

GC27-0429-2
File No. S370/4300-30

Program Product

**Network Communications
Control Facility**

General Information

Releases 1 and 2

Program Number 5735-~~XX~~6

IBM

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Network Communications Control Facility

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Third Edition (September 1979)

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**Summary of Amendments (November 30, 1979) to
GC27-0429-1 by Revision GC27-0429-2**

This revision describes the new functions of NCCF Release 2.

Preface

This publication provides an overview of the Network Communications Control Facility (NCCF). It is directed primarily to customer executives, system administrators, system analysts, system programmers, application programmers, and terminal operators who are operating with DOS/VSE or OS/VS systems.

Readers should use this book to get a general understanding of NCCF concepts, and the requirements and options that must be considered in planning and installing the program. To perform specific steps, such as estimating storage requirements or writing definition statements, readers should use *Network Communications Control Facility Installation*.

Readers unfamiliar with VTAM should consult:

Introduction to VTAM, GC27-6987 (VTAM Level 2)

VTAM Concepts and Planning, GC27-6998 (VTAM Level 2)

ACF/VTAM General Information, GC38-0254 (ACF/VTAM Release 1)

ACF/VTAM Concepts and Planning, GC38-0282 (ACF/VTAM Release 1)

ACF/VTAM General Information: Introduction, GC27-0462 (ACF/VTAM Releases 2 and 3)

ACF/VTAM General Information: Concepts, GC27-0463 (ACF/VTAM Releases 2 and 3)

ACF/VTAME General Information: Introduction, GC27-0438

ACF/VTAME General Information: Concepts, GC27-0451

Readers unfamiliar with TCAM should consult:

OS/VS TCAM Concepts and Applications, GC30-2049 (TCAM Level 10)

Advanced Communications Function for TCAM Concepts and Planning, GC30-3049 (ACF/TCAM Version 1)

ACF/TCAM Version 2 General Information: Introduction, GC30-3057 (ACF/TCAM Version 2 Releases 1, 2, and 3)

The first section of this publication is an overview of NCCF; the second section, "NCCF Functions," provides information on specific functions of the program at a high level. "NCCF Operation" describes basic operating procedures, such as starting and

stopping the program, screen format, and command entry. The remaining sections provide information on terminal and program support, storage, and compatibility considerations.

More detailed information will be found in the following publications:

Network Communications Control Facility Installation, SC27-0430

Network Communications Control Facility Messages, SC27-0431

Network Communications Control Facility Customization, SC27-0433

Network Communications Control Facility Terminal Use, SC27-0432

Network Communications Control Facility Logic, LY38-3010

Throughout this publication, unless otherwise noted, references to VTAM include VTAM Level 2, ACF/VTAM Release 1, ACF/VTAM Release 2, ACF/VTAM Release 3, and ACF/VTAME. References to ACF/VTAM include ACF/VTAME. References to TCAM include TCAM Level 10, ACF/TCAM Version 1, ACF/TCAM Version 2 Releases 1, 2, and 3.

References to ACF systems (ACF/VTAM or ACF/TCAM) in cross-domain environments presume the presence of the Multisystem Networking Facility. ACF systems can, of course, operate with a single domain also.

Note: *The term network has at least two meanings. A public network is a network established and operated by common carriers or telecommunication Administrations for the specific purpose of providing circuit-switched, packet-switched, and leased-circuit services to the public. A user application network is 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 transport services offered by common carriers or telecommunication Administrations.*

Network, as used in this publication, refers to a user application network.

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Introduction

The Network Communications Control Facility (NCCF) is a program product designed for use with various levels of VTAM or TCAM or both in a data communication network. NCCF provides a program base for communications network management (CNM). The program operates as a VTAM or TCAM application program in its own partition in OS/VS1 or address space in OS/VS2 MVS. In DOS/VSE, NCCF is executed as a DOS/VSE task in its own partition or as a subtask in the ACF/VTAM partition.

NCCF contains those function currently provided by the Network Operation Support Program (NOSP). Figure 1 shows the NCCF functions available on various access method versions:

- *User customization.* NCCF permits the addition of user-written command lists and command processors to support additional functions. NCCF provides access method-independent screen management and terminal input/output processing.

NCCF also allows the automation of various operator tasks through the use of user-written exit routines, command lists, and command processors, to reduce the probability of human error. The program further provides for the optional logging of operator interactions on disk, tape, or printer devices.

- *CNM interface support.* NCCF provides input, output, and recovery functions to allow command processors to request problem determination data from the access method across the communications network management interface, and to store and retrieve data from VSAM files. This error data retrieval and formatting may be done by a communications network management processor, such as the IBM Network Problem Determination Application (NPDA; a separately orderable program product) or by a user-written program.
- *Operator control.* NCCF allows multiple network operators, with individually assigned responsibilities, at various locations throughout a network. NCCF operators can enter access method control commands to modify and display the network configuration.
- *Data security and auditing.* NCCF provides data security through operator logon checking and allows user-defined exit routines at various points throughout the program to screen and edit data traffic.
- *Data services.* An optional NCCF data services task allows VSAM support for disk files. Data services can be used as a part of CNM support on all access method levels supported by NCCF, as part of NPDA or as part of a user-written CNM processor.
- *Cross-domain communication.* ACF/VTAM and ACF/TCAM versions of NCCF allow an NCCF operator to communicate with an NCCF in another domain and to cause execution of commands in other domains. (A domain is the portion of a total data communication network that is controlled by one access method in the host.) NCCF also provides for the routing of certain commands to other domains for execution and the return of responses from these domains to the issuing operator station.
- *Span of control.* An operator's control can be restricted to a subset of the network's resources. Spans can overlap so that more than one operator can control the same resource.

NCCF Releases 1 and 2								NCCF Release 2		
	User Customization	CNM Interface Support	Operator Control	Data Security/Auditing	Data Services	Cross-Domain Communication	Span of Control	Scope of Commands	Timer-Initiated Commands and Command Lists	Conditional Command Lists
VTAM Level 2 OS/VS2 MVS, OS/VS1	X			X	X					
ACF/VTAM Release 1 OS/VS2 MVS, OS/VS1	X		X	X	X	X	X			
ACF/VTAM Release 2 OS/VS2 MVS, OS/VS1, DOS/VSE	X	X	X	X	X	X	X	X	X	X
ACF/VTAM Release 3 OS/VS2 MVS, OS/VS1, DOS/VSE	X	X	X	X	X	X	X	X	X	X
ACF/VTAME	X	X	X	X	X	X	X	X	X	X
TCAM Level 10 OS/VS2 MVS, OS/VS1	X			X	X					
ACF/TCAM Version 1 OS/VS2 MVS, OS/VS1	X			X	X	X				
ACF/TCAM Version 2 Release 1 OS/VS2 MVS, OS/VS1	X	X	X	X	X	X				
ACF/TCAM Version 2 Release 2 OS/VS2 MVS, OS/VS1	X	X	X	X	X	X		X	X	X
ACF/TCAM Version 2 Release 3 OS/VS2 MVS, OS/VS1	X	X	X	X	X	X		X	X	X

Figure 1. NCCF Function Availability

NCCF operates with VTAM in the DOS/VSE, OS/VS1, and OS/VS2 MVS systems or TCAM in OS/VS1 and OS/VS2 MVS. The IBM 3275, 3276, 3277, 3278, and 3279 are supported as the operator station. Other IBM 3270 devices supported are listed under “Terminal and Program Support” later in this publication.

Users may wish to write their own command processors to support any additional commands or operands. These command processors must be written in assembler language and assembled and link-edited as load modules or phases. The name of any command processor must be defined during NCCF definition. The specific interfaces provided are discussed in *Network Communications Control Facility Customization*. Service facilities are also provided by NCCF. These include the sending of commands to the access method in any supported domain, and the handling of responses.

User command processors may be used in conjunction with user exit routines to automate certain repetitive operator tasks. For example, a procedure can be written to respond to certain error messages by deactivating failing links and activating others, or initiating the VTAM trace facility.

NCCF provides for user-written exit routines at various locations, including the points of input or output to or from operator stations, the access method, other NCCFs, and the system console. Exits are also provided at input to command execution and in the stream of data flow to both disk log devices and hard-copy log devices.

Exit routines can be written to prevent certain messages from reaching particular operator stations. Exit routines can also be used to augment security by checking for span authorization of user-specific passwords.

The NCCF command list facility can be used to expand operator control as well. Users can code sequences of NCCF commands, user-written commands, and access method commands, into command lists, which are stored in a file during NCCF definition and invoked by name for execution when required. See the section “Command Lists” later in this publication for further information.

NCCF provides a program base upon which the user may add other IBM-supplied programs or user-supplied programs to provide activities and functions collectively called communications network management (CNM). These programs are referred to as communications network management processors. NCCF provides these various processors with an environment that insulates them from operating system and access method (VTAM or TCAM) uniqueness as well as providing application functions that are common and required for execution of individual processors.

Problem determination is available in NCCF through user-coded processors or the Network Problem Determination Application (NPDA), a separately orderable IBM program product. NPDA consists of a presentation services command processor (PSCP) and a data services command processor (DSCP). Problem determination data is sent in from the network (spontaneously or by request) across the CNM interface to NPDA data sets. The data is retrieved by the NPDA user at an NCCF operator station.

The functions provided in CNM processors are activated by an operator or by a program by issuance of commands that are handled by NCCF and result in

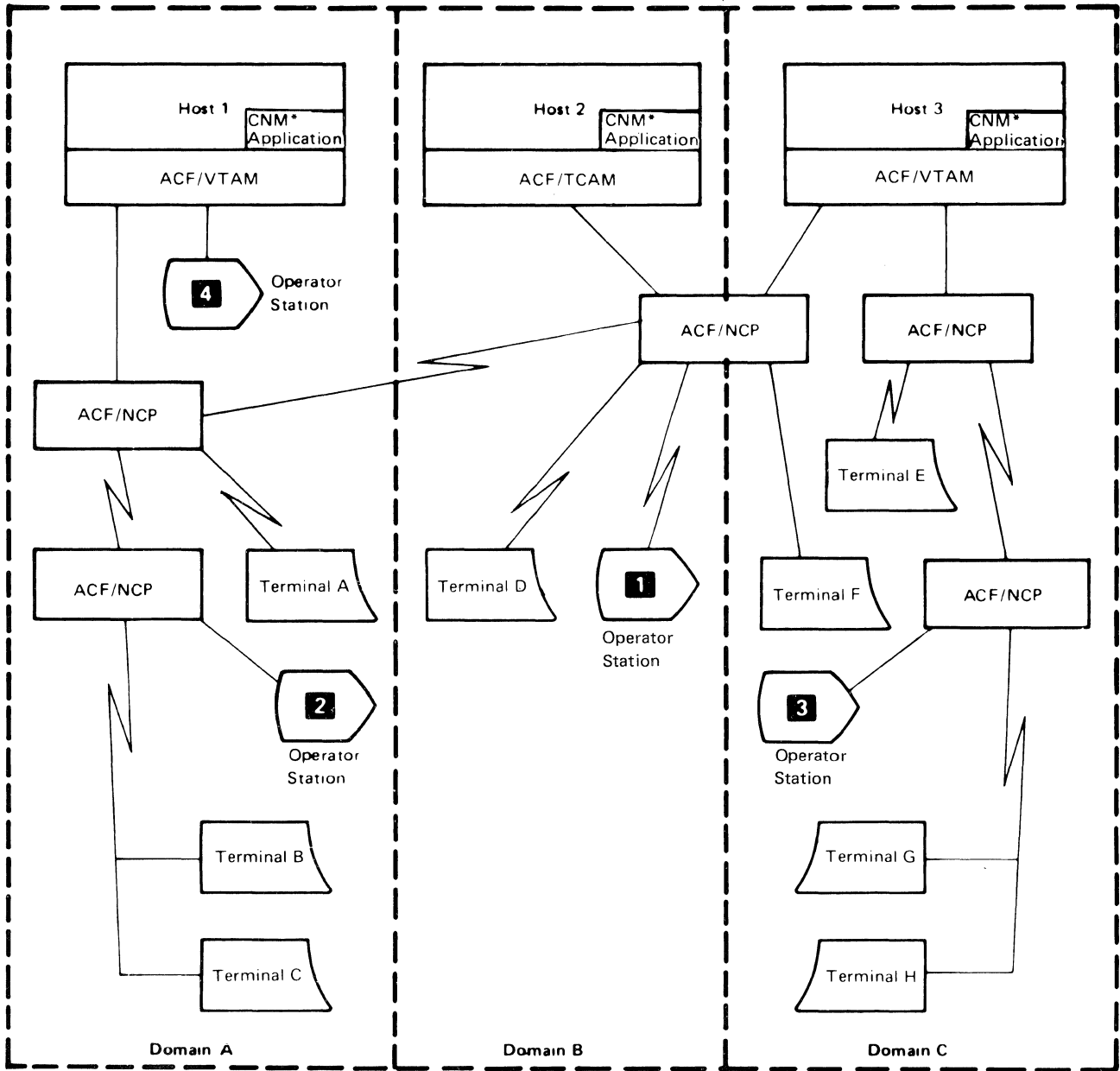
execution of specific command processors under control of NCCF. CNM processors may contain one or many of these command processors running under control of NCCF. NCCF is a base for the addition of CNM processors required by the user to manage a network.

Operators logged on to NCCF may submit commands to NCCF from their operator stations. NCCF communicates with these operator stations using ACF/VTAM's record mode application program interface (API) or ACF/TCAM's application interface. These commands (depending on the function required) may be processed directly by NCCF, passed to ACF/VTAM for execution using ACF/VTAM's program operator interface (POI), passed to ACF/TCAM operator control for execution, routed to a NCCF in another domain for execution, or passed to a user-written or IBM-supplied command processor for execution. Command responses and unsolicited messages are returned to the operator at the display station.

Figure 2 shows a sample multiple-domain ACF network in which operators submit commands from operator stations to NCCF. The program determines the destination of the commands and then passes them to the appropriate access method through a NCCF in another domain. Command responses and unsolicited messages generated by the access method are returned to the appropriate NCCF and returned by the program to the issuing operator station. Hard-copy log devices can be specified during system definition and used to maintain a record of commands and responses.

As shown in Figure 2, several operators can be in session with a NCCF simultaneously. The program analyzes each command entered for the appropriate resource name before passing it for execution. Using this facility, groups of network resources can be assigned to specific operators during system network definition (see "Span of Control" later in this publication). This tailoring of network control makes the network more manageable and frees the system console for other uses. For example, a domain can be entirely controlled by one operator if required, or the domain can be divided into smaller elements, each controlled by a network operator. If properly authorized and defined in each domain, operators may control resources outside of the domain in which their operator station is physically located.

NCCF's centralization of control can be seen in an example using Figure 2. Any of the resources (or all the resources) in domain B or domain C can be controlled from operator station 2 in domain A, provided that NCCF resides in all three domains and cross-domain sessions have been established. Commands submitted from operator station 2, for example, to terminal H in domain C, are routed to the NCCF in domain C over the application program-to-application program session between the two NCCF programs. The program in domain C then submits the command to the ACF/VTAM in domain C for execution. Messages and responses to commands are routed back to operator station 2 over the same path. As shown in the example, operator stations can be either locally or remotely attached, providing greater configuration flexibility.



*The communication network management application is NCCF and associated CNM processors, controlled through NCCF. For example, NCCF and NPDA.

Note: In a multiple-domain network, the access method must be ACF/TCAM, ACF/VTAM, or ACF/VTAME.

Figure 2. Multiple-Domain NCCF



NCCF Functions

Command Processors

IBM-supplied or customer-coded command processors may be used to provide unique services to the operator. These processors are invoked by NCCF when the appropriate commands are entered by the operator. Command processors can also be invoked by messages that NCCF receives from the access method, and by other commands.

NCCF calls the command processor for the duration of the command, allowing one or a series of related functions to be performed by the command processor.

NCCF insulates command processors from access method or operating system uniqueness through macros contained in NCCF and by performing common tasks related to initialization, execution, and termination functions.

NCCF provides command processors and associated services that allow the NCCF operator to enter access method control commands. These commands are passed by NCCF to the access method across the ACF/VTAM POI (program operator interface) for execution by ACF/VTAM or passed to ACF/TCAM operator control for execution by ACF/TCAM. Access method replies to commands are received by NCCF and sent to the originating NCCF operator. In ACF/VTAM and ACF/TCAM, unsolicited access method messages are routed to an operator controlling the affected resource, or to the authorized operator.

NCCF allows command processors to communicate and pass data between themselves. This function, for example, allows command processors to exchange requests about data retrieval or allows commands to be sent to another domain for execution.

Command Types

The commands available to an operator are separated into two types: access method commands and NCCF commands.

Access method commands are those commands recognized by VTAM or TCAM, except START and HALT.

NCCF commands are used by the operator to request program functions within the NCCF environment. The LIST command, for example, can be used to display the configuration of all active operator stations or the status of the domain, and the MSG command can be issued from any operator station to send a message to any currently active operator station (or all operator stations) in this domain or any stations that have issued START commands to this domain from another domain.

NCCF commands are classified as *regular* or *immediate*. Regular commands are processed by standard command processors. Only one regular command may be executed at a time; regular commands issued while a preceding command is in

process are queued. Immediate commands are entered and processed immediately after entry and may interrupt execution of a regular command. NCCF immediate commands are GO, CANCEL, CLOSE, RESET, AUTOWRAP, no-data-enter, and CLEAR key. Details of these commands are found in *Network Communications Control Facility Terminal Use*.

Command Lists

Users can code sequences of access method commands, NCCF commands, and user-written commands into command lists, which are stored in a file during NCCF definition and invoked by name for execution when required. All regular commands may be used in a command list, and any of these commands may appear in a command list any number of times. (See *Network Communications Control Facility Customization* for information on building and filing command lists.)

NCCF provides parameter substitution in command list commands. Both positional and keyword parameters may be used in commands being generated, but only positional parameters (a maximum of nine) are allowed in the invoking command. For example, the command list definition

```
ALTER
  VARY NET,ACT,ID= & 1
  VARY NET,INACT,ID= & 2
```

when invoked by this entry:

```
ALTER ABLE,BAKER
```

results in:

```
VARY NET,ACT,ID=ABLE
VARY NET,INACT,ID=BAKER
```

The PAUSE command may be coded within a command list during definition and may have accompanying text. PAUSE stops execution of the command list. An operator can then either permit a command list to continue processing (by entering the GO command), or cancel the list's execution (by entering the CANCEL command). The GO and CANCEL commands are NCCF immediate commands. Only immediate commands can be executed while in PAUSE status.

Comments may be coded in a command list, in addition to executable commands. A command list may also consist of comments exclusively; such a command list can be invoked to display information, such as a description of operator procedures or the network configuration.

User-written command processors may also call command lists, but lists initiated in this manner are queued until any currently executing command lists and regular commands have completed processing. Command lists called within other command lists are processed before the calling list is allowed to continue processing.

NCCF Release 2 allows conditional command list processing by means of control statements that determine the sequence of execution. These statements include normal arithmetic and character string functions, condition testing, and system variables, set by parameters, of NCCF status. These conditional command lists

may be used, for example, to determine whether to continue or terminate command list execution based on the test of a return code from a command processor.

NCCF Release 2 also allows a command list to be initiated by an unsolicited access method message, to facilitate automated network recovery. Due to the manner in which NCCF processes commands invoked by unsolicited access method messages, not all operator commands may be issued in such a command list. *NCCF Customization* explains this restriction in greater detail.

Timer-Initiation of Commands and Command Lists

NCCF Release 2 allows initiation of commands and command lists by a timer, either on a time-of-day basis or repetitively at intervals. An operator can specify that a command or command list is to be executed even if the operator is not logged on. Timer-initiation is limited to operators defined for this facility. Time intervals may be specified for any command or command list. An operator can purge pending timer-initiated commands or list the commands still pending on the queue.

Presentation Services

NCCF presentation services provides screen management for IBM 3270 devices and terminal input/output processing. Presentation services is invoked by command processors through issuance of a presentation services macro to display data to the operator. Presentation services builds the necessary data streams and controls the screen format.

Logging Facilities

A log of operator station activity can be produced for an online hard-copy record. An individual operator station can use a printer, or several operator stations may share the same terminal printer.

Each entry on the hard-copy log is similar in format to that of the entry on the screen, but with additional information including operator station identification and a time stamp.

Operator station activity may also be sent to a file log. This log is a sequential tape or disk file or data set that contains all operator station activity related to a particular NCCF program, including commands, responses, and unsolicited messages. All messages are time-stamped and identified by origin. An NCCF utility may be used to print the log offline. When the end of an allotted disk extent is reached, the program automatically begins overwriting data.

In NCCF Release 2, the log is maintained on disk in a primary VSAM data set. When the primary data set is filled, logging is automatically switched to a secondary data set, if one has been defined. An NCCF operator can also control switching between the data sets. When logging is switched, the primary data set is closed and may be printed in batch mode while NCCF is still logging on the

secondary data set. If the primary data set is not printed after logging is switched to the secondary data set, logging stops when the secondary data set is filled.

Data Services

NCCF provides data services that allow command processors to store or retrieve CNM problem determination data from a CNM file or data set or to request CNM data from the data communication access method. NCCF provides necessary I/O and recovery functions. NCCF also receives unsolicited CNM data from the data communication access method across the CNM interface and makes that data available to command processors.

NCCF Release 2 allows definition of multiple data services tasks to serve as CNM data bases or as other VSAM data bases. These data sets are defined as pairs of primary and secondary data sets to allow switching (either automatically or by operator command) when the primary data set is full.

Cross-Domain Communication

In ACF versions of NCCF, the user can communicate with NCCFs in other domains and the operator can cause execution of command processors in domains other than his own. The establishment of the communication can be done by NCCF-supplied commands or by automatic establishment of communication after an operator logs on.

In cross-domain communication, the operator can route commands to be executed in other domains by explicitly specifying the domain to which the command is to go. If the ACF/VTAM operator control function is used, NCCF can automatically route commands to the other domains containing the resource affected by the command being processed. The operator of a NCCF operator station uses the NCCF START command to initiate cross-domain communications.

On ACF/VTAM systems, a task within the requesting NCCF becomes the secondary logical unit (SLU) of the session. The NCCF in the other domain, on receiving a request for a cross-domain session, attaches an NCCF-to-NCCF task which becomes the primary logical unit (PLU) of the session. The PLU sends a message to the SLU where it is displayed, requesting logon authorization data. Through the NCCF ROUTE command, the operator enters logon information and the session is established.

On ACF/TCAM systems, upon issuance of the NCCF START command for cross-domain communications, a session for communication between the domains is established in the requesting domain. An NCCF task in the other domain is also attached to control that domain's cross-domain communication. After the cross-domain communication capability is established, logon authorization information is requested as with ACF/VTAM.

NCCF cross-domain communication is supported between NCCFs in ACF/VTAM and ACF/TCAM; cross-domain communication is also supported between NOSF and NCCF on ACF/VTAM.

Span of Control

In NCCF a network operator's control can be restricted to a subset of network resources. Commands can then be issued only for resources defined within an operator's *span of control* (ACF/VTAM systems only), and only messages related to those resources are received. Span authorization is defined during NCCF definition and filed for use by the program. NCCF uses this information when an NCCF operator enters commands. (Span checking is done only on ACF/VTAM commands with the ID keyword.) Details of span definition can be found in *Network Communications Control Facility Installation*.

Span of control can extend across domain boundaries, allowing an authorized operator to control resources that are in domains other than the one in which the issuing operator station is located (or connected). In Figure 3, for example, all of the network resources in the shaded areas can be within one operator's span of control, and the operator may be logged on to any of the NCCF programs. A network resource is any named entity known to the access method, including NCPs, local and remote devices, lines, application programs, and cross-domain resource tables and managers.

Spans of control may overlap, because resource names may appear in lists associated with more than one operator. Under such a condition, either operator may control the network resource, and the resulting status of that resource is the cumulative result of all the commands entered, depending upon the sequence in which they were received by the access method.

Care should be taken when assigning resource names to avoid conflicts, which may occur when a name appears more than once in the program's internal tables.

Scope of Commands

NCCF Release 2 allows restriction of operator use of IBM-supplied and user-written commands and operands. During definition of NCCF operators and commands, an installation can limit use of commands and operands to an operator or group of operators. For example, an installation may want to restrict the use of the CLOSE or STOP FORCE commands to a subset of NCCF operators. Commands not specifically restricted are available to all operators.

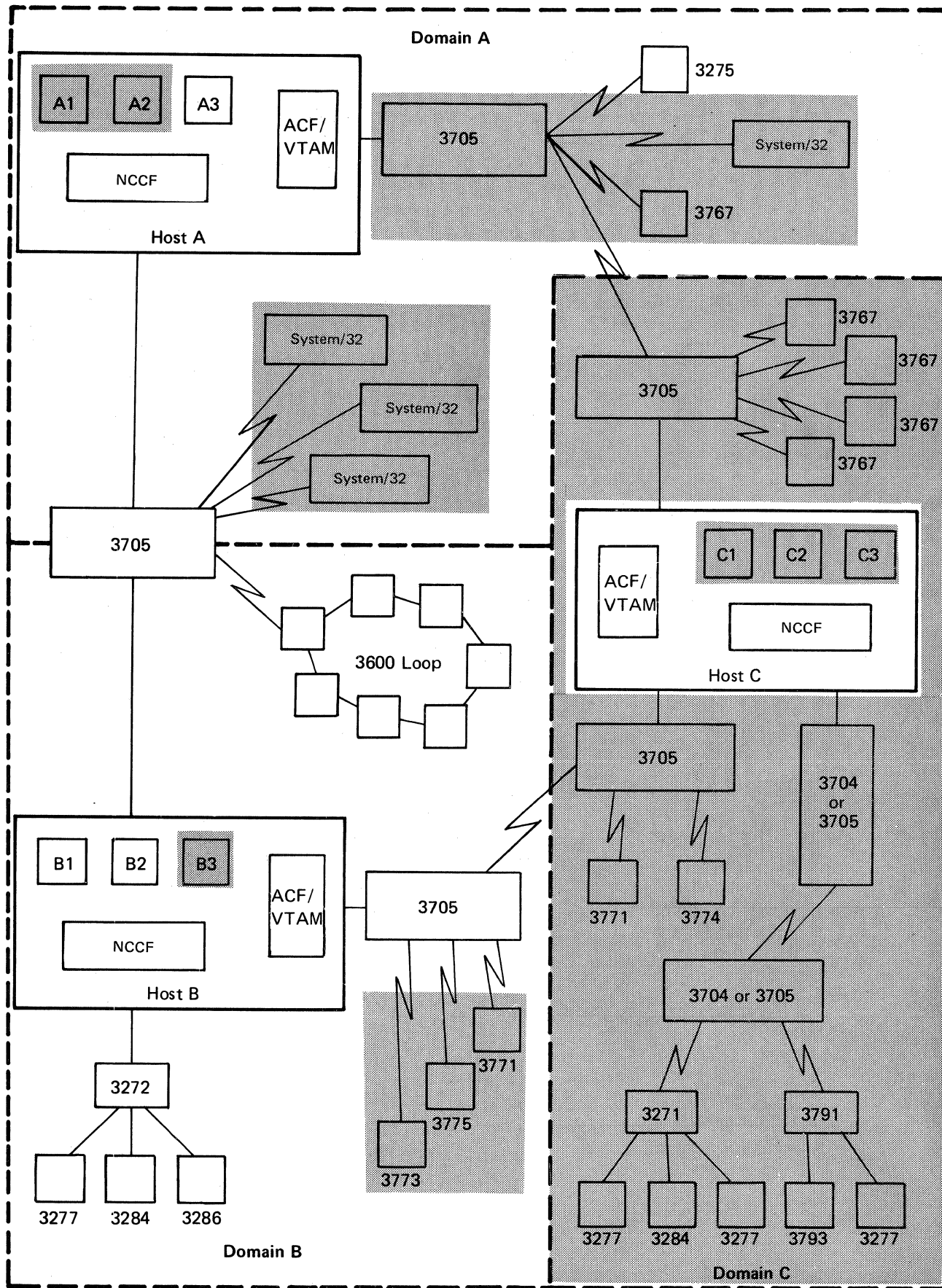


Figure 3. Span of Control

NCCF Operation

Starting the Program

The Network Communications Control Facility is executed as an application program in its own region or partition. When used with DOS/VSE systems, the program can also operate as a subtask in the ACF/VTAM or ACF/VTAME partition. NCCF is started by the system console operator, and for each initialization the program adopts the current configuration reflected in the definition files.

Initialization

During NCCF initialization, tables are built that include a list of all command processors in the system and their addresses. At command processor execution, initiated by operator request, individual command processors are invoked by NCCF tasks that control the execution of the processors.

NCCF provides initialization functions required for the addition of communications network management (CNM) processors to the NCCF system. A CNM processor is a command processor that performs communications network management functions.

NCCF Release 2 can be defined so that commands, or a command list, are automatically executed after NCCF is started.

Stopping the Program

NCCF can be halted using the NCCF CLOSE command with either the NORMAL or the IMMED option entered from an operator station or the system operator's console. The command defaults to a normal, orderly shutdown. The IMMED option results in an immediate end of the program's main task. The DUMP option provides a dump with immediate termination. The program can also be halted with an OS/VS or DOS/VSE system CANCEL command, which cancels the task.

Orderly Shutdown

When the CLOSE command with the NORMAL option is issued, no new operator logons are allowed. Current operator station sessions continue until each session is individually terminated. No new cross-domain session-establishment requests are honored while a shutdown is in progress, but existing requests from other NCCF programs are completed before the sessions are closed. Hard-copy log devices are logged off when their associated operator stations have logged off (see "Logging Facilities" earlier in this publication), and there are no more messages to be printed. The program completes any existing requests where possible, and a final message is sent to the system console. A final entry is made to the log, and it is closed.

Immediate Shutdown

The CLOSE command with the IMMED option immediately ends the NCCF main task. If the DUMP option is chosen, a dump of the region or partition is produced, and cleanup is done by the access method and the operating system. This form of the command may be issued at any time, even while a CLOSE NORMAL is in progress.

Authorization

NCCF provides logon verification of user identification and, optionally, the operator password. The authorized operator attachment to and detachment from NCCF is handled by LOGON and LOGOFF functions provided by NCCF.

In NCCF, an authorized operator can be specified to receive undeliverable messages, authorization messages, lost terminal messages, and other asynchronous messages.

NCCF also provides the ability to specify operator authority on ACF/VTAM systems to issue ACF/VTAM commands relating to individual network resources, both within and between domains. This span of control function allows the user to assign groups of network resources to specific operators. Tailored operator control makes a complex network more manageable. For example, a domain can be entirely available to one operator or divided into smaller elements, each available to an individual NCCF operator. If properly authorized, operators may issue commands relating to resources outside of the domain in which this operator station is located.

Alternately, logon authorization may be checked using the Resource Access Control Facility, a separately orderable IBM program product.

Logon and Logoff

To gain access to NCCF, an operator must log on through VTAM or TCAM (see Figure 4). The APPLID name specified at logon must be the same name given on the DOMAINID parameter of the NCCFID definition statement used during system definition. NCCF returns a request for an operator identification, a password, a profile name, a hard-copy log device name, and a request for the execution of a specified initial command, which may be answered YES or NO. *Network Communications Control Facility Installation* contains a complete description of the NCCFID statement, as well as information concerning passwords and profiles. The program verifies that the logon came from a terminal authorized to issue the command; it also verifies that the operator identification and password are valid by comparing them with the information specified in the definition files or data sets. If no logon errors are found, the appropriate internal tables are adjusted to reflect the new operator station, and a session is started with the terminal.

When an operator logs off through NCCF facilities, NCCF ends the session, and the operator station is disconnected. Any NCCF messages that cannot be sent to the operator station because of a disconnection are directed to the log device associated with that operator station. Any ACF/VTAM messages sent to an operator station that has been disconnected are sent to the system console.

Multiple Network Operators

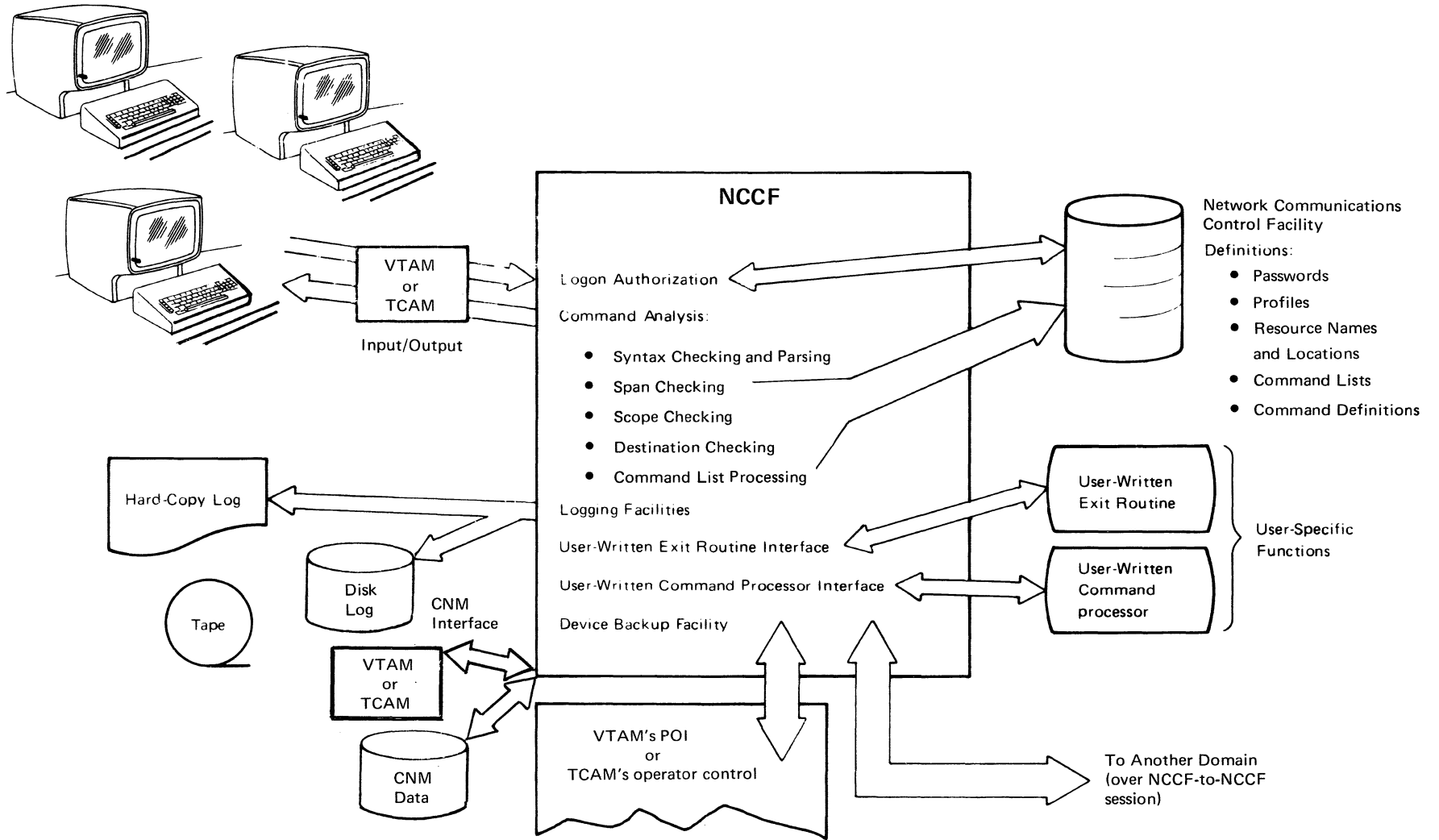


Figure 4. Overview of NCCF Operation

Screen Format and Command Entry

Figure 5 shows the screen format of the operator station as formatted by NCCF. It is divided into a message area for the display of commands, messages, and responses, and (below it) a command entry area where commands are displayed while being entered from the keyboard. The fields at the top of the screen give the name of the program as well as the date and time of the last screen update.

Section A of Figure 5 is used to display entries and responses as held and processed on input and output queues. The fields include a 1-character code for the type of entry (command, response, or unsolicited message) and a domain name field (to clarify which domain the resource resides in), followed by the actual text of the message or command. Continuation lines have blanks in the first two fields. Wherever possible, words are not split when continuation occurs. A line of dashes follows the last entry.

Section B of Figure 5 has two fields followed by an immediate message area. The first field is a 3-digit "ready" indicator. The field is filled with question marks (???) when NCCF is ready to receive regular commands from the keyboard. The second field is another 3-digit indicator, which is filled with asterisks (***) when operator action is required before NCCF begins overwriting a filled screen. (See *Network Communications Control Facility Terminal Use* for a discussion of the actual commands.)

The immediate message area of Section B is used to display asynchronous output, including acknowledgment or error messages issued from immediate command processors.

Section C of Figure 5 is where commands are entered from the keyboard. The program sets the cursor at the beginning of this line.

Device Backup

To maintain reliability, NCCF attempts to deliver every generated message. If a device becomes unavailable to the program, messages continue to be queued for that operator station or hard-copy log until one of the following occurs:

- A network operator issues a command to transfer control, logically deactivating the device and moving its queued messages to another available device with the same device type. Messages are routed to the new device until another such transfer of control occurs.

- A network operator issues a command to deactivate a device. In this case, any messages requiring responses are rerouted to the authorized receiver. See *Network Communications Control Facility Installation* for details related to specifying authority.

- No more storage is available.

Any message that cannot be delivered according to the above rules is routed to the operator station designated as the authorized receiver of undeliverable messages.

Application Program Control and Recovery

NCCF provides informational messages and control commands that provide information about NCCF, and give the user the ability to control the execution of the application program. NCCF commands such as RESET allow a terminal user to stop execution of a function. User- or IBM-supplied command processors execute under control of an NCCF task that can be recovered or terminated without affecting other tasks within NCCF.

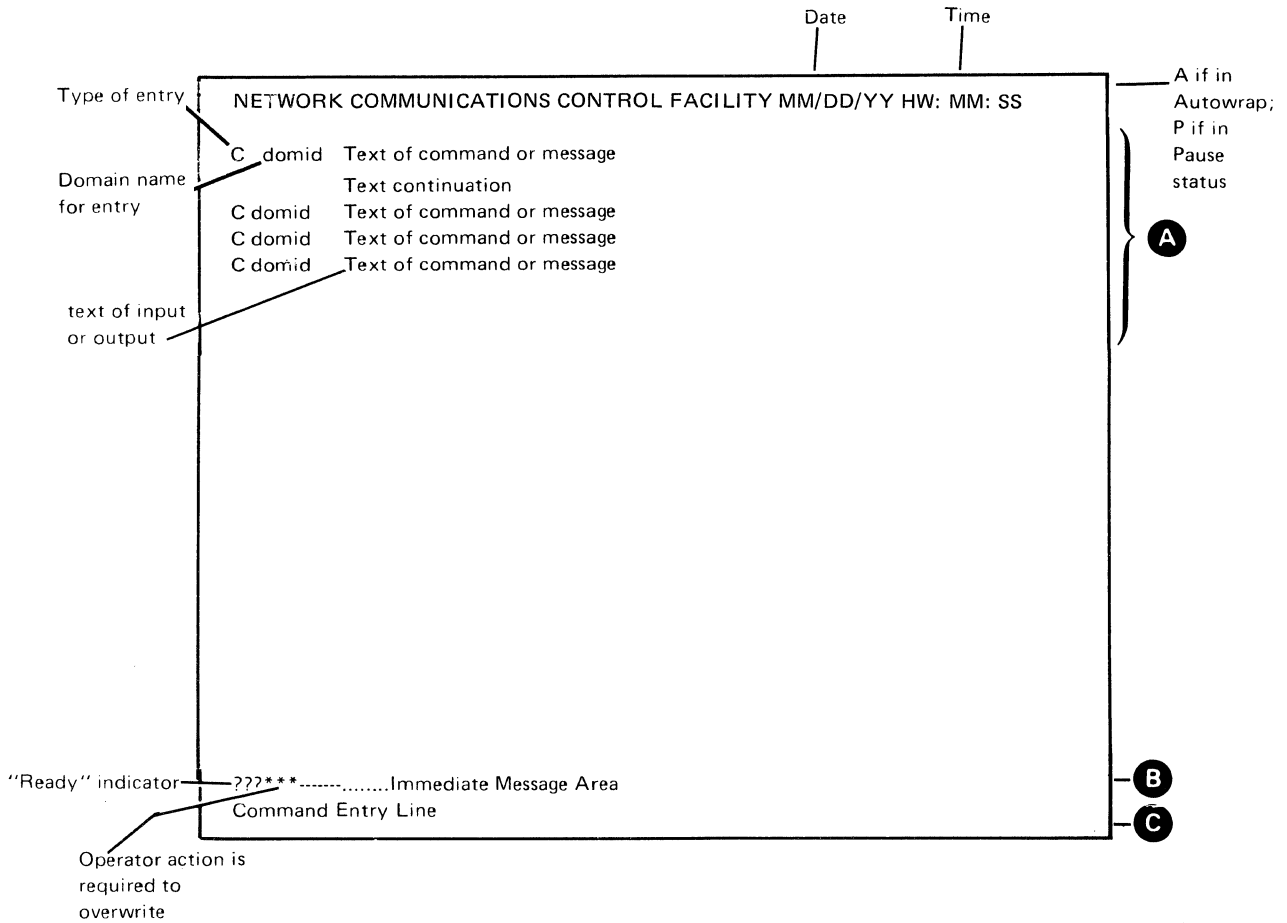


Figure 5. Screen Format at an Operator Station

Storage

The estimated minimum amount of storage required to operate NCCF with a single operator is 300,000 bytes of virtual storage for NCCF Release 1, and 400,000 bytes for NCCF Release 2. This estimate may vary depending upon the device configuration chosen by the user, the configuration and size of the network being controlled, and the NCCF functions chosen by the user. More storage is required for more complex NCCF definitions. Additional storage calculations will be found in *Network Communications Control Facility Installation*.

Terminal and Program Support

NCCF runs on all IBM host processors that support OS/VS1 Release 6.7 or 7.0 or OS/VS2 MVS Release 3.8. NCCF will also run on ACF/VTAM Release 2 under DOS/VSE. VSAM is required if NCCF data services are used.

The terminals supported by NCCF are:

Controllers

- IBM 3271 Model 2 (BSC remote)
- IBM 3271 Model 12 (SDLC remote)
- IBM 3272 Model 2 (local)
- IBM 3274 Model 1A (local SNA)
- IBM 3274 Models 1B and 1D (local non-SNA)
- IBM 3274 Models 1C and 51C (SDLC/SNA, BSC)
- IBM 3791 (with 3270 compatibility mode),
(configuration support 9169)

Controllers/Display Units

- IBM 3275 Model 2 (BSC remote)
- IBM 3275 Model 12 (SDLC)
- IBM 3276 Models 2, 3, and 4 (BSC)
- IBM 3276 Models 12, 13, and 14 (SNA/SDLC)

Display Units

- IBM 3277 Model 2
- IBM 3278 Models 2, 3, 4, and 5 (supported as Model 2)
- IBM 3279 Models 2A and 2B (both supported as IBM 3278 Model 2);
3A and 3B (both supported as IBM 3278 Model 3)

The following printers are supported by NCCF as hard-copy log devices:

IBM 3284 Model 2

IBM 3286 Model 2

IBM 3287 Models 1, 1C (supported as Model 1), 2, and 2C (supported as Model 2). All IBM 3287 models require the SCS Support Feature 9660 when operating with SNA controllers.

IBM 3288 Model 2

IBM 3289 Models 1 and 2

Any additional hardware required is determined by the user's choice of the quantity of terminals and the connection arrangement (local or remote). This may be determined as a part of normal system configuration. NCCF has no unique requirements.

NCCF Release 1 executes on the following access methods:

- VTAM Level 2
- ACF/VTAM Release 1
- ACF/VTAM Release 2
- ACF/VTAME

- TCAM Level 10
- ACF/TCAM Version 1
- ACF/TCAM Version 2 Release 1
- ACF/TCAM Version 2 Release 2

NCCF Release 2 executes on the following access methods:

- ACF/VTAM Release 2
- ACF/VTAM Release 3
- ACF/VTAME
- ACF/TCAM Version 2 Release 2
- ACF/TCAM Version 2 Release 3

NCCF executes in a VM/370 environment on ACF/VTAM Release 2 or 3 and ACF/TCAM Version 2 Releases 1, 2, and 3. NCCF also executes on ACF/VTAME using an IBM 4331 Processor in System/370 compatibility mode.

Network Control Program (NCP) support is described in the appropriate access method publications, listed in the Preface.

Compatibility Considerations

Network Operation Support Program (NOSP) commands entered at operator stations are compatible with NCCF commands. Cross-domain communication is supported between NOSP and NCCF in ACF/VTAM or ACF/VTAME. User exit routines, command processors, and command lists written for NOSP can execute on NCCF in ACF/VTAM Release 1 or 2.

Either NOSP or NCCF can execute as an application program on ACF/VTAM but both cannot reside in the same host processor. NCCF ordered for a specific level or release of a data communication access method for a specific operating system supports only that level or release. For systems with multiple data communication access methods in the same CPU, a copy of NCCF is needed for each data communication access method supported and both copies must be at the same level, as follows:

VTAM Level 2 with TCAM Level 10

ACF/VTAM Release 1 with ACF/TCAM Version 1

ACF/VTAM Release 2 with ACF/TCAM Version 2 Release 1 or 2

ACF/VTAM Release 3 with ACF/TCAM Version 2 Release 3

In some cases, access method commands issued at an operator station must have additional routing parameters appended to them to accommodate cross-domain command execution. For example, an ACF/VTAM Release 1 MODIFY command involving the network solicitor requires a domain routing parameter in addition to the basic command format if the command is to be routed to another ACF/VTAM domain and executed for a network solicitor in that domain. NCCF uses these parameters for routing purposes and removes them before the command is passed to the proper domain.

An installation that wants to use spans with ACF/VTAM and NCP Version 5 must generate the NCP without the SPAN parameters. After NCP generation, a copy is made of the NCP deck and the necessary SPAN parameters are added to the NCP definition. The NCP source deck is filed in the ACF/VTAM definition library. The copy of the deck allows modifying of the SPAN parameters without regeneration of the NCP.

Glossary

This glossary defines terms and abbreviations that are important in Network Communications Control Facility (NCCF) publications. It does not include terms previously established for IBM operating systems and for products used with NCCF. 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 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.

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.

A

ACF/TCAM. Advanced Communications Function for the Telecommunications Access Method.

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

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

alphanumeric. Pertaining to a character set that contains letters, digits, and usually other characters, such as punctuation marks. Synonymous with alphameric.

AMH. Application message handler.

application message handler (AMH). In TCAM, a routine that routes messages between application programs or between an application program and a device message handler. NCCF in TCAM is supplied with an AMH. See also *device message handler*.

application program. (1) A program written for or by a user that applies to a particular application. (2) In data communication, a program used to connect and communicate with terminals in a network, enabling users to perform application-oriented activities.

authorization message. An NCCF message that is directed to an authorized operator. An example is a message about the use of NCCF, such as a successful logon, repeated unsuccessful logons, logon rejected because of an invalid password, a DSM error message, and logoff.

authorized operator. In NCCF, an operator who has been authorized to receive undeliverable messages, authorization messages, and lost terminal messages. Authorization is specified on the AUTH statement during NCCF definition.

C

CNM. Communications network management.

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

command list. A sequential list of commands that is assigned a name. When the name is invoked (as a command) the commands in the list are executed.

command processor. A problem program executed to perform an operation specified by a command.

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

communications network management (CNM). The process of designing, installing, operating, and managing the distribution of information and controls among end users of communication systems.

communications network management application. A combination of the components and elements that comprise the problem determination, operational facilities, and performance functions of CNM. An example is NCCF with added CNM processors.

communications network management interface. The interface provided to application programs by the access method for handling data and commands associated with communication network management. CNM data and commands are handled across this interface.

communications network management processor. A command processor that manages one of the functions of a communication system. A CNM processor is executed under control of NCCF and requires NCCF as a prerequisite program.

cross-domain communication. In a multiple-domain network, communication between domains.

cursor. A movable spot of light on the screen of a display device, usually indicating where the next character will be entered.

D

data services command processor (DSCP). An NPDA component that structures the request for recording and retrieving data in the application program's data base, and also structures the request to solicit data from a network device.

data services manager (DSM). A function in NCCF that provides VSAM services for data storage and retrieval and provides the interface between DSCPs and the CNM interface.

device message handler. In TCAM, a user-defined routine that routes messages between a device and an application message handler, or between devices. See also *message handler*. Contrast with *application message handler*.

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

DSCP. Data services command processor.

DSM. Data services manager.

E

exit routine. Any of several types of special-purpose routines that handle processing for certain conditions in a program. NCCF provides for user-written exit routines. NCCF has its own data communication access method exit routines and system exit routines.

H

hard-copy log. In NCCF, a file written on a hard-copy device (such as a printer) that contains a record of all messages passing through NCCF that are associated with a specific operator or operators.

hard-copy task (HCT). The NCCF subtask that controls the passage of data between NCCF and the hard-copy log device.

HCT. Hard-copy task.

I

immediate command. In NCCF, a command (such as GO, CANCEL, or RESET) that can be executed while a regular command is being processed.

L

log. A collection of messages or message segments placed on a secondary storage device for accounting or data collection.

logger. (1) (ISO) A functional unit that records events and physical conditions, usually with respect to time. (2) In NCCF, a subtask that records errors from EP mode and local mode devices to the EP data base and transmits errors from NCP

mode devices supported by VTAM and TCAM to the NCP data base.

M

message. In data communications, a combination of characters and symbols transmitted from one point to another.

message handler (MH). Under TCAM, a sequence of user-specified macro instructions that examine and process control information in message headers, and perform the functions necessary to prepare message segments for forwarding to their destinations. One message handler is required for each line group having unique message-handling requirements.

MH. Message handler.

N

NCCF. Network Communications Control Facility.

NCP. Network control program.

Network Communications Control Facility (NCCF). A program product consisting of a base for command processors that can monitor, control, and improve the operation of a data communication network.

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

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

Network Problem Determination Application (NPDA). A program product that assists the user in identifying communication network problems from a central control point using interactive display techniques.

NPDA. Network problem determination application.

network resource. Any named entry known to the access method. Network resources include network control programs (NCPs), local and remote terminals, lines, application programs, cross-domain resource tables, and cross-domain resource managers.

O

operator. See network operator.

operator control. The ACF/TCAM facility that allows users to enter ACF/TCAM operator control commands to examine or alter the status of the communication network. Operator control commands may be entered from an authorized station on a nonswitched link, from the system console, or from an application program.

operator station. A control point in NCCF that links a terminal, an operator, and the control environment assigned to the operator (such as profile and span of control). The logical unit from which an operator logged on.

operator station task (OST). The NCCF subtask that establishes and maintains the online session with the network operator. There is one operator station task for each network operator who logs on to NCCF.

OST. Operator station task.

overlapped span of control. A condition that exists when the network resource name appears in a span or spans associated with more than one active network operator. Under such a condition, either operator may control the resource. The status of the device depends on the cumulative effect of commands entered and the sequence in which the commands are received by the access method.

P

password. (1) A unique string of characters that a program, computer operator, or user must supply to meet security requirements before gaining access to data. (2) In systems with time sharing, a 1- to 8-character symbol that the user may be required to supply at the time he logs on the system. The password is confidential, as opposed to the user identification.

POI. VTAM's program operator interface.

PPT. Primary POI task.

presentation services. In SNA, a component of function management within a logical unit supporting the LU-LU session. It supports both application-program end users, and specific hardware capabilities, such as a printer/keyboard used by terminal-operator end users. It adapts the data and control conventions of one end user of a session to the requirements of the other end user of the session. It makes available to the end user various levels of presentation functions; these are: access to presentation classes, access to data flow control, or access directly to the transmission subsystem.

presentation services command processor (PSCP). An NPDA component that processes user requests from a user terminal and formats displays to be presented at the user terminal.

primary POI task (PPT). The NCCF subtask that performs disk logging and processes all unsolicited messages received from the VTAM program operator interface (POI) and either delivers them to the controlling operator station task or command processor.

profile. In NCCF, a record that describes the control available to a particular network operator. The profile includes the operator's span of control, the name of the terminal to be used as a hard-copy device, whether the operator is authorized (see *authorized operator*), and (optionally) the name of a command or command list that is executed immediately after logon is successfully completed.

program operator. A VTAM application program that is authorized to issue network operator commands and receive network operator messages.

PSCP. Presentation services command processor.

R

regular command. Any access method or NCCF command that is not an immediate command and is processed by a regular command processor. Only one regular command may be executed at one time; regular commands issued while other regular commands are being processed are queued. Contrast with *immediate command*.

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

resource. See *network resource*.

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

routing qualifier. An explicit parameter added to commands in NCCF to accommodate cross-domain execution. NCCF removes the routing qualifier before the command is passed to the appropriate access method.

RU. Request/response unit.

S

scope of commands. An NCCF Release 2 facility that allows restriction of the use of NCCF commands and operands to a subset of all NCCF operators in the network.

SNA. Systems network architecture.

span. In NCCF, a user-defined group of network resources within a single domain. Each major or minor node is defined as belonging to one or more spans. See also *span of control*.

span of control. The total network resources over which a particular network operator has control. All the network resources listed in spans associated through profile definition with a particular network operator are within that operator's span of control.

station. (1) One of the input or output points of a system that uses communication facilities; for example, the telephone set in the telephone system or the point where the business machine interfaces with the channel on a leased private line. (2) In SNA, one of the input or output points on an SDLC data link. (3) One or more computers, terminals or devices at a particular location.

T

TCAM. Telecommunications Access Method.

TCAM control task (TCT). The NCCF subtask that controls communication between NCCF and TCAM.

TCT. TCAM control task.

terminal. (1) A point in a system or communication network at which data can either enter or leave. (2) A device, usually equipped with a keyboard and some kind of display or hard-copy device, capable of sending and receiving information over a communication channel. (3) In VTAM, an end point in a data communication network; that is, a physical or logical unit, a start/stop or BSC device, or a 3270 Information Display System.

U

unsolicited message routing. A method of routing replies to CNM application programs by using a routing table instead of a process request identifier.

V

VSAM. Virtual Storage Access Method.

VTAM. Virtual Telecommunications Access Method.

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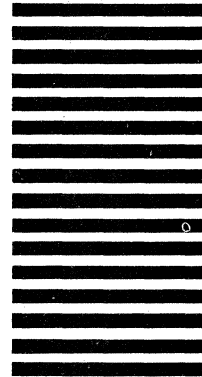
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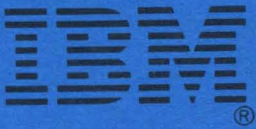
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