, a communication line and data circuit terminating equipment (DCE).

link level 2 test. See *link test.*

link station. (1) In SNA, the combination of hardware and software that allows a node to attach to and provide control for a link. (2) In ACF/VTAM, a named resource within a subarea node representing another subarea node directly attached by a cross-subarea link. In the resource hierarchy, the link station is subordinate to the cross-subarea link.

Note: An SDLC link station is defined in an NCP subarea node with a PU PUTYPE=4 macro in the NCP definition. A channel link station is defined dynamically by ACF/VTAM when a channel-attached NCP is activated.

link test. In SNA, a test in which one link station returns data received from another link station without changing the data in order to test the operation of the link.

Note: Three tests can be made; they differ in the resources that are dedicated during the test. A link test, level 0 requires a dedicated subarea node, link, and secondary link station. A link

test, level 1 requires a dedicated link and secondary link station. A link test, level 2 requires only the dedicated link station.

local. (1) Synonymous with *channel-attached.* (2) Pertaining to a device that is attached to a controlling unit by cables, rather than by a communication line.

local address. In SNA, an address used in a peripheral node in place of a network address and transformed to or from a network address by the boundary function in a subarea node.

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

local session identification (LSID). In SNA, a field in a FID3 transmission header that contains an indication of the type of session (SSCP-PU, SSCP-LU, or LU-LU) and the local address of the peripheral logical unit (LU) or physical unit (PU).

local SNA major node. In ACF/VTAM, a major node whose minor nodes are channel-attached peripheral nodes.

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

logical unit (LU). In SNA, one of three types of network addressable units (NAUs). It is a port through which an end user accesses the SNA network in order to communicate with another end user and through which the end user accesses the functions provided by the system services control point (SSCP). An LU is capable of supporting at least two sessions one with the SSCP, and one with another logical unit and may be capable of supporting many sessions with other logical units. See also *peripheral LU, physical unit, system services control point, primary logical unit, secondary logical unit.*

logical unit (LU) services. In SNA, capabilities in a logical unit to: (1) receive requests from an end user and, in turn, issue requests to the system services control point (SSCP) in order to perform the requested functions, typically for session initiation; (2) receive requests from the SSCP, for example to activate LU-LU sessions via Bind Session requests; and (3) provide session presentation and other services for LU-LU sessions. See also *physical unit (PU) services.*

logic error. In ACF/VTAM, an error condition that results from an invalid request; a program logic error.

log off. In ACF/VTAM, to request that a session be terminated.

logoff. In ACF/VTAM, an unformatted session-termination request.

log on. In ACF/VTAM, to initiate a session between an application program and a logical unit.

logon. In ACF/VTAM, an unformatted session-initiation request for a session between two logical units. See *automatic logon* and *simulated logon.* See also *session-initiation request.*

logon data. In ACF/VTAM: (1) The user data portion of a field-formatted or unformatted session-initiation request. (2)

The entire logon sequence or message from an LU. Synonymous with *logon message.*

logon-interpret routine. In ACF/VTAM, an installation exit routine, associated with an interpret table entry, that translates logon information. It may also verify the logon.

logon message. Synonym for *logon data.*

logon mode. In ACF/VTAM, a subset of session parameters specified in a logon mode table for communication with a logical unit. See also *session parameters.*

logon mode table. In ACF/VTAM, a set of entries for one or more logon modes. Each logon mode is identified by a logon mode name.

LSID. Local session identification.

LU. Logical unit.

LU connection test. A diagnostic aid that permits a terminal operator to check whether the path between a system services control point (SSCP) and a logical unit (LU) is operational.

LU-LU session. In SNA, a session between two logical units in an SNA network. It provides communication between two end users, or between an end user and an LU services component.

LU-LU session type. In SNA, the classification of an LU-LU session in terms of the specific subset of SNA protocols and options supported by the logical units (LUs) for that session, namely:

> The mandatory and optional values allowed in the session activation request.
> The usage of data stream controls, FM headers, RU parameters, and sense codes.
> Presentation services protocols such as those associated with FM header usage.

LU-LU session types 0, 1, 2, 3, 4, 6, and 7 are defined.

LU type. In SNA, deprecated term for LU-LU session type.

M

main network address. In ACF/VTAM, the LU network address used for the SSCP-LU session and certain LU-LU sessions with the LU. Contrast with *auxiliary network address.*

maintenance services. In SNA, one of the types of network services in system services control points (SSCPs) and physical units (PUs). Maintenance services provide facilities for testing links and nodes and for collecting and recording error information. See also *configuration services, management services, network services, session services.*

major node. In ACF/VTAM, a set of minor nodes that can be activated and deactivated as a group. See *node* and *minor node.*

management services. In SNA, one of the types of network services in system services control points (SSCPs) and logical

units (LUs). Management services forward requests for network data, such as error statistics, and deliver the data in reply. See also *configuration services, maintenance services, network services, session services.*

mandatory cryptographic session. Synonym for *required cryptographic session.*

message unit. In SNA, a generic term for the unit of data processed by any layer; for example, a basic information unit (BIU), a path information unit (PIU), a request/response unit (RU).

minor node. In ACF/VTAM, a uniquely-defined resource within a major node. See *node* and *major node.*

modem. *(modulator-demodulator) A device that modulates and demodulates signals transmitted over data communication facilities.

multiple-domain network. In SNA, a network with more than one system services control point (SSCP). Contrast with *single-domain network.*

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/VTAM application program that processes requests for more than one session concurrently. Contrast with *single-thread application program.*

N

NAU. Network addressable unit.

NC. Network control.

NCP. Network control program.

NCP major node. In ACF/VTAM, a set of minor nodes representing resources, such as lines and peripheral nodes, controlled by a network control program. See *major node.*

negative polling limit. For a start-stop or BSC terminal, the maximum number of consecutive negative responses to polling that the communication controller accepts before suspending polling operations.

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

negotiable BIND. In SNA, a capability that allows two logical unit half-sessions to negotiate the parameters of a session when the session is being activated.

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

network address. In SNA, an address, consisting of subarea and element fields, that identifies a link, a link station, or a network addressable unit. Subarea nodes use network addresses; peripheral nodes use local addresses. The boundary function in the subarea node to which a peripheral node is attached transforms local addresses to network addresses and vice versa. 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 for parallel LU-LU sessions.) The path control network and the NAUs collectively constitute the SNA network.*

network configuration tables. The tables through which the system services control point (SSCP) interprets the network configuration.

network control (NC). In SNA, an RU category used for requests and responses exchanged between physical units (PUs) for such purposes as activating and deactivating explicit and virtual routes and sending load modules to adjacent peripheral nodes. See also *data flow control layer* and *session control.*

network control mode. The functions of a network control program that enable it to direct a communication controller to perform activities such as polling, device addressing, dialing, and answering. Contrast with *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 communication controller.

network control program generation. The process, performed in a host system, of assembling and link-editing a macro instruction program to produce a network control program.

networking. In a multiple-domain network, communication among domains.

network name. (1) In SNA, the symbolic identifier by which end users refer to a network addressable unit (NAU), 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.* See *uninterpreted name.*

network node. Synonym for *node.*

network operator. (1) In SNA, a person or program responsible for controlling the operation of all or part of a network. (2) The person or program that controls all the domains in a multiple-domain network. Contrast with *domain operator.*

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

network services (NS). In SNA, the services within network addressable units (NAUs) that control network operation via SSCP-SSCP, SSCP-PU, and SSCP-LU sessions. See *configuration services, maintenance services, management services, session services.*

network services (NS) header. In SNA, a 3-byte field in an FMD request/response unit (RU) flowing in an SSCP-LU, SSCP-PU, or SSCP-SSCP session. The network services header is used primarily to identify the network services category of the RU (for example, configuration services, session services) and the particular request code within a category.

Network Services Procedure Error (NSPE). A request unit that is sent by an SSCP to an LU when a procedure requested by that LU has failed.

Network Terminal Option (NTO). An IBM program product that extends the capabilities of the ACF/NCP to support a select group of non-SNA devices.

NIB. Node initialization block.

NIB list. A series of contiguous node initialization blocks.

node. (1) In SNA, a junction point in a network, that contains a physical unit (PU). A node also contains other network addressable units, path control components and data link control components, and may contain boundary function. (2) In ACF/VTAM, a point in a network defined by a symbolic name. Synonymous with *network node.* See *major node* and *minor node.*

node initialization block (NIB). In ACF/VTAM, 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 to indicate how communication requests on a session are to be handled by ACF/VTAM.

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

node type. In SNA, a designation of a node according to the protocols it supports and the network addressable units (NAUs) that it can contain. Four types are defined: 1, 2, 4, and 5. Type 1 and type 2 nodes are also referred to as peripheral nodes and type 4 and type 5 nodes are also referred to as subarea nodes. See also *physical unit type.*

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

nonswitched line. A mode of operating a link in which a data circuit is established without the use of switching facilities.

no response. In SNA, a value in the form-of-response-requested field of the request header (RH) indicating that no response is to be returned to the request, whether or not the request is received and processed successfully. Contrast with *definite response, exception response.*

normal flow. In SNA, a data flow designated in the transmission header (TH) that is used primarily to carry end-user data. The rate at which requests flow on the normal flow can be regulated by session-level pacing. Contrast with *expedited flow.*

Note: *The normal and expedited flows move in both the primary-to-secondary and secondary-to-primary directions. Requests and responses on a given flow (normal or expedited) usually are processed sequentially within the path, but the expedited-flow traffic may be moved ahead of the normal-flow traffic within the path at queuing points in the half-sessions and for half-session support in the boundary functions.*

Notify. A network services request unit that is sent by an SSCP to an LU to inform the LU of the status of a procedure requested by the LU.

NS. Network services.

NSPE. Network Services Procedure Error.

NTO. Network Terminal Option.

O

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

P

pacing. In SNA, a technique by which a receiving component controls the rate of transmission of a sending component to prevent overrun or congestion. See *session-level pacing, send pacing,* and *virtual route pacing.* See also *flow control.*

pacing response. In SNA, an indicator that signifies a receiving component's readiness to accept another pacing group; the indicator is carried in a response header (RH) for session-level pacing, and in a transmission header (TH) for virtual-route pacing.

parallel links. In SNA, two or more links between adjacent subarea nodes.

parallel sessions. In SNA, two or more concurrently active sessions between the same two logical units (LUs) using different pairs of network addresses. Each session can have independent session parameters.

partitioned emulation programming (PEP) extension. A function of a network control program that enables a communication controller to operate some communication lines in network control mode while simultaneously operating others in emulation mode.

path. (1) In SNA, the series of path control network components (path control and data link control) that are traversed by the information exchanged between two network addressable units (NAUs). A path consists of a virtual route

and its route extension, if any. See also *explicit route*. (2) In defining a switched major node, a potential dial-out port that can be used to reach a physical unit.

path control layer. In SNA, the layer that manages the sharing of link resources of the SNA network and routes basic information units (BIUs) through it. Path control routes message units between network addressable units (NAUs) in the network and provides the paths between them. It converts the BIUs from transmission control (possibly segmenting them) into path information units (PIUs) and exchanges basic transmission units (BTUs) and one or more PIUs with data link control.

Note: *The unit of control information built by the sending path control component is the transmission header (TH), attached to the BTU; the TH is interpreted by the receiving path control component. The path control layer in subarea nodes consists of explicit route control, transmission group control, virtual route control, and boundary function path control. See also* BIU segment, blocking of PIUs, data link control layer, transmission control layer.

path control (PC) network. In SNA, the part of the SNA network that includes the data link control and path control layers. See *SNA network* and *user application network*.

path information unit (PIU). In SNA, a message unit consisting of a transmission header (TH) alone, or of a TH followed by a basic information unit (BIU) or a BIU segment. See also *transmission header*.

PC. Path control.

pending active session. In ACF/VTAM, the state of an LU-LU session recorded by the SSCP when it finds both LUs available and has sent a CINIT request to the PLU of the requested session.

PEP. Partitioned emulation programming.

peripheral LU. In SNA, a logical unit in a peripheral node.

peripheral node. In SNA, a node that uses local addresses for routing and therefore is not affected by changes in network addresses. A peripheral node requires boundary function assistance from an adjacent subarea node. A peripheral node is a type 1 or type 2 node connected to a subarea node.

peripheral PU. In SNA, a physical unit in a peripheral node.

physical connection. A point-to-point connection or multipoint connection.

physical unit (PU). In SNA, one of three types of network addressable units (NAUs); each node of an SNA network contains a physical unit (PU) that manages and monitors the resources (such as attached links) of a node, as requested by an SSCP via an SSCP-PU session. See also *peripheral PU, physical unit type, subarea PU*.

Note: *An SSCP activates a session with the physical unit in order to indirectly manage, through the PU, resources of the node such as attached links.*

physical unit (PU) services. In SNA, the components within a physical unit (PU) that provide configuration services and maintenance services for SSCP-PU sessions. See also *logical unit (LU) services*.

physical unit type. In SNA, the classification of a physical unit (PU) according to the type of node in which it resides. The PU type is the same as its node type; that is, a type 1 PU resides in a type 1 node, and so forth.

PIU. Path information unit.

plaintext. Synonym for *clear data*.

PLU. Primary logical unit.

point-to-point line. A link that connects a single remote link station to a node; it may be either switched or nonswitched. Contrast with *multipoint line*.

positive response. In SNA, a response indicating that a request was received and processed. Contrast with *negative response*.

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

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

primary half-session. In SNA, the half-session that sends the session activation request. See also *primary logical unit*. Contrast with *secondary half-session*.

primary logical unit (PLU). In SNA, the logical unit (LU) that contains the primary half-session for a particular LU-LU session. Contrast with *secondary logical unit*.

Note: *A particular logical unit may contain primary and secondary half-sessions for different active LU-LU sessions.*

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

protocol. In SNA, the meanings of, and the sequencing rules for, requests and responses used for managing the network, transferring data, and synchronizing the states of network components.

PU. Physical unit.

public network. A network established and operated by communication common carriers or telecommunication Administrations for the specific purpose of providing circuit-switched, packet-switched, and leased-circuit services to the public. Contrast with *user application network*.

PU-PU flow. In SNA, the exchange between physical units (PUs) of network control requests and responses.

PU type. Physical unit type.

Q

queued BIND. In ACF/VTAM, a BIND request, sent from an LU (the PLU) to another LU (the SLU), that has not yet been responded to by the SLU. This creates a pending active session at the SLU. When the SLU is an ACF/VTAM application program, it responds to a BIND by issuing an OPNSEC or SESSIONC macro instruction.

queued CINIT. In ACF/VTAM, a CINIT request, sent from an SSCP to an LU, that has not yet been responded to by the LU. This creates a pending active session at the LU. An ACF/VTAM application program responds to a CINIT by issuing an OPNDST ACCEPT or a CLSDST macro instruction.

queued session. In ACF/VTAM, pertaining to a requested LU-LU session that cannot be started because one of the LUs is not available. If the session-initiation request specified queuing, the SSCP(s) will record the request and later continue with the session-establishment procedure when both LUs become available.

quick closedown. In ACF/VTAM, a closedown in which any RPL-based communication macro instruction is terminated (posted complete with an error code) and no new sessions can be established and no new ACBs can be opened. Contrast with *cancel closedown* and *orderly closedown*.

quiesce protocol. In ACF/VTAM, a method of communicating in one direction at a time. Either the primary LU or the secondary LU assumes the exclusive right to send normal-flow requests, and the other node refrains from sending such requests. When the sender wants to receive, it releases the other node from its quiesced state.

R

RDT. Resource definition table.

receive pacing. In SNA, the pacing of message units that the component is receiving. See also *send pacing.*

record mode. In ACF/VTAM, the mode of data transfer in which the application program can communicate with logical units. Contrast with *basic mode.*

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

remote. Synonym for *link-attached.*

request header. In SNA, a request unit (RU) header preceding a 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 establishing or terminating a session, or for some other operation.

request/response header (RH). In SNA, control information, preceding a request/response unit (RU), that specifies the type of RU (request unit or response unit) and contains control information associated with that RU.

request/response unit (RU). In SNA, a generic term for a request unit or a response unit.

request unit (RU). In SNA, a message unit that contains control information such as a request code or FM headers, end-user data, or both.

required cryptographic session. A cryptographic session in which all outbound data is enciphered and all inbound data is deciphered. Synonymous with *mandatory cryptographic session.* Contrast with *selective cryptographic session* and *clear session.*

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

resource hierarchy. In ACF/VTAM, the relationship among network resources in which some resources are subordinate to others as a result of their position in the network structure and architecture; for example, the LUs of a peripheral PU are subordinate to that PU, which, in turn, is subordinate to the link attaching it to its subarea node.

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

responded output. In ACF/VTAM, a type of output request that is completed when a response is returned. Contrast with *scheduled output.*

response header (RH). In SNA, a header, optionally followed by a response unit (RU), that indicates whether the response is positive or negative and that may contain a pacing response. See also *negative response, pacing response, positive response.*

response unit (RU). In SNA, a message unit that acknowledges a request unit; it may contain prefix information received in a request unit. If positive, the response unit may contain additional information (such as session parameters in response to Bind Session), or if negative, contains sense data defining the exception condition.

REX. Route extension.

RH. Request/response header.

route. In SNA, see *explicit route, virtual route.*

route extension (REX). In SNA, the path control network components, including a peripheral link, that comprise the portion of a path between a subarea node and a network addressable unit (NAU) in an adjacent peripheral node.

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, an application program exit 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 *EXLST exit routine.*

RU. Request/response unit.

RU chain. In SNA, a set of related request/response units (RUs) that are consecutively transmitted on a particular normal or expedited data flow. The request RU chain is the unit of recovery: if one of the RUs in the chain cannot be processed, the entire chain is discarded.

Note: *Each RU belongs to only one chain, which has a beginning and an end indicated via control bits in request/response headers within the RU chain. Each RU can be designated as first RU of chain, last RU of chain, middle RU of chain, or only RU of chain. Response units and expedited-flow request units are always sent as only RU of chain.*

S

same-domain LU-LU session. In SNA, an LU-LU session between logical units (LUs) in the same domain. Contrast with *cross-domain LU-LU session.*

SC. Session control.

scheduled output. In ACF/VTAM, a type of output request that is completed, as far as the application program is concerned, when the program's output data area is free. Contrast with *responded output.*

SCS. SNA character string.

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* and *half-session.*

secondary half-session. In SNA, the half-session that receives the session-activation request. See also *secondary logical unit.* Contrast with *primary half-session.*

secondary logical unit (SLU). In SNA, the logical unit (LU) that contains the secondary half-session for a particular LU-LU session. Contrast with *primary logical unit.*

Note: *A logical unit may contain secondary and primary half-sessions for different active LU-LU sessions.*

secondary logical unit (SLU) key. A key encrypting key used to protect a session cryptography key during its transmission to the secondary end of the session.

segmenting of BIUs. In SNA, an optional function of path control that divides a basic information unit (BIU) received from transmission control into two or more path information units (PIUs). The first PIU contains the request header (RH) of the BIU and usually part of the RU; the remaining PIU or PIUs contain the remaining parts of the RU.

Note: *When segmenting is not done, a PIU contains a complete BIU.*

selective cryptographic session. A cryptographic session in which an application program is allowed to specify the request units to be enciphered. Contrast with *required cryptographic session* and *clear session.*

send pacing. In SNA, pacing of message units that the component is sending. See also *receive pacing.*

session. In SNA, a logical connection between two network addressable units (NAUs) that can be activated, taylored to provide various protocols, and deactivated, as requested. The session activation request and response can determine options relating to such things as the rate and concurrency of data exchange, the control of contention and error recovery, and the characteristics of the data stream. Sessions compete for network resources such as the links within the path control network. See *half-session, LU-LU session, SSCP-LU session, SSCP-PU session, SSCP-SSCP session.* See also *LU-LU session type, PU-PU flow.*

Note: *Each session is uniquely identified in a transmission header (TH) by a pair of network addresses, identifying the origin and destination NAUs of any transmissions exchanged during the session.*

session activation request. In SNA, a request that activates a session between two network addressable units (NAUs) and specifies session parameters that control various protocols during session activity; for example, BIND, ACTCDRM, ACTPU, and ACTLU. Synonymous with *generic BIND.* Contrast with *session deactivation request.*

session address space. In ACF/VTAM, an ACB address space or an associated address space in which an OPNDST or OPNSEC macro instruction is issued to establish a session. See *ACB address space* and *associated address space.*

session control (SC). In SNA, (1) One of the components of transmission control. Session control is used to purge data flowing in a session after an unrecoverable error occurs, to resynchronize the data flow after such an error, and to perform cryptographic verification. (2) An RU category used for requests and responses exchanged between the session control components of a session and for session activation/deactivation requests and responses.

session cryptography key. In SNA, a data encrypting key used to encipher and decipher function management data (FMD) requests transmitted in an LU-LU session that uses cryptography.

session deactivation request. In SNA, a request that deactivates a session between two network addressable units (NAUs); for example, UNBIND, DACTCDRM, DACTPU, and DACTLU. Synonymous with *generic UNBIND*. Contrast with *session activation request*.

session-establishment macro instructions. In ACF/VTAM, the set of RPL-based macro instructions used to initiate, establish, or terminate LU-LU sessions.

session-establishment request. In ACF/VTAM, a request to an LU to establish a session. For the PLU of the requested session, the session-establishment request is the CINIT sent from the SSCP to the PLU. For the SLU of the requested session, the session-establishment request is the BIND sent from the PLU to the SLU.

session-initiation request. In SNA, an Initiate or logon request from a logical unit (LU) to a system services control point (SSCP) that an LU-LU session be activated.

session-level pacing. In SNA, a flow control technique that permits a receiving connection point manager to control the data transfer rate (the rate at which it receives request units) on the normal flow. It is used to prevent overloading a receiver with unprocessed requests when the sender can generate requests faster than the receiver can process them. See also *pacing, virtual route pacing*.

session limit. (1) In SNA, the maximum number of concurrently active LU-LU sessions a particular logical unit can support. Note: *ACF/VTAM application programs acting as logical units have no session limit. Device-type logical units have a session limit of one.* (2) In the network control program, the maximum number of concurrent line-scheduling sessions on a non-SDLC, multipoint line.

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

session partner. In SNA, one of the two network addressable units having an active session.

session seed. Synonym for *initial chaining value*.

session sequence number. In SNA, a sequentially-incremented identifier that is assigned by data flow control to each request unit on a given normal flow of a session, typically an LU-LU session, and is checked by transmission control. The identifier is carried in the transmission header (TH) of the path information unit (PIU) and is returned in the TH of any associated response. Contrast with *session sequence number, virtual route sequence number*.

session services. In SNA, one of the types of network services in the system services control point (SSCP) and in the logical unit (LU). These services provide facilities for an LU or a network operator to request that the SSCP initiate or terminate sessions between logical units. See *configuration services* and *maintenance services*.

session-termination request. In ACF/VTAM, a request that an LU-LU session be terminated.

shadow resource. In ACF/VTAM, an alternate representation of a network resource that is retained as a definition for possible future use.

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

share limit. In SNA, the maximum number of control points that can concurrently control a network resource.

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-domain network. In SNA, a network with one system services control point (SSCP). Contrast with *multiple-domain network*.

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

SLU. Secondary logical unit.

SNA. Systems Network Architecture.

SNA character string (SCS). In SNA, a data stream composed of EBCDIC controls, optionally intermixed with end-user data, that is carried within a request/response unit.

SNA network. In SNA, the part of a user-application network that conforms to the formats and protocols of Systems Network Architecture. It enables reliable transfer of data among end users and provides protocols for controlling the resources of various network configurations. The SNA network consists of network addressable units, boundary function components, and the path control network.

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

SNBU. Switched network backup.

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

specific-mode. In ACF/VTAM: (1) The form of a RECEIVE request that obtains input from one specific session. (2) The form of an accept request that completes the establishment of a session by accepting a specific queued CINIT request. (3) Contrast with *any-mode*. See *continue-specific mode*.

SSCP. System services control point.

208

SSCP ID. In SNA, a number uniquely identifying a system services control point (SSCP). The SSCP ID is used in session activation requests sent to physical units (PUs) and other SSCPs.

SSCP-LU session. In SNA, a session between a system services control point (SSCP) and a logical unit (LU). The session enables the LU to request the SSCP to help initiate LU-LU sessions.

SSCP-PU session. In SNA, a session between a system services control point (SSCP) and a physical unit (PU); SSCP-PU sessions allow SSCPs to send requests to and receive status information from individual nodes in order to control the network configuration.

SSCP-SSCP session. In SNA, a session between the system services control point (SSCP) in one domain and the SSCP in another domain. An SSCP-SSCP session is used to initiate and terminate cross-domain LU-LU sessions.

start option. In ACF/VTAM, a user-specified or IBM-supplied option that determines certain conditions that are to exist during the time an ACF/VTAM system is operating. Start options can be predefined or specified when ACF/VTAM is started.

subarea. In SNA, a portion of the SNA network consisting of a subarea node, any attached peripheral nodes, and their associated resources. Within a subarea node, all network addressable units, links, and link stations that are addressable within the subarea share a common subarea address and have distinct element addresses.

subarea address. In SNA, a value in the subarea field of the network address that identifies a particular subarea. See also *element address*.

subarea LU. In SNA, a logical unit in a subarea node. Contrast with *peripheral LU*.

subarea node. In SNA, a node that uses network addresses for routing and whose routing tables are therefore affected by changes in the configuration of the network. Subarea nodes can provide boundary function support for peripheral nodes. Type 4 and type 5 nodes are subarea nodes. See also *peripheral node, node type*.

subarea PU. In SNA, a physical unit in a subarea node.

switched line. A communication line in which the connection between the communication controller and a remote link station is established by dialing.

switched network backup (SNBU). An optional facility that allows a user to specify, for certain types of PUs, 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 units and logical units attached by switched SDLC links.

Synchronous Data Link Control (SDLC). In SNA, a discipline conforming to subsets of the Advanced Data Communication Control Procedures (ADCCP) of the American National Standards Institute and High-Level Data Link Control (HDLC) of the International Standards Organization, for managing synchronous, code-transparent, serial-by-bit information transfer over a link connection. Transmission exchanges may be duplex or half duplex over switched or nonswitched links. The configuration of the link connection may be point-to-point, multipoint, or loop.

synchronous operation. In ACF/VTAM, a communication, or other operation in which ACF/VTAM, after receiving the request for the operation, does not return control to the program until the operation is completed. Contrast with *asynchronous operation*.

synchronous request. In ACF/VTAM, a request for a synchronous operation. Contrast with *asynchronous request*.

system services control point (SSCP). In SNA, a network addressable unit (NAU) that provides configuration, maintenance, management, and session services via sessions with physical units, logical units, and other SSCPs. The SSCP has an active session with each logical unit and each physical unit for which it provides these services. It also provides services for the network operators who control the configuration. The SSCP is located in a type 5 node.

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

Note: *The purpose of the layered structure of SNA is to allow the ultimate origins and destinations of information -- that is, the end users -- to be independent of, and unaffected by, the way in which the specific SNA network services and facilities used for information exchange are provided.*

T

TC. Transmission control.

TCAS. Terminal Control Address Space.

terminal. A device, often equipped with a keyboard and some kind of display, capable of sending and receiving information over a link.

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.

Terminal Control Address Space (TCAS). The part of TSO/VTAM that provides logon services for TSO/VTAM users.

Terminate. In SNA, a request unit that is sent by an LU to its SSCP to cause the SSCP to start a procedure to end one or more designated LU-LU sessions.

TGID. Transmission group identifier.

TH. Transmission header.

transmission control (TC) layer. In SNA, the layer within a half-session that synchronizes and paces session-level data traffic, checks session sequence numbers of requests, and enciphers and deciphers end-user data. Transmission control has two components: the connection point manager and session control. See also *half-session.*

transmission control character. *(ISO) Any control character used to control or facilitate transmission of data between data terminal equipment. Synonymous with *communication control character.*

transmission group. In SNA, a group of links between adjacent subarea nodes, appearing as a single logical link for routing of messages.

Note: *A transmission group may consist of one or more SDLC links (parallel links) or of a single System/370 channel.*

transmission group identifier (TGID). In SNA, a set of three values, unique for each transmission group, consisting of the subarea addresses of the two adjacent nodes connected by the transmission group, and the transmission group number (1-255).

transmission header (TH). In SNA, control information, optionally followed by a basic information unit (BIU) or a BIU segment, that is created and used by path control to route message units and to control their flow within the network. See also *path information unit.*

transmission priority. In SNA, a rank assigned to a path information unit (PIU) that determines its precedence for being selected by the transmission group control component of path control for forwarding to the next subarea node of the route used by the PIU.

transmission services (TS) profile. In SNA, a specification in a session activation request (and optionally, the responses) of transmission control (TC) protocols (such as session-level pacing and the usage of session-control requests) to be supported by a particular session. Each defined transmission services profile is identified by a number.

transmission subsystem component (TSC). The component of ACF/VTAM that comprises the transmission control, path control, and data link control layers of SNA.

TSC. Transmission subsystem component.

TSO/VTAM. Time Sharing Option for the Virtual Telecommunications Access Method.

U

unformatted. In ACF/VTAM, pertaining to commands (such as LOGON or LOGOFF) entered by an end user and sent by a logical unit in character form. The character-coded command must be in the syntax defined in the user's unformatted system

services definition table. Synonymous with *character-coded.* Contrast with *field-formatted.*

unformatted system services (USS). A facility that translates an unformatted command, such as a logon or logoff command, into a field-formatted command for processing by formatted system services. Contrast with *formatted system services.* See also *converted command.*

uninterpreted name. In SNA, a character string that an SSCP is able to convert into the network name of an LU.

Note: *Typically, an uninterpreted name is used in a logon or Initiate request from an SLU to identify the PLU with which the session is requested. The SSCP interprets the name into the network name of the PLU in order to set up the session. When the PLU eventually sends a BIND to the SLU, the BIND contains the original uninterpreted name.*

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

user application network. A configuration of data processing products (such as processors, controllers, and terminals) established and operated by users for the purpose of data processing or information exchange, which may use services offered by common carriers or telecommunication Administrations. Contrast with *public network.*

user correlator. A 4-byte value supplied to ACF/VTAM by an application program when certain macro instructions (such as REQSESS) are issued. It is returned to the application program when subsequent events occur (such as entry to a SCIP exit routine upon receipt of BIND) that result from the procedure started by the original macro instruction.

user exit queue. A structure built by ACF/VTAM that is used to serialize the execution of application program exit routines. Only one exit routine on each user exit queue can run at a time.

USS. Unformatted system services.

V

virtual route (VR). In SNA, a logical connection (1) between two subarea nodes that is physically realized as a particular explicit route, or (2) that is contained wholly within a subarea node for intra-node sessions. A virtual route between distinct subarea nodes imposes a transmission priority on the underlying explicit route, provides flow control through virtual-route pacing, and provides data integrity through sequence numbering of path information units (PIUs). See also *explicit route, path, route extension.*

virtual route identifier (VRID). In SNA, a virtual route number and a transmission priority number that, when combined with the subarea addresses for the subareas at each end of a route, identify the virtual route.

virutal route (VR) pacing. In SNA, a flow control technique used by the virtual route control component of path control at each end of a virtual route to control the rate at which path information units (PIUs) flow over the virtual route. VR pacing

can be adjusted according to traffic congestion in any of the nodes along the route. See also *pacing, session-level pacing.*

virtual route selection exit routine. In ACF/VTAM, an optional installation exit routine that modifies the list of virtual routes associated with a particular class of service before a route is selected for a requested LU-LU session.

virtual route sequence number. In SNA, a sequential identifier assigned by the virtual route control component of path control to each path information unit (PIU) that flows over a virtual route. It is stored in the transmission header of the PIU. Contrast with *session sequence number.*

VR. Virtual route.

VRID. Virtual route identifier.

VTAM Terminal I/O Coordinator (VTIOC). The part of TSO/VTAM that converts TSO TGET, TPUT, and terminal control macro instructions into SNA request units.

VTIOC. VTAM Terminal I/O Coordinator.

W

window. In SNA, (1) The path information units (PIUs) that can be transmitted on a virtual route before a virtual-route pacing response is received, indicating that the virtual route receiver is ready to accept more PIUs on the route. (2) The requests that can be transmitted on the normal flow in one direction in a session before a session-level pacing response is received, indicating that the receiver is ready to accept the next group of requests.

window size. In SNA, (1) The number of path information units (PIUs) in a virtual route window. The window size varies according to traffic congestion along the virtual route. (2) The number of requests in a session-level window. The window size is set at session activation.

X

XID. A data link control command and response passed between adjacent nodes that allows the two nodes to exchange identification and other information necessary for operation over the data link.

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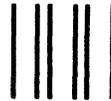
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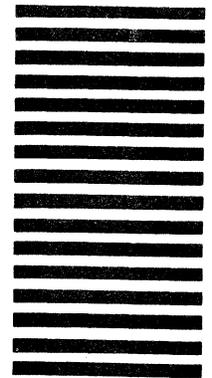
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