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File No. S370-30

Network Terminal Option (NTO)

General Information Introduction

Program Product

Program Number: 5735-XX7

IBM

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Systems

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This edition applies to the Network Terminal Option Releases 1 and 2 (Program Number 5735 - XX7). The information in this publication should be used for planning until the Network Terminal Option becomes available.

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Preface

This publication gives an overview of the Network Terminal Option (NTO). It is intended primarily for installation managers and planners who evaluate the use of NTO for their data processing network.

This publication is organized into the following chapters:

- Chapter 1, "NTO Overview," describes the NTO program product including the devices supported and the NTO functions.
- Chapter 2, "Requirements for NTO Support," describes the hardware and software requirements for NTO.
- Chapter 3, "NTO Planning Considerations," discusses the planning considerations for installing NTO in an SNA network.
- Chapter 4, "Reliability, Availability, and Serviceability Considerations," is an overview of the problem determination support for NTO.

Prerequisite Publications
The reader should be familiar with the basic concepts of data communications, Systems Network Architecture (SNA), and Advanced Communications Function for the Network Control Program (ACF/NCP) presented in the following publications:

- *Introduction to Data Communications Systems,* SR20-4461
- *System Network Architecture General Information,* GA27-3102
- *ACF/NCP/VS Control Program System Support Programs: General Information,* GC30-3058

Related Publications
In addition to the prerequisite publications, the following publications may be useful:

- *Network Terminal Option Installation,* SC38-0298
- *Network Terminal Option Diagnosis and Logic,* LY38-3018
- *ACF/VTAM General Information: Introduction,* GC27-0462
- *ACF/VTAM Installation,* (DOS/VSE), SC27-0464
- *ACF/VTAM Installation,* (OS/VS), SC27-0468
- *IBM 3767 Component Description,* GA27-3096

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Chapter 1. NTO Overview

The Network Terminal Option (NTO) is an IBM program product that extends the capabilities of the Advanced Communications Function Network Control Program (ACF/NCP) in a 3705 Communications Controller to allow Systems Network Architecture (SNA) support for a select group of non-SNA devices. These non-SNA devices are run under a host access method in an SNA network and in this publication are called NTO devices.

The NTO Release 1 program product runs only under the ACF/NCP/VS Release 2. The NTO Release 2 program product runs only under the ACF/NCP Release 3. Both releases of NTO require the support of the Advanced Communications Function Virtual Teleprocessing Access Method (ACF/VTAM) Release 2 or 3. In this publication, both ACF/NCP/VS Release 2 and ACF/NCP/VS Release 3 are referred to as ACF/NCP, and both ACF/VTAM Release 2 and ACF/VTAM Release 3 are referred to as ACF/VTAM, unless a distinction is necessary. The Time Sharing Option (TSO) and Virtual Storage Personal Computing (VSPC) Release 2 also support NTO through the host access method. User-written TSO command processors, ACF/VTAM application programs, and VSPC application programs can be written to use the facilities of the NTO program product.

The NTO program product allows installations with non-SNA devices to migrate to SNA. NTO allows an installation with non-SNA devices to have the use of SNA services that:

- Provide a consistent and comprehensive structure for data communications growth
- Minimize the effects of system changes
- Distribute data communications functions throughout the network
- Allow for the sharing of resources in the network
- Extend data communication functions conveniently and effectively to the user
- Minimize the user's involvement in the details of data communications operation

In addition to the use of SNA services, the NTO program product provides for format 1 (FID1) level communication for the NTO devices in the SNA network. This support is transparent to the NTO device. The host access method operates as if the NTO device is supported as a PU type 1, LU type 1 (one LU for each PU) through the host access method. This allows the NTO device to be supported under the record application program interface (API) of the host access method and permits it to communicate in cross-domain sessions. To the NTO device it appears as if it is receiving its normal support and communicating with format 0 (FID0) level path information units (PIUs).

NTO Device Support

NTO provides FID1 support for the following non-SNA start-stop terminals:

- IBM 2741 Communications Terminal
- IBM 2740 Communication Terminal Model 1
- Western Union Teletypewriter Exchange Services (TWX Model 33/35)
- World Trade Teletypewriter Terminals (WTTY)

These NTO devices can communicate with an application program through the host access method using the NTO program product. Each appears to the host access method like a PU type 1, LU type 1 and supports the same Bind parameters as the SDLC 3767 Communications Terminal. These NTO devices are not buffered so application programs supporting these devices may have to establish text editing conventions in order to communicate. Special planning considerations for programs supporting the NTO program product are discussed in Chapter 3, "NTO Planning Considerations."

Notes:

1. *Devices that are equivalent to those devices explicitly supported by NTO may also function satisfactorily. The user of NTO is responsible for establishing this equivalency. IBM assumes no responsibility for the impact that any changes to the IBM-supplied products or programs may have on such devices.*
2. *All of the features of these NTO devices that are supported by the ACF/NCP are also supported by NTO.*

Relationship of the NTO Program Product to an SNA Network

The NTO program product resides in the 3705 Communications Controller and runs under the ACF/NCP through the programmed resource capability of the ACF/NCP. The program resource capability provides NTO with network addressable units (NAUs) to which NTO can be attached. NTO makes these NAUs appear as links, physical units (PUs), and logical units (LUs) to the host access method in order to support NTO lines and NTO devices in an SNA network.

NTO converts SNA commands and session protocols into non-SNA commands to support the NTO device or generates commands to make the NTO device look like a PU type 1, LU type 1 to the host access method.

The host access method sends format 1 (FID1) path information units (PIUs) to the ACF/NCP. These FID1 PIUs are passed from the ACF/NCP through the programmed resource capability of the ACF/NCP to NTO. NTO receives these PIUs and can:

- Convert the FID1 command into the appropriate format 0 (FID0) PIU and send it to the NTO device.
- Generate a response for the FID1 PIU command and send it back to the host access method. (A FID1 response can be generated with or without NTO receiving a FID0 response from the NTO device. An example of a FID1 response without a response from the NTO device is the response to the Activate Physical Unit command.)
- Send the data in the form of a FID0 PIU to the NTO device. (The FID0 PIUs are converted by the BSC/start-stop processor of the ACF/NCP into basic transmission units (BTUs) before they are sent to the NTO devices.)

By not performing any data stream mapping, NTO minimizes the need for changes to existing application programs. Figure 1-1 shows the flow of the PIUs and responses through NTO to the network and the NTO devices.

NTO Function Description

In general, NTO is structured according to the major sessions that take place in an SNA network (SSCP-PU, SSCP-LU, and LU-LU). Figure 1-2 shows the functions provided by NTO and how they relate to each other. Each function provides a specific service for the NTO device to allow it to be supported in the network.

Link Functions

The commands generated at the host processor that are supported by this function are:

- Abandon Connection
- Activate Connect In
- Deactivate Connect In
- Activate Link
- Deactivate Link
- Activate Line Trace
- Deactivate Line Trace

This function also supports Request Contact commands that are directed to a host processor.

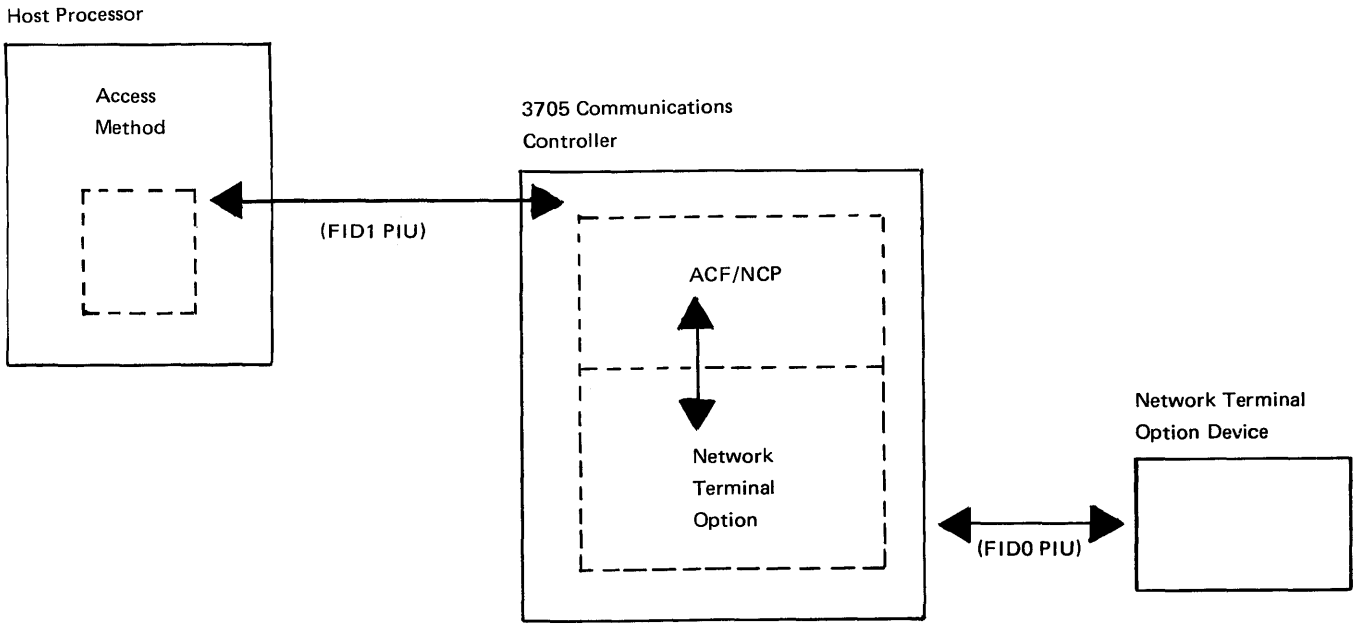

Figure 1-1. The Flow of PIUs through a Network with the Network Terminal Option

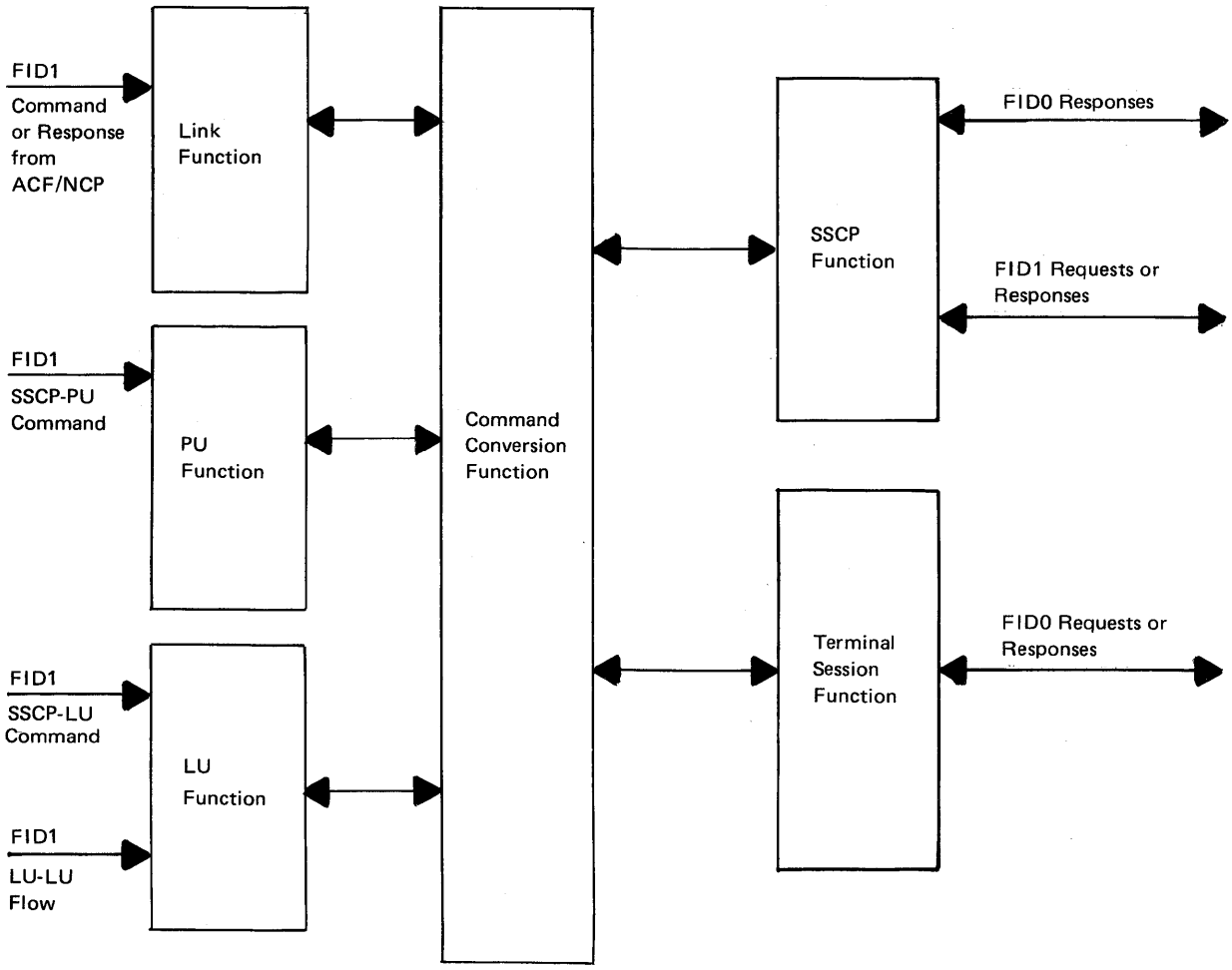

Figure 1-2. Functions of the Network Terminal Option Program Product

NTO PU Function

NTO performs the PU function for each NTO device. The PU function is used in host processor SSCP-PU sessions to monitor and control the commands that would normally be sent and received between the NTO device and the host SSCP. During session establishment, NTO acts like a PU for the NTO device.

This function supports the following commands that are directed to the NTO device PU:

- Activate Physical Unit
- Deactivate Physical Unit
- Contact
- Discontact
- Set Control Vector (key 3)
- Request Network Address Assignment
- Free Network Address

In addition to these commands, this function also supports Contacted commands that are directed to a host processor.

NTO LU Function

NTO performs the LU function for each NTO device. This LU function is used in host processor SSCP-LU sessions and in LU-LU sessions. The following host access method commands are handled by this function for SSCP-LU sessions:

- Activate Logical Unit
- Deactivate Logical Unit

The following commands are handled by this function for LU-LU flows (for application program-to-NTO device flows):

- For session control and data traffic protocols

  Bind

  Unbind

  Clear

  Start Data Traffic

- For Data Flow Control Protocols

  Cancel

  Chase

  Shutdown

  Shutdown Complete

  Bid

  Signal

  Logical Unit Status (LUSTAT)

In addition to these commands, the following communications protocols are handled by this function for function management data:

- Bracket
- Pacing
- Chaining
- Contention
- Flip-Flop (Half-Duplex)

NTO Command Conversion Function

This function converts FID1 PIUs that are sent to NTO into the appropriate FID0 PIUs before they are sent to the NTO device. Similarly, it converts all FID0 PIUs coming to NTO from the NTO device into FID1 PIUs before they are sent to the host access method. This function interfaces with the link, PU, and LU functions of NTO to convert the commands for establishing and terminating sessions sent between the NTO device and the host access method.

Note: *In some cases the PIU being converted can be translated into more than one PIU or can have no corresponding match. In the case where NTO does not support the PIU, NTO replies with a function not supported response (negative response PIU).*

NTO System Services Control Point (SSCP) Function

NTO acts like an SSCP for the lines and terminals it supports. It sends the commands to the lines and terminals for session establishment and session termination. To these lines and terminals, it appears as if they are communicating with the host's SSCP. This relationship is established when the link is activated through the ACTLINK command and remains until the line is deactivated through the DACTLINK command.

The SNA commands supported by this function and generated by the host access method are:

- Activate Link
- Deactivate Link

This function also handles the following commands generated by the ACF/NCP:

- Record Maintenance Statistics
- Record Line Trace Data
- Lost Subarea
- Inoperative (INOP)
- Initialization Complete
- Exiting Slowdown
- Entering Slowdown
- Activate Physical
- Start Data Traffic

NTO Terminal Sessions Function

This function sends and receives data between NTO and the NTO device. It interfaces with the command conversion function of NTO to map FID0 session PIUs into the appropriate FID1 PIUs before they are transmitted to the network.

In addition to this service, the NTO terminal sessions function provides a sequence number management function according to SNA protocols. The NTO devices are defined with function management (FM) profile 3, transmission services (TS) profile 3 (the same as the SDLC 3767 Communication Terminal). This causes sequence numbers to be used on all normal flows with Set and Test Sequence Number (STSN) not being allowed. A maximum sequence number is set, the first request is numbered one, and the sequence number is incremented by one for each additional request until the maximum number is reached. When the maximum is reached the sequence number field is reset to zero. All responses carry the same number as the request. All expedited flow requests carry unique identifiers rather than sequence numbers.

Additional Functions Supported by NTO Release 2

When the Network Terminal Option Release 2 is installed with ACF/NCP Release 3 and ACF/VTAM Release 3, NTO provides access to these additional ACF/NCP and ACF/VTAM functions:

- Multiple routes
- Extended flow control
- Session outage notification

Multiple Routes

ACF/VTAM Release 3 and ACF/NCP Release 3 allow the user to define up to eight routes for transmission between two host systems or between a host system and a 3705 Communications Controller. When a session is initiated between two logical units, one of the routes is automatically selected for the traffic. The user can limit the selection to a particular route or to one of an ordered sequence of routes. Using this capability, the user can distribute the traffic for different sessions among different routes.

The ordered sequence of routes, which are defined by the user, defines the set of alternate routes available for session traffic. If a route becomes inoperative during a session, the logical units can re-initiate the session. This causes the automatic selection of one of the alternate routes. The logical units can then re-synchronize the session's data traffic and continue communication on the new route.

Extended Flow Control

ACF/VTAM Release 3 and ACF/NCP Release 3 provide extended flow control to prevent deadlocks from arising in the network.

Session Outage Notification

In ACF/VTAM Release 3 and ACF/NCP Release 3, if a session's route becomes inoperative, the primary and secondary logical units are notified of the problem. The logical units can then restore the session using an alternate route.

Chapter 2. Requirements for NTO Support

This chapter describes the hardware support, software support, ACF/NCP storage requirements, and programming considerations needed for NTO.

Hardware Support for NTO

NTO is designed to operate in conjunction with the IBM 3705 Communications Controller. For information on the hardware needed to support the rest of the network, see *ACF/VTAM General Information: Introduction* and *ACF/NCP General Information: Product Summary.*

Software Support for NTO

The NTO Release 1 program product runs only under ACF/NCP Release 2 through the programmed resource capability of the ACF/NCP. It is also supported in the network through ACF/VTAM Release 2 or 3.

The NTO Release 2 program product runs only under ACF/NCP Release 3 through the programmed resource capability of the ACF/NCP. It is also supported in the network through ACF/VTAM Release 2 or 3.

In addition to the ACF/NCP and host access method support, the NTO program product Releases 1 and 2 can also be supported through TSO (as contained in the host access method) and VSPC. However, TSO/VTAM does not support the 2740 Model 1 Communications Terminal and TSO/TCAM and VSPC do not support the 2740 Model 1 Communications Terminal and the WTTY.

ACF/NCP Storage Requirements for NTO

In addition to the storage required by ACF/NCP for the start-stop devices through the use of the LINE and TERMINAL macro instructions, NTO has storage requirements for the support of the NTO devices. Figure 2-1 shows how to calculate the storage requirements for NTO Release 1. Figure 2-2 shows how to calculate the storage requirements for NTO Release 2.

An Example of Calculating NTO Storage

A 3705 Communications Controller is defined with the NTO Release 2 program product. Attached to the 3705 are 25 switched links, and 25 non-switched links each one being point-to-point (one PU for each link). The storage required would be for 50 start-stop terminals in the ACF/NCP (with one terminal for each line), plus the required storage for the programmed resources (50 PUs, 50 LUs, and 100 LU-LU session extensions), the code for the programmed resource capability in the ACF/NCP, and the following NTO-required code.

Total Storage Required = 41054 + (84 X L) + (300 X ND) +
(6 X SW) + (2 X MTA)
= 41054 + (84 X 50) + (300 X 50) +
(6 X 25) + (2 X 0)
= 41054 + 4200 + 15000 + 150 + 0
= 60404 bytes

Program Considerations

The following network components may need to be modified before NTO can be supported in an SNA network:

- User written ACF/VTAM application programs
- TSO command processors
- ACF/VTAM definition statements
- ACF/NCP generation statements

For more information on these modifications, see Chapter 3, "NTO Planning Considerations."

Storage Required	Number of Bytes
For control blocks and modules required to establish NTO	31104
NTO SSCP control block storage	94
Control block storage for a NTO-supported link	84
Control block storage required for a NTO device	300
Additional control block storage for a NTO-supported switched link	6
Additional control block storage required for an MTA NTO device	2

Total Storage Required = 31198 + (84 x L) + (300 x ND) + (6 x SW) + (2 x MTA) where L = the number of NTO-supported links, ND = the number of NTO devices, SW = the number of switched lines suported, and MTA = the number of MTA suboperands in the NTO definition statements.

Figure 2-1. Calculating the ACF/NCP Storage Requirements for NTO Release 1

Storage Required	Number of Bytes
For control blocks and modules required to establish NTO	40960
NTO SSCP control block storage	94
Control block storage for a NTO-supported link	84
Control block storage required for a NTO device	300
Additional control block storage for a NTO-supported switched link	6
Additional control block storage required for an MTA NTO device	2

Total Storage Required = 41054 + (84 x L) + (300 x ND) + (6 x SW) + (2 x MTA) where L = the number of NTO-supported links, ND = the number of NTO devices, SW = the number of switched lines supported, and MTA = the number of MTA suboperands in the NTO definition statements.

Figure 2-2 Calculating the ACF/NCP Storage Requirements for NTO Release 2

Chapter 3. NTO Planning Considerations

NTO is an IBM program product that runs under the ACF/NCP. The NTO generation deck is assembled first. This assembly output is used as input to the ACF/NCP assembler with the ACF/NCP Stage 2 input. The output from the ACF/NCP assembler defines NTO, the ACF/NCP, and their relationship to each other through the programmed resource capability of the ACF/NCP in the 3705 Communications Controller. Figure 3-1 describes the process for defining NTO with the ACF/NCP. For more information on the installation process, see *Network Terminal Option Installation.*

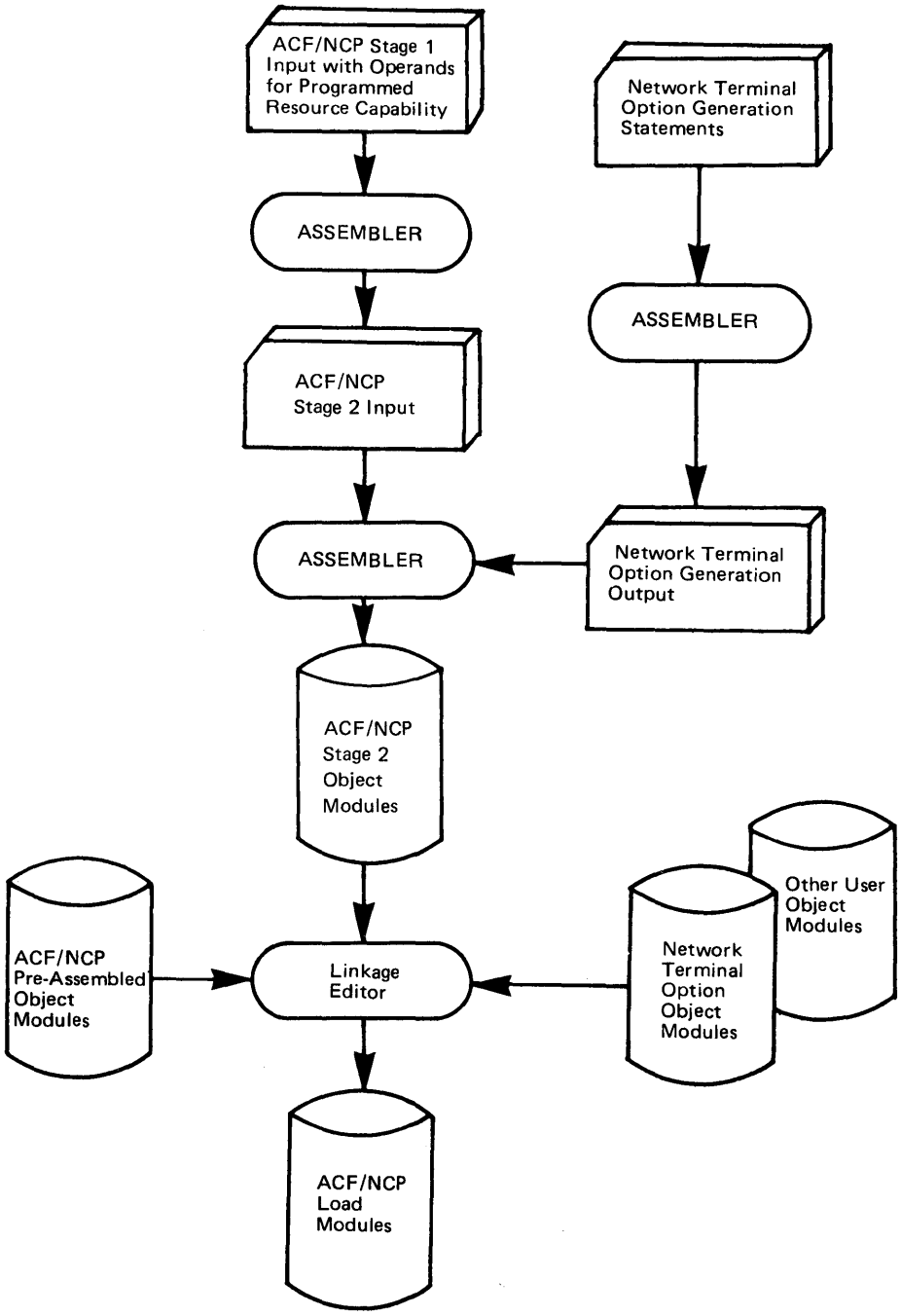

Figure 3-1. Defining the Network Terminal Option to the ACF/NCP

The NTO generation provides a one-to-one mapping of the NTO devices and links to the SNA definitions that represent them in the network. These SNA definitions are specified in the ACF/NCP generation statements and the host access method definition statements. The mapping performed by NTO creates the controls and the command handling capabilities necessary to provide support for the NTO devices in the SNA network.

NTO Generation Statements

The NTO generation deck is built from the following NTO macros:

- NETOBLD

  Builds control blocks for NTO SSCP functions

  Initializes a link map table for NTO-supported lines to the NTO devices

- NETOLINE

  Creates an entry in the link map table for the NTO-supported line

  Builds a control block for the NTO-supported line

- NETOPU

  Creates control blocks for the NTO-supported PUs and LUs and associates them with the NTO devices

- NETOEND

  Terminates the building of the link map table

Planning for ACF/NCP

NTO uses existing ACF/NCP service macros to perform functions (such as freeing buffers, queueing, and dequeueing) on behalf of the NTO devices and the network and runs under ACF/NCP interrupt level 5. The programmed resource capability of the ACF/NCP is used to establish a relationship between NTO and the ACF/NCP.

In the ACF/NCP generation statements, the following information must be coded to define NTO in the ACF/NCP:

- The relationship between the programmed resource capability of the ACF/NCP and NTO are specified in the BUILD, NCPNAU, and GENEND macro instructions.
- The control facilities of NTO are defined in the NCPNAU macro instruction.
- The start-stop link associated with the start-stop device specified in the LINE macro instruction, and the start-stop device is associated with the link through the TERMINAL macro instruction.
- The link associated with the NTO device is defined with the LINE macro instruction, and the NTO device is defined to the ACF/NCP by the PU and LU macro instructions.

For more information on ACF/NCP planning, see *ACF/NCP General Information: Product Summary*

Planning for ACF/VTAM

The ACF/VTAM user must define the NTO devices as if they were SNA SDLC 3767 Communications Terminals. ACF/VTAM uses the definitions of the NTO-supported lines and NTO devices in the ACF/NCP generation statements as a base to build its own support for NTO. ACF/VTAM uses the PU and LU macros to define the NTO-supported lines or NTO devices. For switched devices, NTO devices are identified to ACF/VTAM when the NTO device sends in an XID (the identifier from a dial-in operation). When ACF/VTAM receives the identifier, it compares it with the identifier specified in ACF/VTAM definition. For more information on NTO-supported lines and NTO devices in ACF/VTAM, see *ACF/VTAM Installation.*

TSO Conversion Considerations for NTO

NTO allows TSO command processors access to the NTO devices (through ACF/VTAM). New command processors can be written based on SDLC 3767 bind parameters and session protocols or existing command processors can be converted to support the NTO devices. Modification may be needed to handle the non-SNA device character set, and certain characteristics inherent in the SDLC 3767 (such as vertical tab set sequences) may not be directly supported for communication with NTO devices.

VSPC Conversion Considerations

The following must be considered for VSPC support of NTO devices:

- Existing VSPC application programs may need modification to handle the new SNA bind parameters and session protocols.
- New VSPC application programs must be able to handle non-SNA device character sets.
- USS tables and messages for VSPC-supported devices may need modification.

For more information on VSPC modifications, see *NTO Installation.*

General Considerations for Conversion of User-Written Application Programs

To convert existing ACF/VTAM application programs to support the NTO devices:

- An understanding of SNA concepts is required.
- The application program must be converted from basic to record mode macro instructions (ACF/VTAM).

- The session protocols and device characteristics must be examined to see which are compatible with both the application program and the NTO devices (the INQUIRE macro instruction in ACF/VTAM).
- I/O dependencies within the application program code must be evaluated for consistency with the new SNA environment (ACF/VTAM).
- Device-dependent code in the application program must be examined.

For developing a new application program, the following considerations must be evaluated:

- The application program must be written to meet the NTO device requirements (such as device character sets).
- SNA concepts must be understood with consideration being given to protocols for session establishment, communication, and termination.

Chapter 4. Reliability, Availability, and Serviceability Considerations

Through the use of SNA, the host access method, and ACF/NCP services, NTO has a comprehensive set of reliability, availability, and serviceability (RAS) aids to maintain the performance of the data communications network. These RAS aids for NTO can be divided into the following categories:

- Traces
- ACF/NCP formatted dumps
- ACF/NCP dynamic dumps
- SYS1.LOGREC error recording
- ACF/VTAM display facilities for ACF/NCP storage
- Error recovery procedures

Traces

Operating system (DOS/VSE or OS/VS) and host access method traces pinpoint network problems to a component. These traces show network activity between the host processor and the ACF/NCP or between the ACF/NCP and the NTO device. A problem in NTO or the ACF/NCP may be determined by comparing the output recorded on these traces (what did happen) with what was supposed to happen in the network at the time of the error (based on SNA concepts used in defining and operating the network).

DOS/VSE Operating System Trace

The operating system trace facilities for DOS/VSE are part of the system debugging aid (SDAID). Data collected by SDAID provides a record of the network activities and conditions that existed when an error occured. SDAID facilities can be used to show the FID1 PIU leaving the host processor and entering the ACF/NCP and the data leaving the ACF/NCP and entering the NTO device. The DOS/VSE utility program DOSVSDMP can be used to print the trace data set, and the ACF/TAP routine can be used to edit the trace data into a usable size for problem determination.

OS/VS Operating System Traces

The OS/VS operating system uses the generalized trace facility (GTF). Through the use of the RNIO and BUFFER options, GTF can record FID1 PIUs entering and leaving the network. With the LINE option, GTF can record the activity of the line between the ACF/NCP and the NTO device (ACF/NCP line trace). The OS/VS utility PRDMP can be used to print the GTF trace data set, and the ACF/TAP routine can be used to edit the trace data set into a usable size for problem determination.

ACF/VTAM Traces

In addition to the systems traces, ACF/VTAM provides its own network traces to record the sending and receiving of PIUs in a network with NTO. The ACF/VTAM internal trace (VIT) with the PIU option can record the FID1 PIUs

sent to and from NTO. This trace can be started, or have the options changed, or stopped with the MODIFY command.

FID0 Trace

The FID0 trace is used to map the FID0 PIUs that are sent between the NTO devices and NTO. This trace is activated when the host access method issues the ACTTRACE command to NTO, and the output of this trace is formatted in the host by the ACF/TAP routine. This trace can trace up to eight lines concurrently.

ACF/NCP Dumps

The ACF/NCP formatted dump facility is a standalone dump program. When it is determined by the traces that a network error was caused by the either the ACF/NCP or NTO, the ACF/NCP dump program can be used to show the NTO and ACF/NCP modules and control blocks.

ACF/NCP Dynamic Dumps

The ACF/NCP dynamic dump facilities can be used to map ACF/NCP and NTO storage without loss of of network operation time. The entire storage of ACF/NCP and NTO can be mapped (256 bytes at a time) with the MODIFY DUMP command with the DYNA option for any ACF/NCP in the network.

SYS1.LOGREC Error Recording

NTO collects NTO device status and information. This information is formatted into miscellaneous data records (MDRs) and is sent to the host processor to be recorded on the SYS1.LOGREC error recording data set.

Host Access Method Display Facilities

The host access method display facilities can be used to view the storage used by NTO and the ACF/NCP. The host access method DISPLAY command is used with the NCPSTOR option. The DISPLAY can map from 1 to 256 bytes of ACF/NCP storage (with a default of 32 bytes). ACF/VTAM display facilities can be used to show NTO and ACF/NCP modules, control blocks, and work areas.

Error Recovery Procedures

NTO has a standard set of error handling capabilities to support the NTO devices (the same functions are supported as for non-SNA devices running under NCP Release 5). NTO translates the nonrecoverable error to the appropriate FID1 negative response and sends it to the host processor. NTO then resets the NTO device and the link so that future sessions can be established. All SNA commands that are not supported by NTO are mapped to a negative response by NTO and returned to the host processor.

Glossary

This glossary describes terms and abbreviations that are important in the Network Terminal Option (NTO) publications. It does not include terms previously established for IBM operating systems and for products used with this program product. Additional terms can be found by referring to the index, to prerequesite and corequesite publications, and the *IBM Data Processing Glossary,* GC20-1699.

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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.

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

A

access method. A technique for moving data between main storage and input/output devices.

ACF. Advanced Communications Function.

ACF/NCP. Advanced Communications Function for the Network Control Program.

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.

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

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

B

bid. In the contention form of invitation or selection, an attempt by the computer or a station to seize control of a line so that it can transmit data.

bracket. (1) An exchange of one or more messages between an application program and a logical unit that accomplishes some task defined by the user as uninterruptible. (2) In SNA, an uninterruptible unit of work, consisting of one or more chains of request units and their responses, exchanged between two logical units. Examples are data base inquiries/responses, update transactions, remote job entry output sequences to work stations, and similar applications.

bracket protocol. (1) In SNA, a data flow control protocol in which exchanges between logical units (LUs) are achieved through the use of brackets, with one LU designated at session initiation as the first speaker, and the other LU as the bidder. The bracket protocol involves bracket initiation and termination rules. (2) A method of communication in which a new bracket is not started until the bracket in progress is completed.

C

chaining. A system of storing records in which each record belongs to a list or group of records and has a linking field for tracing the chain.

change-direction protocol. A method of communication in which the sender stops sending on its own intiative, signals this fact to the receiver, and prepares to receive.

chase indicator. An indicator that when returned to its originator, signifies that all responses have transmitted.

clear indicator. A SESSIONC indicator sent by one node to another that prevents the exchange of messages and responses.

communication controller. A type of communication control unit whose operations are controlled by a program stored and executed in the unit. An examples is the 3705 Communication Controller.

communication line. Any physical link, such as a wire or a telephone circuit. Contrast with *data link.*

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

cross-domain session. A session between network addressable units in different domains.

D

data link. (1) (SC1) An assembly of those parts of two data terminal equipments that are controlled by a link protocol, together with their interconnecting data circuit, that enables data to be transferred from a data source to a data sink. (2) The communication channel, modem, and communication controls of all stations connected to the communication channel, used in the transmission of information between two or more stations. (3) The physical connection and the connection protocols between the host and communication controller nodes via the host data channel. (4) Contrast with *communication line.*

definition statement. In ACF/VTAM, the means of describing an element of the telecommunication system.

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

F

FID. Format identification.

flip-flop. * A circuit or device containing active elements, capable of assuming either one or two stable states at a given time.

FM. Function management.

FMD. Function management data.

format identification (FID) field. In SNA, a field in a transmission header (TH) that defines the subsequent format of the header and the type of TH fields involved with a transmission. FID0 (for pre-SNA product support) and FID1 are the header formats used between host and communication controller nodes and between two communication controller nodes. FID2 and FID3 are the header formats used between communication controller nodes with boundary function and cluster controller and terminal nodes.

FSM. Finite state machine.

function management (FM). In SNA, the layer of functional capability between the application layer and the transmision subsystem. It includes data flow control and function management data (FMD) services. See also *application layer, transmission subsystem.*

G

generalized trace facility (GTF). An optional OS/VS service program that records significant system events (such as supervisor calls and start I/O operations) for the purpose of problem determination.

GTF. Generalized trace facility.

H

host processor. The central or controlling processing unit in a multiple processing unit configuration.

L

line. See *communication line.*

line trace. In the network control program, an optional function that logs online diagnostic information. Tracing is limited up to eight lines at a time.

link. (1) (ISO) In computer programming, the part of a computer program, in some cases a single instruction or an address, that passes control and parameters between separate portions of the computer program. (2) (ISO) In computer programming, to provide a link. (3) Synonymous with linkage. (4) See *data link.*

linkage. (ISO) Synonym for link (1).

logical unit. (1) The combination of programming and hardware that comprises a terminal. (2) In SNA, one of three types of network addressable units (NAUs). It is the port through which an end user accesses function management in order to communicate with another end user. It is also the port through which the end user accesses the services provided by the system services control point (SSCP). It must be capable of supporting at least two sessions–one with the SSCP, and one with another logical unit. It may be capable of supporting many sessions with other logical units. See also *physical unit, system services control point.*

LU. Logical unit.

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

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

N

NCP. Network control program.

NCP/VS. Network control program/virtual storage.

network. (1) (SC1) The assembly of equipment through which connections are made between terminal installations. (2) In data communication, a configuration in which two or more terminal installations are connected. (3) The interconnection of electrical components.

network address. In SNA, the address, consisting of subarea and element subfields, that uniquely identifies a link or the location of a network addressable unit. The conversion from a local address to a network address, or vice versa, is accomplished as

part of the boundary function in the node attached to a cluster controller node or a terminal node.

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 in the transmission subsystem. Each NAU has a network address that represents it to the transmission subsystem. The transmission subsystem and the NAUs collectively constitute the communication system.

network control (NC). In SNA, a transmission control component that permits logically adjacent connection point managers to communicate through the common network, using sessions established for other purposes and thereby avoiding special session establishment. See also *connection point manager, session control.*

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

network control program generation. The process, performed in a processing unit, of assembling and link-editing a macro instruction program to produce a network control program.

network control program/virtual storage. Any of the NCP versions supported under OS/VS, DOS/VS, or DOS/VSE.

network definition. In ACF/VTAM, the process of defining the identities and characteristics of each node in the telecommunication system and the arrangement of the nodes in that system.

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 (called NTO devices) as PU type 1, LU type 1 devices without data stream mapping.

non-SNA terminal. A locally-attached 3270 Information Display System or devices supported by ACF/VTAM that use start-stop or BSC protocols.

NTO. Network Terminal Option.

NTO device. A non-SNA device that is supported through the Network Terminal Option in an SNA network as a PU type 1, LU type 1 device (like an SDLC 3767 Communications Terminal).

P

pacing. (1) In data communication, a technique by which a receiving station controls the rate of transmission of a sending station to prevent overrun. (2) In SNA, a mechanism that permits a receiving connection point (CP) 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 either the receiver or the network can process them. When a CP manager exists within a path (that is, at the boundary function) between two CP managers, pacing can occur in stages: sending CP manager to middle CP manager, and middle CP manager to receiving CP manager. (3) In the NCP, a means for limiting the number of basic information units (BIUs) sent to a logical unit on an SDLC link until the logical unit acknowledges its ability to receive more BIUs.

path information unit (PIU). In SNA, the unit of transmission consisting of a transmission header (TH) and either a basic information unit (BIU) or a BIU segment.

physical unit (PU). In SNA, one of three types of network addressable units; a PU is associated with each node that has been defined to a system services control point (SSCP). A PU controls the resources local to its associated node. The SSCP establishes a session with the physical unit as part of the bring-up process. See also *logical unit, system services control point.*

PIU. Path information unit.

problem determination. The process of identifying the source of a problem; e.g., a program component, a machine failure, data communication facilities, user or contractor-installed programs or equipment, an environment failure such as a power loss, or a user error.

protocol. In SNA, the sequencing rules for requests and responses by which network addressable units in a communication network coordinate and control data transfer operations and other operations. See also *bracket protocol.*

PU. Physical unit.

PU-SSCP session. In SNA, a session between a physical unit (PU) and the system services control point (SSCP) that is used to control the physical configuration and to control an individual node. Each physical unit in the network must participate in a session with the SSCP that provides services for that physical unit.

S

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

session control (SC). In SNA, one of the components of transmission control. It is responsible for allocating resources necessary for a session, for purging data flowing in a session if an error disrupts operations, and for resynchronizing the data flow after such an error.

SNA. Systems network architecture.

SSCP. System services control point.

start-data-traffic (SDT) indicator. A SESSIONC indicator sent by one node to another that enables data flow between them.

start-stop transmission. (SC1) Asynchronous transmission such that a group of signals representing a character is preceded by a start element and followed by a stop element.

system definition. In industry systems, the time before a system is put into use, when desired functions and operations of the system are first selected from various options available. Synonymous with system generation.

system generation (SYSGEN). The process of selecting desired functions and operations of a system from various options and assembling and link-editing the IBM-supplied control program components that constitute an operating system.

system macro instruction. (1) A macro instruction that calls for the processing of an IBM-supplied library macro definition; for example, the ATTACH macro. (2) In the 3704 and 3705 Communication Controllers, one of the control program generation macro instructions that provides information pertaining to the entire communications controller.

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

systems network architecture (SNA). The total description of the logical structure, formats, protocols, and operational sequences for transmitting information units through the communication system. Communication system functions are separated into three discrete areas: the application layer, the function management layer, and the transmission subsystem layer. The structure of SNA allows the ultimate origins and destinations of information–that is, the end users–to be independent of, and unaffected by, the specific communication-system services and facilities used for information exchange.

T

TC. Transmission control.

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, capable of sending and receiving information over a communication channel. (3) An end point in a telecommunication network; that is, a physical or logical unit, a start-stop or BSC device, or a 3270 Information Display System.

time sharing option (TSO). An option of MVT and OS/VS2 that provides conversational time sharing from remote terminals.

transmission header (TH). In SNA, a control field attached to a basic information unit (BUI) or to a BIU segment, and used by path control. It is created by the sending path control component and interpreted by the receiving path control component. See also *path information unit.*

TSO. Time sharing option.

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