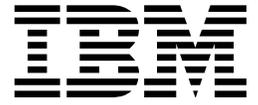


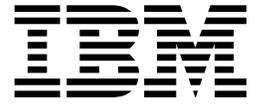
Network Terminal Option



Planning, Migration, and Resource Definition

Release 11

Network Terminal Option



Planning, Migration, and Resource Definition

Release 11

Note

Before using this document, read the general information under "Notices" on page ix.

Ninth Edition (October 1998)

This revision replaces SC30-3347-7. This edition applies to Network Terminal Option Releases 5.1, 7, 9, 10, and 11 (program number 5735-XX7) and to all subsequent releases and modifications until otherwise indicated in new editions or technical newsletters. See "What Is New in This Book" for a summary of the changes made to this manual. Technical changes or additions to the text and illustrations are indicated by a vertical line (|) to the left of the changes. Be sure you are using the correct edition for the level of the product.

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About This Book

Read this section first. It contains the following important information:

- Who should use this book
- How this book is organized
- Terms used in this book
- How IBM 3745 Communication Controller Model Numbers are Used
- How numbers are written
- What is new in this book
- Where to find more information.

This book applies to Releases 5.1, 7, 9, 10, and 11 of Network Terminal Option (NTO).

Who Should Use This Book

The purpose of this book is to enable management personnel and system programmers to install the NTO licensed program and to define NTO resources to a Systems Network Architecture (SNA) network.

Before you read this book, you should be familiar with the basic concepts of data communication, SNA, and the NTO product as it relates to an SNA network. The following publications are useful in helping all NTO users acquire this knowledge:

- *SNA Concepts and Products*
- *SNA Technical Overview*
- *Introduction to Advanced Communications Function*
- *Network Terminal Option Diagnosis*
- *Planning for NetView, NCP, and VTAM.*

You should also know how the following components function within an SNA network:

- Network Control Program (NCP)
- The communication controller that NCP resides in
- The access methods with which NCP communicates.

How This Book is Organized

This book is divided into the following chapters and appendixes:

- Chapter 1, "Understanding NTO," provides a brief overview of the NTO licensed program.
- Chapter 2, "Checking Installation, Migration, and Resource Definition Steps," provides a checklist outlining the various subtasks for installing NTO.
- Chapter 3, "Preparing for Installation," provides: (1) information on the hardware and software required by NTO throughout the network, (2) a list of NTO devices and special considerations for defining those devices to the network, and (3) an explanation of how to estimate the storage required by NTO in the communication controller.
- Chapter 4, "Defining NTO Devices to NCP," explains how to modify an NCP generation definition to include definitions for NTO devices.

- Chapter 5, “Defining NTO Devices to VTAM,” describes the modifications that must be made to Virtual Telecommunications Access Method (VTAM) to support NTO.
- Chapter 6, “Defining NTO Devices to TCAM,” describes the modifications that must be made to Telecommunications Access Method (TCAM) to support NTO.
- Chapter 7, “Defining NTO Devices to Subsystems and Application Programs,” describes the subsystem-supported and application program-supported NTO devices and the changes that might be needed for Customer Information Control System/Virtual Storage (CICS/VS), Information Management System/Virtual Storage (IMS/VS), Time Sharing Option (TSO), Virtual Machine/VTAM Communication Network Application (VM/VCNA), VM SNA console support (VSCS), and virtual storage personal computing (VSPC) to support these NTO devices.
- Chapter 8, “Generating NTO,” explains how to generate your combined NTO/NCP generation definition.
- Appendix A, “Resource Definition Example with NTO,” provides coding examples of a network with NTO R11 installed.
- Appendix B, “Migrating to a Combined NTO and NCP Generation Definition,” explains how to merge your pre-R4 NTO and NCP generation definitions into one definition. In addition, it provides coding examples of a network that is migrated to an NTO release that uses the NDF standard attachment facility for generation.
- Appendix C, “NTO Messages and Codes,” explains the messages that are issued for NTO during generation in NCP.
- Appendix D, “BIND Format and Validity Checking of the BIND RU,” describes BIND formats, the user extension to the BIND for NTO devices, and validity checking of the BIND request unit.
- Appendix E, “MTA Sign-On Procedure for Terminal Operators,” describes the multiple terminal access (MTA) sign-on procedure for various types of NTO devices.

The book also includes a glossary, a bibliography, and an index.

Because NTO expands the capabilities of NCP, both NCP and NTO documentation are cited throughout the book. When the NTO and NCP functions combine such as in defining resources, *NTO Planning, Migration, and Resource Definition* covers in detail **only** those NCP procedures directly affecting NTO. **Not all NCP generation and resource definition procedures are covered by this book.** *NCP, SSP, and EP Resource Definition Reference*, *NCP, SSP, and EP Resource Definition Guide*, and *NCP, SSP, and EP Generation and Loading Guide* contain the complete processes.

Terms Used in This Book

The following sections identify some important terms used in this book. See “Glossary” on page 129 for definitions of these and other terms used in this book.

How Advanced Communications Functions are Used

The following product names are used as defined below:

- NCP** Advanced Communications Function for the Network Control Program
- SSP** Advanced Communications Function for System Support Programs
- TCAM** Advanced Communications Function for the Telecommunications Access Method
- VTAM** Advanced Communications Function for the Virtual Telecommunications Access Method.

How Switched and Nonswitched Are Used

This book uses the terms *switched line* and *nonswitched line*. It is important to remember the following distinction:

- switched line** A telecommunication line on which connections are established by dialing. *Switched* is equivalent to *dialed*.
- nonswitched line** A telecommunication line on which connections do not have to be established by dialing. *Nonswitched* is equivalent to *leased*.

How Version and Release Numbers Are Used

Version and release numbers of the NTO, NCP, VTAM, and TCAM licensed programs are specified *only when a distinction is necessary*. When these terms are used without a specific version or release number, you can assume that the term applies to *all* releases of the particular licensed program. When required, version and release numbers are specified in an abbreviated format. The abbreviation for version is V, and the abbreviation for release is R. For example, NCP Version 7 Release 7 is specified as NCP V7R7.

How IBM 3745 Communication Controller Model Numbers are Used

In this book, the term *IBM 3745 Communication Controller* refers to all IBM 3745 models. When particular models are discussed, the appropriate model numbers are specified. Model numbers include IBM 3745-130, 3745-150, 3745-160, 3745-170, 3745-17A, 3745-210, 3745-21A, 3745-310, 3745-31A, 3745-410, 3745-41A, 3745-610, and 3745-61A.

How Numbers are Written

This book shows numbers over 9999 in metric style, which means that a space is used instead of a comma to separate groups of three digits. For example, the number ten thousand five hundred fifty-two is written 10 552. However, if the number is a keyword value, for example, SALIMIT=65535, it does not include a blank.

What Is New in This Book

This edition of *NTO Planning, Migration, and Resource Definition* adds information about NTO R11 and removes obsolete information about releases prior to NTO R5.1.

New or changed technical information is identified by a vertical bar (|) in the left margin.

Where to Find More Information

The following list shows selected planning, definition, and diagnosis books, arranged according to task. For more information on related publications, see “Bibliography” on page 141.

Planning

- | | |
|-----------|--|
| SC31-8063 | <i>Planning for NetView, NCP, and VTAM</i>
Provides at-a-glance planning information regarding the newest functions available from these three product areas. |
| SC27-0593 | <i>NRF Planning</i>
Helps plan for NRF in the network. Contains information about estimating storage requirements and about defining resources. Explains, in general, how to customize NRF and how to prepare a plan in case of network errors. |
| SC30-3347 | <i>NTO Planning, Migration, and Resource Definition</i>
Enables managers and system programmers to plan for installing the NTO licensed program. |

Installation, Resource Definition, and Customization

- | | |
|-----------|---|
| SC31-6221 | <i>NCP, SSP, and EP Generation and Loading Guide</i>
Helps system programmers understand the generation and loading procedures and helps them determine which control statements they need to generate and load NCP. |
| SC30-3347 | <i>NTO Planning, Migration, and Resource Definition</i>
Enables managers and system programmers to install the NTO licensed program and to define NTO resources to a Systems Network Architecture (SNA) network. |
| SC31-6203 | <i>NRF Migration, Resource Definition, and Customization</i>
Describes the keywords and definition statements used to define resources to NRF. Includes information to help debug NRF during system generation and migrate pre-R3.3 NRF releases to NRF R3.3 and later releases. Applies to NRF R3.3 and later releases. |
| SC30-3889 | <i>NCP V7R7 Migration Guide</i>
This book (or the equivalent book for another NCP release) provides information to help modify an Advanced Communications Function (ACF) for a Network Control Program (NCP) generation definition to migrate from your current NCP release to the later NCP release. |
| SC30-3407 | <i>NRF Resource Definition and Customization</i> |

Describes the keywords and definition statements used to define resources to NRF. Includes information to help debug NRF during system generation. Applies to NRF releases prior to NRF 3.3.

Diagnosis

LY30-5597

NRF Diagnosis

Explains how to identify network problems and collect the traces and dumps that are required to solve the problems. Includes a trace record template to help identify traces and corresponding codes as they appear on the screen of a terminal.

LY30-3194

NTO Diagnosis

Helps field support personnel, system analysts, and system programmers isolate and diagnose failures that occur in NTO.

BookManager Online Books

Those publications available as softcopy books have cross-document search and hypertext links for speedy, online information retrieval. These softcopy books are grouped together on an electronic bookshelf and are part of the *ACF/NCP, ACF/SSP, EP, NPSI, and NTuneMON Softcopy Collection Kit*, LK2T-0414, on compact disc read-only memory (CD-ROM).

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<http://booksrv2.raleigh.ibm.com>

World Wide Web

Visit the NCP Home Page at:

<http://www.networking.ibm.com/375/375prod.html>

Chapter 1. Understanding NTO

Before you use this book, be sure to read “About This Book” on page xi. It explains the purpose of the book, how it is organized, and what knowledge you should have before using it.

Read this chapter to familiarize yourself with the NTO product. The chapter is divided into two major sections:

- “Introducing NTO” provides an overview of NTO.
- “Using NTO Functions” describes the functions NTO supplies to your network devices and additional network functions NTO supports.

Introducing NTO

The Network Terminal Option (NTO), an IBM licensed program, resides in a communication controller and extends the capabilities of the Network Control Program (NCP). With NTO, NCP provides Systems Network Architecture (SNA) support for a select group of non-SNA lines and devices. Non-SNA devices running under a host access method in an SNA network are called *NTO devices*. Non-SNA lines, such as start-stop (SS) lines, connect NTO devices to a communication controller and appear as SNA lines to the network. That is, they appear as Synchronous Data Link Communication (SDLC) lines. These non-SNA lines are called *NTO lines*.

NTO operates through the programmed resource facility of NCP. This facility provides NTO with network addressable units (NAUs) to which NTO devices can be attached. NTO makes these NAUs appear like physical units and logical units to the host access method. The host access method supports each NTO device as a physical unit type 1, logical unit type 1 (one logical unit for each physical unit). This allows the NTO device to be supported under the record mode application program interface of the host access method and permits it to communicate in cross-domain sessions.

NTO provides SNA support since it communicates with NTO devices using the format 0 (FID0) interface of NCP. It converts these FID0 path information units (PIUs) into FID1 PIUs that can communicate with the rest of the SNA network. Conversely, NTO makes the SNA FID1 support appear as non-SNA FID0 support to the NTO devices by converting SNA requests and session protocols into non-SNA requests.

The host access method sends FID4 PIUs that contain FID1 PIUs to NCP. These FID1 PIUs are passed through the programmed resource capability of NCP to NTO. NTO receives these FID1 PIUs and can do the following:

- Convert the FID1 PIU to the appropriate FID0 request sequence. The FID0 PIUs are converted by the binary synchronous communication/start-stop (BSC/SS) processor in NCP into basic transmission units (BTUs) before they are sent to NTO devices.
- Generate a response for the FID1 PIU and send it back to the host access method. FID1 responses can be generated with or without NTO receiving a

FID0 response from NTO device; for example, the Activate Physical Unit response can be generated without any FID0 activity.

NTO does not perform any data stream mapping, thereby reducing the need to change existing application programs. Figure 1 shows the flow of data through NTO to the network and to the NTO device.

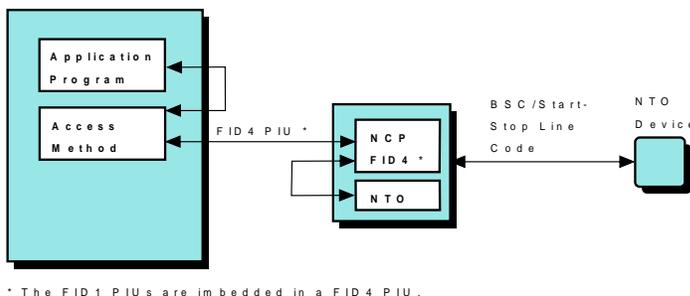


Figure 1. Data Flow through a Network with NTO

NTO provides SNA services that:

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

Using NTO Functions

NTO performs functions for NTO devices so that SNA sessions can be established. It also provides additional network functions. NTO is structured according to the major sessions that take place in an SNA network between the following components:

- System services control point (SSCP) and physical unit (SSCP-PU session)
- SSCP and logical unit (SSCP-LU session)
- logical unit and logical unit (LU-LU session).

Figure 2 on page 3 illustrates how these NTO functions relate to each other.

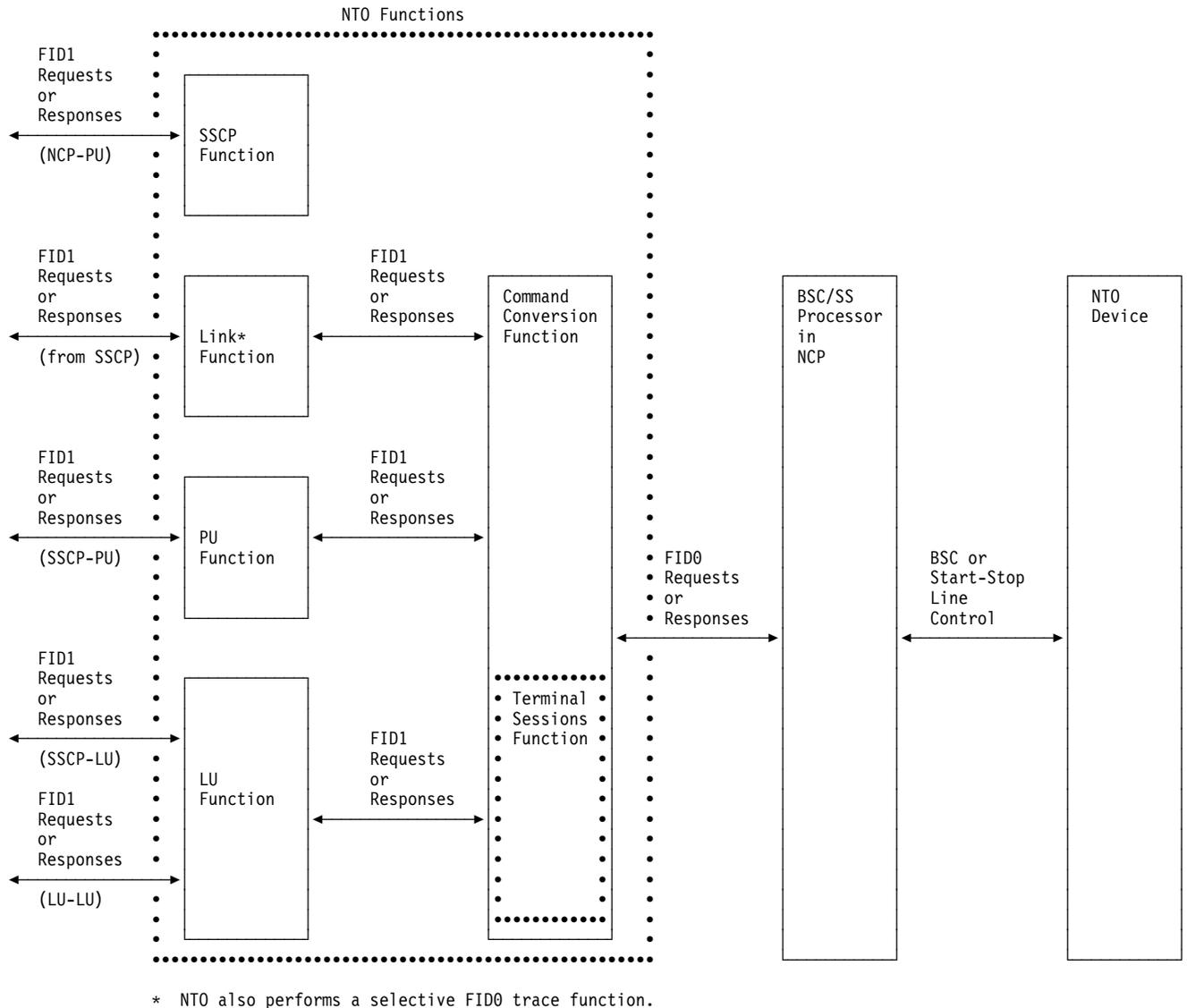


Figure 2. NTO Functions

The following sections describe the functions performed by NTO.

NTO Link Functions

NTO performs link functions for each NTO link. The link functions are used by the host access method's SSCP to activate or to deactivate the virtual link, thereby causing activation or deactivation of the real NTO link.

NTO Physical Unit Function

NTO performs the physical unit function for each NTO device. The physical unit function is used by the host access method's SSCP-PU sessions to monitor and to control the requests that would normally be sent and received between the NTO device and the host access method's SSCP.

NTO Logical Unit Function

NTO performs the logical unit function for each NTO device. This logical unit function is used in host access method's SSCP-LU sessions and LU-LU sessions.

NTO SSCP Function

NTO acts like an SSCP for the lines and terminals that NTO supports. NTO sends the requests 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 access method's SSCP.

NTO Command Conversion Function

This function converts SNA requests and data into the appropriate non-SNA requests and data before they are sent to the NTO device. Similarly, this function converts all non-SNA requests and data to the appropriate SNA requests and data before they are sent to the host access method. This function works with the physical unit and logical unit functions of NTO to convert the requests for establishing and terminating sessions sent between the NTO device and the host access method.

NTO Terminal Sessions Function

NTO sends data to and receives data from the NTO devices. This function works with the command conversion function to map non-SNA requests and responses into the appropriate SNA requests and responses before they are transmitted to the host.

Other Functions Supported by NTO

In addition to the NTO functions that enable NTO devices to communicate in an SNA network, NTO supports these functions:

- Multiple routing
- Session outage notification
- Session continuation
- Flow control
- Binary synchronous communication (BSC) protocol
- Force deactivation
- Extended network addressing
- Dial-out
- Improved generation
- Extended subarea addressing
- Explicit routing.

Multiple Routing

Multiple routing allows the user to define up to 16 routes for transmission between two host subareas or between a host subarea and a communication controller subarea. When a session is requested between two network nodes, the host access method selects one of the possible routes for data communication. If the route fails during a session, each end of the session is notified. The end users may then request that the session be reestablished. If the session can be established over an alternate route to the destination, the appropriate restart procedures may be initiated.

Session Outage Notification

Session outage notification notifies the primary and secondary logical units if a session's route becomes inoperative. The logical units can then restore the session using an alternate route.

Session Continuation

If an owning SSCP becomes inactive, session continuation maintains certain LU-LU sessions for as long as the SSCP is inactive. When the owning SSCP's session is reestablished, the LU-LU sessions are ended. The user can reestablish the LU-LU sessions by initiating restart procedures.

Note: Session continuation maintains only the LU-LU sessions that communicate over a route *other than* the route between the owning SSCP and the communication controller subarea.

Figure 3 and Figure 4 on page 6 show examples of session continuation.

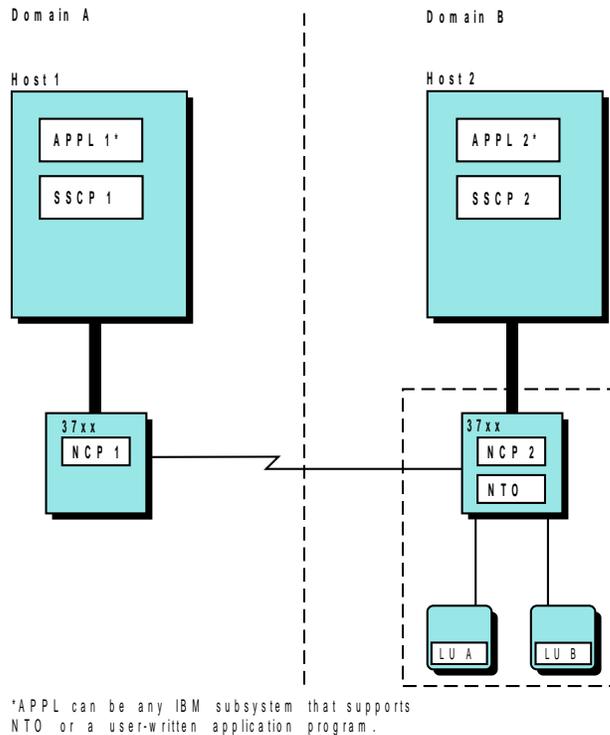


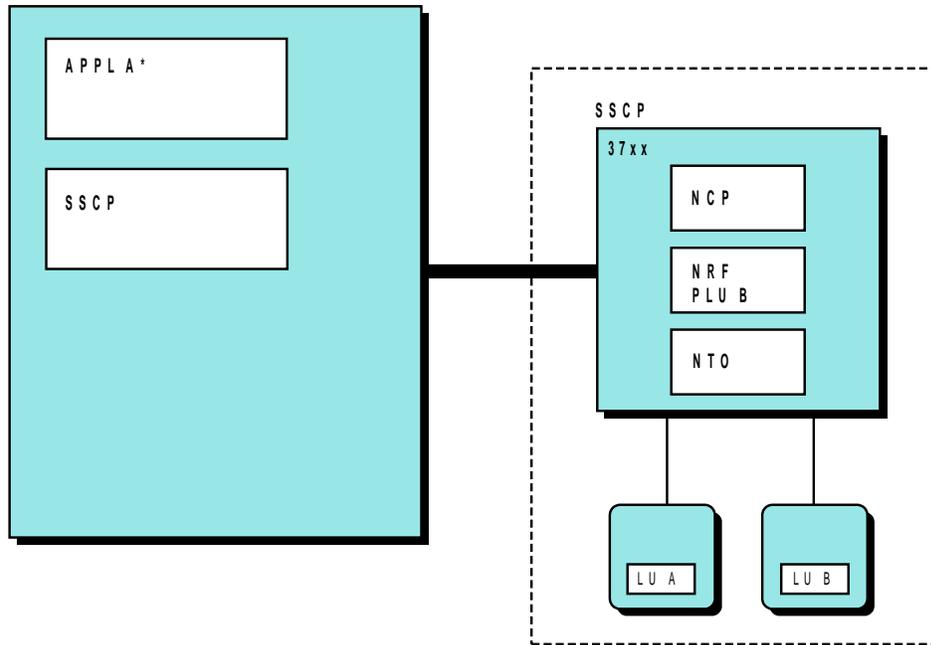
Figure 3. Example of the Continuation of Cross-Domain Sessions

Figure 3 shows a configuration in which SSCP 2 owns the two NTO devices (represented by LU A and LU B) in the communication controller subarea. The following sessions exist:

APPL 1 – LU A (a cross-domain LU-LU session)

APPL 2 – LU B (a same-domain LU-LU session).

If SSCP 2 becomes inactive, NTO maintains the APPL 1 – LU A session because it does not use the route to SSCP 2.



*APPL can be an IBM subsystem that supports NTO or a user-written application program

Figure 4. Example of the Continuation of Same-Subarea Sessions

Figure 4 on page 6 shows a configuration in which an SSCP owns two NTO devices (represented by LU A and LU B) in the communication controller subarea. This subarea includes the Network Routing Facility (NRF), NCP, and NTO. The following sessions exist:

APPL A – LU A

PLU B (NRF) – LU B.

If the SSCP becomes inactive, NTO maintains the primary logical unit (PLU) B – LU B session because it does not use the route to the owning SSCP.

Flow Control

The flow control function regulates the flow of data through the network to prevent congestion of data and to optimize the transmission rate of data.

BSC Protocol

NTO provides a limited BSC 3780 protocol. This protocol supports the IBM 3780 Data Communication Terminal as a nonswitched, point-to-point device in half-duplex contention mode. NTO also provides this support for the IBM 1750 and 3750 Private Automatic Branch Exchange (PABX) Switching Systems.

Force Deactivation

NTO provides force deactivation. This function gives network operators an additional means to recover disabled NTO resources. When an NTO device no longer functions correctly and cannot be deactivated through any other means, the operator may issue a DACTLINK Force request unit (RU). On receiving this RU, NTO will attempt to return the device and its link to a reset state. Once the link is reset, the operator may reactivate the device through the normal procedure.

Extended Network Addressing

Extended network addressing is an addressing scheme that increases the number of devices a user can define in the network. This addressing scheme provides one byte for the subarea address of a device and two bytes for the element address. For more information on extended network addressing, refer to *Planning and Reference for NetView, NCP and VTAM*.

Dial-out

NTO offers dial-out support for teletypewriter exchange (TWX) service devices. This support may be dial-in only, dial-out only, or dial-inout (both dial-in and dial-out). To perform this function, NTO converts SNA switched line protocol to FIDO requests. This allows the host to dial out to the device.

Improved Generation

NTO is generated in a one-step procedure using the NCP Definition Facility (NDF). NTO definition statements are coded along with the NCP generation definition.

Extended Subarea Addressing

Extended subarea addressing is an addressing scheme that increases the number of subareas you can define in a network.

Extended subarea addressing allows you to define up to 65 535 subareas in a single network.

Explicit Routing

Explicit routing offers 16 ERs (explicit routes).

Program Enhancements

NTO offers several other program enhancements in addition to NDF and dial-out support. The following list describes those enhancements:

- When large blocks of data are exchanged, large amounts of the NTO buffers are used and long path lengths are employed. NTO shortens FIDO/FID1 conversion by eliminating the copying of buffers when building a FIDO or FID1 PIU. This reduces buffer usage and path length, and improves performance and storage utilization.
- NTO forwards Network Management Vector Transport (NMVT) records to the owning host SSCP for processing.

Chapter 2. Checking Installation, Migration, and Resource Definition Steps

This chapter helps you outline the steps needed to install NTO and to define NTO resources to an SNA network. Use this chapter as a checklist.

When installing NTO, divide your work into these steps:

1. Prepare for installation:

- ___ Check your network configuration to make sure that the products that operate with your NTO devices are at the appropriate level.
- ___ Identify all of the BSC/SS terminals that will be supported by NTO. Note any unique device characteristics that require special coding considerations.
- ___ Examine the BIND formats for NTO devices outlined in Appendix D, "BIND Format and Validity Checking of the BIND RU." Note any default values that may affect BIND operation for any of your specific NTO devices. Note also any required values for a specific device.
- ___ Contact the IBM Support Center for preventive service planning (PSP) installation documentation.
- ___ Estimate the storage requirements for NTO in NCP.

2. Apply installation and program update tapes:

- ___ Install the prerequisite level of NCP for your NTO. Refer to the *Program Directory* shipped with your NTO tapes.

NCP installation involves defining NCP and System Support Program (SSP) libraries, as detailed in the *Program Directory for ACF/NCP* and the *Program Directory for ACF/SSP*.

- ___ Install the NTO licensed program installation tape, using the same libraries defined during NCP installation.
- ___ Apply current NTO program temporary fixes (PTFs) to NTO by installing the accumulative PTF tape.
- ___ Apply the PTFs listed in Preventive Service Planning (PSP) installation documentation.

3. Update the NCP generation definition for NTO support (Chapter 4, "Defining NTO Devices to NCP"):

- ___ Add the OPTIONS definition statement and its keyword.
- ___ Define NTO to NCP with the BUILD and NCPNAU definition statements.
- ___ Add support for the real NTO devices with the real GROUP, LINE, and TERMINAL definition statements.
- ___ Add virtual definitions corresponding to the real definitions with virtual GROUP, LINE, PU, and LU definition statements.

4. Add access-method-dependent definitions (Chapter 5, "Defining NTO Devices to VTAM," and Chapter 6, "Defining NTO Devices to TCAM"):

- For the Virtual Telecommunications Access Method (VTAM), create a switched major node with virtual PU and LU definition statements to support NTO devices on switched lines. Code the VTAM required, restricted, and optional keywords.
 - For the Telecommunications Access Method (TCAM), identify whether TCAM operates as a subsystem or access method, code TCAM definition statements with NTO restrictions, and modify the message handler for an NTO (non-SNA) data stream.
5. Examine your application programs and subsystems and add subsystem and application program dependent definitions (Chapter 7, “Defining NTO Devices to Subsystems and Application Programs”):
- Application programs using Time Sharing Option (TSO), Virtual Storage Personal Computing (VSPC), or Customer Information Control System for Virtual Storage (CICS/VS) subsystem interfaces may require minimal changes.
 - User-written application program changes depend on their present level of support.
6. Generate NTO and NCP.
- Complete the NCP generation.

Chapter 3. Preparing for Installation

This chapter is divided into five sections:

- “Required Hardware and Software Support” describes the requirements for running NTO.
- “Checking Your Network Configuration” allows you to check that your network configuration is compatible with your release of NTO.
- “Identifying NTO Device Characteristics for Resource Definition” allows you to identify unique NTO device characteristics for coding.
- “Determining NCP and NTO Storage Considerations” provides an overview of the storage requirements of NTO.
- “Calculating Storage Requirements” helps you calculate the amount of storage required by NTO.

Required Hardware and Software Support

To provide SNA support for installations with non-SNA devices, NTO must operate under an NCP and reside in your communication controller.

NTO also requires SSP, an operating system, and an access method (such as VTAM or TCAM). Table 1, Table 2 on page 12, and Table 3 on page 12 outline the specific levels of NCP and SSP that each NTO release requires. These tables are defined by the operating system.

Requirements for MVS Users

Table 1. Required Hardware and Software Support for NTO (MVS)

NTO	NCP	SSP	Channel- or Link-Attached Communication Controller
R5.1	V4R3.1 V5R2.1	V3R4.1	3725 3720 or 3745
R7	V5R4	V3R6	3720 or 3745
R9	V6R2	V3R8	3745
R10	V7R1-V7R6	V4R1-V4R6	3745
R11	V7R7	V4R7	3745

Note: The information included in Table 1 was accurate at the time of publication, but it is subject to change. Consult your IBM marketing representative for more information about the required level of support.

Requirements for VSE Users

Table 2. Required Hardware and Software Support for NTO (VSE)

NTO	NCP	SSP	Channel- or Link-Attached Communication Controller
R5.1	V4R3.1 V5R2.1	V3R4.1	3725 3720 or 3745
R7	V5R4	V3R6	3720 or 3745
R10	V7R1-V7R6	V4R1-V4R6	3745
R11	V7R7	V4R7	3745

Note: The information included in Table 2 was accurate at the time of publication, but it is subject to change. Consult your IBM marketing representative for more information about the required level of support.

Requirements for VM Users

Table 3. Required Hardware and Software Support for NTO (VM)

NTO	NCP	SSP	Channel- or Link-Attached Communication Controller
R5.1	V4R3.1 V5R2.1	V3R4.1	3725 3720 or 3745
R7	V5R4	V3R6	3720 or 3745
R9	V6R2	V3R8	3745
R10	V7R1-V7R6	V4R1-V4R6	3745
R11	V7R7	V4R7	3745

Note: The information included in Table 3 was accurate at the time of publication, but it is subject to change. Consult your IBM marketing representative for more information about the required level of support.

Checking Your Network Configuration

To provide SNA support for installations with non-SNA devices, NTO operates under NCP and resides in an IBM 3720, 3725, or 3745 Communication Controller. NTO also requires the support of SSP, an operating system (MVS, VSE, or VM), and an access method (such as VTAM or TCAM). Therefore, the first step in preparing for installation and resource definition is to make sure all the software and hardware products in your network are at the appropriate level to run with NTO.

For information on the levels of NCP and SSP required by NTO, see “Required Hardware and Software Support” on page 11. This section lists other software products that, although not required, can operate with NTO.

NTO can operate with certain IBM subsystems and licensed programs to provide additional support for NTO devices. See Chapter 7, “Defining NTO Devices to Subsystems and Application Programs,” for more detailed information.

Subsystem Compatibility

NTO can operate with the following subsystems:

- Time Sharing Option (TSO)
- Customer Information Control System/VS (CICS/VS)
- VM/VTAM Communication Network Application (VM/VCNA)
- Virtual Storage Personal Computing (VSPC)
- Information Management System/VS (IMS/VS)
- TCAM V3.

NRF Compatibility

NRF operates with NTO in the following ways:

- With NTO and NRF communicating in the same controller:
 - NRF R4 operates with NTO R5.1.
 - NRF R6 operates with NTO R7.
 - NRF R8 operates with NTO R9.
 - NRF R9 operates with NTO R10 and R11.
- With NTO and NRF communicating in different controllers, any NRF operates with any NTO.

Working with NTO, NRF replaces the SDLC and BSC path functions of NCP. Refer to *NRF Planning* for more information about NRF.

Application Program Compatibility

The following application programs can communicate with NTO:

- VM SNA console support (VSCS)
- User-written application programs operating through the SNA interface of the host access method.

NDF Support Considerations

NTO utilizes the standard attachment facility of NDF and no longer requires its own generation definition. Some NTO keywords are merged with the NCP definition and the rest are eliminated; therefore only NCP needs to be processed.

Refer to the appropriate NCP customization guide for information on NDF.

Identifying NTO Device Characteristics for Resource Definition

The next step in preparing for resource definition is to examine your NTO devices for any unique device characteristics that require special coding considerations. This section lists the devices that are supported by NTO, the data link characteristics required by each device, and unique device or operational characteristics that require special resource definitions or BIND images.

NTO provides SNA support for the following group of SS and BSC devices. Each NTO device appears to the host access method as a physical unit type-1, logical unit type-1 SNA device and supports the same BIND parameters as the SDLC 3767 Communication Terminal. These NTO devices are not buffered; so application programs or subsystems supporting these devices may have to establish text-editing conventions or develop user-written block-handler routines to

communicate. (Refer to *NCP, SSP, and EP Resource Definition Guide* or to the appropriate NCP customization guide for more information on block-handler routines.) Switched support for an NTO device is both dial-in and dial-out. Dial-out support is for TWX devices only.

Note: Devices that are equivalent to any of the devices listed in the following sections may also function satisfactorily. You are 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.

IBM 2740 Communications Terminal Model 1

NTO supports the IBM 2740 Model 1 (2740-1) when the 2740-1 is attached to a data link that is either switched or nonswitched in a point-to-point configuration or nonswitched in a multipoint configuration.

If a 2740-1 has the “timeout 15” feature and TEXTTO=NONE is specified on the NCP GROUP definition statement, then the device will hang if it is allowed to sit idle with an outstanding BID for more than 15 seconds.

IBM 2741 Communications Terminal

NTO supports the IBM 2741 when the 2741 is attached to a data link that is either switched or nonswitched and in a point-to-point configuration.

The following devices are also supported through NTO as an IBM 2741:

- IBM 3767 Communication Terminal
- IBM Displaywriter System.

Wherever “IBM 2741” is used in this book, it refers to the IBM 2741 or any NTO device supported as an IBM 2741.

IBM 3780 Data Communication Terminal

NTO supports a limited BSC protocol for the IBM 3780 when the 3780 is attached to a data link that is nonswitched, in half-duplex contention mode, and in a point-to-point configuration.

The following world trade systems are also supported through NTO as an IBM 3780:

- IBM 1750 PABX Switching System
- IBM 3750 PABX Switching System.

These devices communicate with user-written application programs; no subsystem support is provided. Wherever “IBM 3780” is used in this book, it refers to the IBM 3780 or any NTO device supported as an IBM 3780.

For NTO to support a limited BSC protocol for the 3780, the application programmer must consider the following:

Half-Duplex Contention Support: The application program must issue a BIND specifying half-duplex contention mode protocol communications.

Temporary Text Delay Character: If a BSC 3780 device has the temporary text delay character, then the application program must issue a BIND specifying “do text mode ERPs.” Text mode error recovery procedures (ERPs) are activated and

deactivated based on data in the first and second bytes of the mode flags in the user extension of the BIND. In this case, the default for mode flag byte 1 bit 1 (override text mode ERPs) must not be used. See Appendix D, “BIND Format and Validity Checking of the BIND RU,” for the specific bit values required to specify “do text mode ERPs.”

Data Stream: NCP removes line control and block control characters. The application program does not see them. The inter-record separator (IRS) may be present in the data stream to separate records.

BSC EBCDIC transparency: This optional function is activated by the application program if transparency is defined in the user data field (BINUSE) of the BIND. Specifying transparency (see Appendix D, “BIND Format and Validity Checking of the BIND RU”) causes NTO to flag all outbound data as transparent data. For more information, refer to *Component Information for the 3780 Data Communication Terminal*.

The application program can specify INQUIRE DEVCHAR to determine the type of device with which it is communicating. Code TERM=3780 on the virtual LU definition statement for VTAM to do this. See “Virtual LU Definition Statement” on page 50 for specific coding considerations.

Teletypewriter Exchange (TWX) Service Models 33, 33ASR, and 35

NTO supports the TWX when the TWX is attached to a data link that is either switched or nonswitched and in a point-to-point configuration.

The following devices are also supported through NTO as a TWX:

- IBM Displaywriter System
- IBM Personal Computer
- IBM Personal System/2
- IBM 3101 Display Terminal
- IBM 3232 Keyboard Printer Terminal Model 51

Wherever “TWX” is used in this book, it refers to a TWX Model 33, 33ASR, or 35, or to any other NTO device supported as a TWX.

The TWX terminals may have an ID feature that is indicated on the TERMINAL definition statement by specifying IDSEQ=PASS. This ID is transmitted to the controller after the terminal makes a dial-in connection. It may be correlated with the LU definition to uniquely identify the terminal to the network. The first 5 digits (20 bits) of the TWX ID are used to replace the last 20 bits of the NTO.ID specified on the virtual LINE definition statement. If the TWX ID is less than 5 digits, it is left-justified and padded on the right with zeros.

This modified ID is sent to the host access method, which searches its switched LU definitions for a matching ID. This allows the TWX terminal to be uniquely identified by the host access method.

The IBM 3101 Communications Terminal, supported as a TWX, does not pass a unique ID sequence to the host access method. Therefore, IDSEQ=NONE should be specified (or defaulted to) on the TERMINAL definition statement.

TWX terminals used with TSO/VTAM indicate end-of-text transmission with either XOFF or carriage return. TSO/VTAM provides line feed. The carriage return

functions are required. The character that NCP recognizes as an end-of-text indicator is defined by the CHAREC keyword on the GROUP definition (described in *NCP, SSP, and EP Resource Definition Guide* and in *NCP, SSP, and EP Generation and Loading Guide*).

World Trade Teletypewriter Terminals (WTTY)

NTO supports the WTTY device when the device is attached to a data link that is nonswitched and in a point-to-point configuration.

For WTTY devices, NTO simulates REPLYTO=NONE.

VTAM expects a carriage return or line feed as the end-of-text character. To remove end-of-text characters as specified on the WTTYEOT keyword of the GROUP definition statement, the REMOVCTL definition statement must be specified immediately following the first STARTBH definition statement in the NCP generation definition. The REMOVCTL definition statement specifies an NCP block handler to remove end-of-text characters from the data stream, as shown in the following example:

```
WTTYGP      GROUP      WTTYEOT=xxx
                .
                .
                .
BHRRTN      STARTBH    BHEXEC=PT2
                REMOVCTL
                ENDBH
                .
                .
STRIP       BHSET      EXEC=YES
                .
                .
                ,PT2=BHRRTN
```

Keyboard Characteristics for NTO Devices

Certain NTO devices support control keys or keyboard locking, as listed in Table 4 on page 17.

Table 4. Control Keys Supported by NTO Devices

Device	Control key(s)
2740 Model 1	SYSTEM REQUEST simulation through "99999"
2741	ATTENTION (defined as Transmit Interrupt [Break] feature) SYSTEM REQUEST simulation through "99999"
3780	No control keys. No system request.
TWX	ATTENTION (Break Key) SYSTEM REQUEST simulation through "99999"
WTTY	ATTENTION (Break Key or Break feature depending on the model) SYSTEM REQUEST simulation through "99999" Note: If OLT=YES is coded on the BUILD definition statement in the NCP generation definition, then any input data beginning with "99999" from a 2741, 2740 Model 1, TWX, or WTTY device simulates a system request.

Keyboard Locking

NTO device keyboards can be either locked or unlocked, depending on the commands and response issued to support these devices. Since the TWX or WTTY is never physically locked, the definitions in Table 5 apply.

Table 5. Keyboard Locking Definitions for NTO Devices

Device	LOCKED	UNLOCKED
2740-1	Not polled	Polled
2741	Locked	Unlocked
TWX/WTTY	Logical lock	Logical unlock

Determining NCP and NTO Storage Considerations

You need to calculate the storage required for NTO and add that value to the storage required by the base NCP (NCP without NTO). You also need to consider the storage required for the programmed resource facility of NCP. The amount of storage in the communication controller must be large enough to contain both NCP and NTO and to leave space for a buffer pool of sufficient size.

NTO and NCP reside under different storage protection keys in the communication controller. NTO resides in unprotected storage (protection key 1). NCP resides in protected storage (protection key 0). Protection keys for all controllers except an IBM 3745 are assigned on 2K-byte boundaries; therefore, NTO code must start on the first 2K-byte boundary after the NCP code. This can cause up to 2K-1 bytes of storage to be left unused. Protection keys for an IBM 3745 are assigned on 4K-byte boundaries; therefore, NTO code must start on the first 4K-byte boundary after the NCP code. This can cause up to 4K-1 bytes of storage to be left unused.

Table 6 on page 18 can help you determine your storage requirements for NTO. However, you may want to use Hands-on Network Environment (HONE) Aids instead. HONE Aids calculate your storage requirements based on the input you provide. These aids use a HONE Configurator, which produces a printed storage report listing the total storage required for a given NCP configuration. In addition, they also produce an analysis by licensed program and type of storage. To find out more about HONE Aids, consult with an IBM system engineer.

Calculating Storage Requirements

The minimum NCP storage requirement for NTO 5.1 or later is 61 000 bytes. This estimate includes the following components:

- Storage for NTO modules and control blocks (See Table 6)
- An NTO link
- An NTO device
- A switched NTO line
- NCP storage for:
 - The virtual representation of BSC and start-stop devices
 - The NTO representation of BSC and start-stop devices.

Notes:

1. This storage estimate is only a minimum value. Requirements vary according to your network configuration
2. This value does *not* include storage for the real BSC and start-stop definitions.

For more information on the NCP storage required for the real BSC and start-stop devices and their virtual representations, refer to *Planning and Reference for NetView, NCP, and VTAM*.

When determining the storage required for NTO devices, first calculate NCP control block storage for the real BSC and start-stop device. This calculation is the same as if the device were not supported in NCP through NTO. For more information on calculating storage for NCP, refer to *Planning and Reference for NetView, NCP, and VTAM*.

To this storage, add storage for both the virtual NCP control blocks and the NTO control blocks. Table 6 breaks down the storage required for the additional NCP control blocks and the NTO R5.1 and later control blocks.

Table 6 (Page 1 of 2). Calculating Storage Requirements for NTO R5.1 and Later

Storage Description	NCP Virtual Control Blocks	NTO Control Blocks	Total
Modules required to establish NTO	0	60 000 ¹	60 000
Modules required to establish a programmed resource	1400 ²	0	1400
NTO Internal Trace Record	0	16	16
NTO SSCP control block	60	24	84
NTO link	52	52	104
NTO device	308	106	414

Table 6 (Page 2 of 2). Calculating Storage Requirements for NTO R5.1 and Later

Storage Description	NCP Virtual Control Blocks	NTO Control Blocks	Total
Switched NTO link	0	6	6
NTO-supported MTA devices	0	2	2

- ¹ This number includes the function vector tables (FVTs) required for NTO R5.1 and later releases. It also includes a 5% contingency factor for NTO program updates.
- ² This number represents the number of bytes that are required to add a programmed resource (such as NTO, NRF, or user code) to NCP. It should be calculated only once, regardless of the number of programmed resources associated with your NCP.

Total Storage Required = 60 000 + 1400 + (16 X TR) + 84 + (104 X L) + (414 X ND) + (6 X SW) + (2 X MTA) where:

- TR** is the number of NTO internal trace records coded on the NTO.TRCTABL keyword of the NCPNAU definition statement.
- L** is the number of NTO links.
- ND** is the number of NTO devices.
- SW** is the number of switched NTO links.
- MTA** is the number of NTO-supported Multiple Terminal Access (MTA) devices.

Chapter 4. Defining NTO Devices to NCP

This chapter is divided into six major sections:

- “Relating Real and Virtual Definitions” describes the relationship between the real and virtual definitions for NTO devices.
- “Planning for NCP” provides additional information on how NTO is defined in NCP.
- “Coding Lower Level Keywords on Higher Level Definition Statements” describes how to save coding effort by coding a keyword on the highest-level definition statement common to all of the uses of that keyword.
- “Modifying NCP Generation Definition Statements” describes how to define NTO devices to NCP and to modify the NCP generation definition statements to support NTO.
- “Defining the Selective FID0 Trace Facility” describes how to set up a dummy NTO trace line to record FID0 PIU activity.
- “Coding Examples for NTO Devices” contains coding examples for specific NTO devices.

As suggested in the NCP library, to create an NCP generation definition, you code the following statements:

- System definition statements
- Network configuration definition statements
- Block handler definition statements
- Generation delimiter definition statements.

For NTO support, code non-SNA devices as BSC and start-stop devices. Then add virtual definitions for the SNA representation of the NTO devices.

Defining NTO devices to NCP involves both NTO and NCP procedures. Therefore, in addition to this book, you are directed to NCP books. This book covers in detail those procedures that specifically influence defining NTO devices. To examine the entire NCP generation process, refer to the appropriate *NCP, SSP, and EP Resource Definition Guide*; *NCP, SSP, and EP Generation and Loading Guide*; and *NCP, SSP, and EP Resource Definition Reference*.

Relating Real and Virtual Definitions

Each NTO device must have a real (BSC or start-stop) definition and a virtual (SDLC) definition. The real definition describes the actual physical characteristics of the NTO devices to NCP. The real definition includes a GROUP, LINE, and TERMINAL definition statement. The virtual definition describes the NTO device as an SNA device. The virtual definition includes GROUP, LINE, PU, and LU definition statements.

All real definitions for an NTO device are always coded *before* any virtual definition. Table 7 on page 22 is an example of the coding order for an NTO device. Table 8 on page 22 shows how the real and virtual NCP definitions are related.

Table 7. Sample Coding Order for an NTO Device

	Definition Statement Coding Sequence
	OPTIONS BUILD SYSCNTRL NCPNAU
Real Definitions	GROUP LINE TERMINAL
Virtual Definitions	GROUP LINE PU LU
	GENEND

Table 8. Relationship between the Real and Virtual NCP Definitions

	Real Definitions	Virtual Definitions
Nonswitched Support	GROUP DIAL=NO LINE TERMINAL : GROUP DIAL=NO : LINE TERMINAL :	GROUP DIAL=NO, VIRTUAL=YES LINE PU LU (Another GROUP definition statement is not required.) LINE PU LU
Switched Support	GROUP DIAL=YES LINE TERMINAL	GROUP DIAL=YES, VIRTUAL=YES LINE PU

Notes:

1. GROUP: Code at least one virtual GROUP for any nonswitched GROUPs. Code at least one virtual group for any switched GROUPs.
2. LINE: For every real LINE, code a virtual LINE.
3. TERMINAL: For nonswitched support, code a virtual PU and virtual LU for every TERMINAL definition statement. For switched support, code a virtual PU in the NCP generation definition for every TERMINAL definition statement.

Planning for NCP

NTO uses existing NCP definition statements to define resources to the network. NTO operates under NCP interrupt level 5. The programmed resource facility of NCP establishes the relationship between NTO and NCP.

The following list describes how the NCP generation statements define NTO in NCP:

- The OPTIONS definition statement notifies NDF that the NTO definition statements and load module exist.
- The BUILD and NCPNAU definition statements specify the relationship between the programmed resource facility of NCP and NTO.
- The NCPNAU definition statement defines the SSCP control facilities of NTO.
- The real LINE definition statement associates the BSC and start-stop link with the BSC start-stop device.
- The TERMINAL definition statement associates the BSC start-stop device with the link.
- The virtual LINE definition statement defines the link associated with the NTO device.
- The virtual PU and virtual LU statements define the NTO device to NCP.

For more information on NCP planning, refer to *Planning and Reference for NetView, NCP, and VTAM*.

Coding Lower Level Keywords on Higher Level Definition Statements

Certain keywords explained under one definition statement in this chapter are coded on a different definition statement in the samples at the end of the chapter. Coding lower-level keywords on higher-level definition statements mainly saves coding effort. For example, a characteristic common to an IBM 2740, 2741, and 3780 on a nonswitched line can be specified once in the GROUP definition statement rather than separately for each device in its LINE, PU, and LU definition statements.

Modifying NCP Generation Definition Statements

To support NTO, you modify some NCP definitions because of NTO requirements or restrictions. When you code an NCP keyword one way exclusively, you have an *NTO requirement*. When a keyword offers a choice between at least two values, but NTO places a limit on this choice, you have an *NTO restriction*.

When coding an NCP generation statement:

1. See Table 9 on page 24 to identify any NTO requirements or restrictions for that statement. If there are any, the statement is listed in this table.
2. Scan beneath the definition statement to identify the keywords that are affected by NTO.

Note: If a default value exists for a keyword, then the value is underlined.

3. Scan the definition statement explanation section following Table 9 for the appropriate definition statement. Locate the keyword you need to modify. Each affected keyword is explained in the text that follows.
4. Once you have determined the modifications for that keyword, return to *NCP, SSP, and EP Resource Definition Reference*. Code the definition statement with both NCP keywords and NTO-modified keywords.

Specific coding samples for the definition statements can be found in “Coding Examples for NTO Devices” on page 35 and in Appendix A, “Resource Definition Example with NTO.”

Table 9 (Page 1 of 2). NTO Restrictions and Requirements for the NCP Generation Definition

Definition Statement Keywords	NTO Requirement	NTO Restriction
OPTIONS USERGEN=CXNNTO	X	
BUILD BFRS= <i>size</i>|88 MAXSSCP= <i>count</i>|1 OLT= <u>YES</u>|NO TYPGEN= <u>NCP</u>|PEP|NCP-R		X X X X
SYSCNTRL OPTIONS=(BHSASSC, ENDCALL, MODE, RCOND, RIMM)	X	
NCPNAU VIROWNER=CXNNTO <i>symbol</i> ¹ NTO.TRACEML= <u>YES</u>|NO NTO.TRCTABL= <i>number</i>|200	X X	X X
DIALSET LINES=(<i>line name</i>) QLIMIT=0 QLOAD=0 RESERVE=0	X (dial support) X (dial support) X (dial support) X (dial support)	
real LINE <i>symbol</i> ¹ ADDRESS= <i>line address</i> AUTO= <i>autocall unit address</i> CALL= <u>IN</u>|OUT|INOUT DIALSET= <i>line name</i> DUPLEX= <u>FULL</u>|HALF FEATURE= <u>NOIMEND</u>|IMEND ISTATUS=INACTIVE MONITOR=YES POLIMIT=(<i>n</i> ,QUEUE) POLLED= <u>YES</u>|NO SERVLIM= <i>count</i> SERVPRI=OLD SESSION= <i>count</i>|1 TYPE=NCP YIELD= <u>YES</u>|NO	X X (dial-out support) X (switched or dial support) X (dial-out support) X (VTAM only) X (start-stop only) X (multipoint only) X (multipoint only) X (multipoint only) X (multipoint only) X X (with NRF)	X X X X X (multipoint only) X X (multipoint only) X (multipoint only) X (multipoint only)
SERVICE <i>symbol</i> ¹ ORDER=(<i>entry</i> ,...)	X (multipoint only) X (multipoint only)	

Table 9 (Page 2 of 2). NTO Restrictions and Requirements for the NCP Generation Definition

Definition Statement Keywords	NTO Requirement	NTO Restriction
real GROUP CHAREC=(XON, <i>chars</i>|XOFF, <i>chars</i> |XONOFF, <i>chars</i>|NO, <i>chars</i>) DIAL=YES|NO LNCTL=SS|BSC REPLYTO= <i>count</i>|NONE TEXTTO= <i>count</i>|NONE WTTYEOT= <i>user-defined ending sequence</i>		X (TWX only) X X X (WTTY only)
real TERMINAL <i>symbol</i> ¹ BHSET=DYNAMIC CTERM=YES|NO CUIDLEN=TWX|0 DIALNO= <i>telephone number</i> TERM=2740-1|2741|TWX|WTTY|MTA|3780 FEATURE=BREAK	X X (dial support) X (dial-out support) X X	 X X (TWX only)
virtual GROUP VIROWNER=CXNNT0 LNCTL=SDLC VIRTUAL=YES	X X X	
virtual LINE <i>symbol</i> ¹ AUTO=YES CALL=IN|OUT|INOUT NTO.CALLOUT= <i>terminal name</i> NTO.SSLINE= <i>symbol</i> NTO.ID= <i>number</i> NTO.MTA=((<i>lctype,digit</i>),...) NTO.TRALL=YES|NO	X X (dial-out support) X (dial support) X (dial-out support) X X	 X (switched only) X (MTA only) X
virtual PU <i>symbol</i> ¹ NTO.SSTERM= <i>symbol</i> NTO.EDIT= <i>char</i>|37 MAXLU=1 MAXOUT=1 PASSLIM=1 PUTYPE=1 NTO.WTTYTO=YES|NO	X X (nonswitched only) X (switched group only) X (VTAM support) X (VTAM support) X X (WTTY only)	 X
virtual LU (<i>nonswitched only</i>) <i>symbol</i> ¹ LOCADDR=0 TERM=2740-1|2741|TWX|WTTY|3780	X X	 X (VTAM only)

¹ *symbol* can be any valid assembler-language symbol. The first character cannot be \$. *symbol* also may not be represented by NTOSSCP or CXNxxxx where xxxx is a number. NTO generates those labels for other keywords. If you use these as a value for *symbol*, an error message is produced. Other restrictions also apply as indicated in *NCP, SSP, and EP Resource Definition Guide*.

OPTIONS Definition Statement

USERGEN=CXNNTO

Required for NDF support. NTO creates a load module that processes the definition statements and uses the NDF generation capabilities to produce the appropriate NTO generation output. To get NDF to load this module so that processing can take place, NDF must be notified that NTO keywords exist in the NCP generation definition.

Note: This OPTIONS definition statement must be the *first* statement in the generation definition.

BUILD Definition Statement

BFRS=*size*|88

Specifies the size in bytes of the buffers in the NCP buffer pool. A value of less than 96 causes truncation of the FID0 PIU for the selective FID0 trace facility. The default is BFRS=88.

MAXSSCP=*count*|1

Specifies the maximum number of SSCPs that can be in session with this NCP. NTO is one of these SSCPs and is always active. Include the NTO SSCP in addition to the host SSCPs in this count. Therefore, this count must be at least $n + 1$, where n is the number of host SSCPs in session with this NCP. The default is MAXSSCP=1.

OLT=YES|NO

Specifies that the Online Test Facility is to be included. If OLT=NO is specified, the VTAM Unformatted System Services (USS) logon facility is still available; however, the USS logoff facility through 99999 is not available for the NTO devices. The default value is OLT=YES.

TYPGEN=NCP|PEP|NCP-R

NTO restricts this keyword to these values. The default is TYPGEN=NCP.

SYSCNTRL Definition Statement

OPTIONS=(BHSASSC,ENDCALL,MODE,RCOND,RIMM)

Required. Specifies which of the dynamic control facilities are to be included in NCP.

The following values of the OPTIONS keyword are required for NTO:

BHSASSC	Modify block handler set
ENDCALL	Physical disconnect
MODE	Change line speed
RCOND	Reset conditional
RIMM	Reset Immediate

NCPNAU Definition Statement

VIROWNER=CXNNTO

Required. Because NTO, user-written generation applications, and NCP are generated together, NTO must be able to distinguish between its own virtual definitions and those of user-written generation applications. NDF provides the VIROWNER keyword to determine the owner of the virtual definitions. VIROWNER=CXNNTO signifies NTO resources are being defined.

symbol

Required. Specifies the resource name for the NTO SSCP NLB. *symbol* may be any valid assembler language symbol, but it may not begin with a \$. *symbol* also may not be represented by NTOSSCP or CXNxxxx, where xxxx is a number. NTO generates those labels for other keywords. If you use them as a value for *symbol*, an error message is produced. Other restrictions also apply as indicated in *NCP, SSP, and EP Resource Definition Guide*.

NTO.TRACEML=YES|NO

Activates the NTO internal trace to record all mainline events. If NTO.TRACEML=NO, then the internal trace for mainline flows will be activated only when an ACTTRACE request is received by the NTO virtual line. If NTO.TRACEML=YES, then the internal trace will record mainline flows all the time. The default is NTO.TRACEML=NO.

Note: Activating the internal trace for all mainline events can cause up to a 10% decrease in NTO performance.

NTO.TRCTABL=*number*|200

Specifies the size or number of records in the NTO internal trace table. Each record in the trace table is 16 bytes in length. The minimum value is 10; the maximum value is 32000. The default is NTO.TRCTABL=200.

DIALSET Definition Statement

LINES=(*line name*)

Required for dial support. Specifies the name of the start-stop line that NCP assigns to the TWX terminal having either CALL=OUT or CALL=INOUT coded on the LINE definition statement. Only one real NTO line can be identified on each DIALSET definition statement.

QLIMIT=0

Required for dial support. Specifies the maximum number of requests NCP lets accumulate on the queue for a dial set. A value of 0 signifies that NCP rejects any request when the program does not immediately have a line available.

QLOAD=0

Required for dial support. Specifies the number of call-out requests NCP lets accumulate on the queue for a dial set before using a line from the alternate dial set. A value of 0 signifies that a line from the alternate dial set is used when no primary dial set line is available.

RESERVE=0

Required for dial support. Specifies the number of lines in a dial set reserved for incoming calls from devices. A value of 0 signifies that no lines are reserved.

Real LINE Definition Statement

symbol

Required. Provides a label for the real line supported through NTO. *symbol* may be any valid assembler-language symbol. The first character may not be \$. *symbol* also may not be represented by NTOSSCP or CXNxxxx where xxxx is a number. NTO generates those labels for other keywords. If you use these as a value for *symbol*, an error message is produced. This keyword must match the label specified on the NTO.SSLINE keyword in the Virtual LINE

definition statement. Other restrictions also apply as indicated in *NCP, SSP, and EP Resource Definition Guide*.

ADDRESS=*line address*

Specifies the line interface address for the line represented by this LINE definition statement. Specify a single line interface address.

AUTO=*autocall unit address*

Required for dial-out support. Identifies the autocall unit address.

CALL=IN|OUT|INOUT

Required for switched lines or dial support. Specify that the NTO devices initiate calls, receive calls, or both initiate and receive calls. The default is CALL=INOUT.

DIALSET=*line name*

Required for dial-out support. Specifies the name of the BSC/SS line used in the DIALSET definition statement. Code the DIALSET keyword only if you have coded CALL=OUT or CALL=INOUT on the LINE definition statement.

DUPLEX=FULL|HALF

Specify for the real NTO line DUPLEX=FULL for start-stop devices and DUPLEX=HALF for BSC devices. The default is DUPLEX=HALF.

FEATURE=NOIMEND|IMEND

Specifies whether a receive operation immediately ends when the end of transmission (EOT) is received. If you specify IMEND, the operation ends immediately. If you specify NOIMEND, the program delays ending the operation. The default is FEATURE=NOIMEND.

ISTATUS=INACTIVE

Required for VTAM only. Specify this keyword for all real NTO lines. If you want the real line initially inactive, specify ISTATUS=INACTIVE on both the real and virtual LINE definition statements. If you want the real line initially active, specify ISTATUS=INACTIVE on the real LINE definition statement and ISTATUS=ACTIVE on the virtual LINE definition statement.

To include the selective FID0 trace facility in your network: ISTATUS can be specified as ISTATUS=INACTIVE for the selective FID0 trace facility. For a description of all selective FID0 trace facility coding, see "Defining the Selective FID0 Trace Facility" on page 35.

MONITOR=YES

Required for start-stop devices only. Specifies that NCP is to monitor for an attention signal or a disconnect condition at the terminal.

POLIMIT=(n,QUEUE)

Multipoint lines only. *n* is the number of negative responses to polling that NCP will accept from the NTO station before breaking the logical connection. The maximum value of *n* is 255.

QUEUE specifies that NCP is to break the logical connection, notify the host processor, and queue the current read request onto the beginning of the queue for the station.

POLLED=YES|NO

Specifies whether the stations attached to the line must be polled and addressed. POLLED=YES is valid only for IBM 2740 Model 1 Communications

Terminals on a multipoint line. POLLED=NO is required for all other NTO devices. The default is POLLED=NO.

SERVLIM=*count*

Multipoint lines only. Specifies the number of entries in the service order table for the NTO multipoint line that NCP is to check each time the program performs service seeking.

If you omit this keyword, the program checks one half of the table entries each time it performs service seeking.

SERPRI=OLD

Multipoint lines only. Specifies that NCP is to give priority to servicing current sessions on the multipoint line. NTO restricts this keyword to this value.

SESSION=*count***1**

Multipoint lines only. Specifies the number of sessions that NCP is to attempt to maintain concurrently on the NTO multipoint line. The maximum number of sessions must not exceed the number of devices connected to the line. The default for this keyword is 1.

TYPE=NCP

Required. Specify that the real NTO line represented by this LINE definition statement is to operate in network control mode only.

YIELD=YES**|NO**

YES, is required with NRF. Specify YIELD=NO to ensure that no yield to contention responses will be returned. The default is YIELD=YES.

SERVICE Definition Statement

symbol

Required for multipoint lines only. Provides a name for the definition statement. *symbol* may be any valid assembler-language symbol. The first character may not be \$. *symbol* also may not be represented by NTOSSCP or CXNxxxx, where xxxx is a number. NTO generates those labels for other keywords. If you use these as a value for *symbol*, an error message is produced. The generation procedure does not check the symbol for validity. If more than one definition statement is required, specify a name on the first definition statement only. Other restrictions also apply as indicated in *NCP, SSP, and EP Resource Definition Guide*.

ORDER=(*entry***,...)**

Required for multipoint lines only. Specifies the order in which the devices on an NTO multipoint line are serviced. *entry* is the name of a device. This name appears on the TERMINAL or PU definition statements associated with the multipoint line for which this service order table is being generated. A device name may appear in the list more than once.

Real GROUP Definition Statement

CHAREC=(XON**,***chars***|**XOFF**,***chars***|**XONOFF**,***chars***|**NO**,***chars***)**

TWX only. Specifies the message-ending characters recognized by NCP when receiving data from a TWX terminal.

NTO allows only the following options when selecting the ending characters:

- (XON,*chars*) indicates XON only or one or two user-defined characters.

- (XOFF,*chars*) indicates XOFF only or one or two user-defined characters.
- (XONOFF,*chars*) indicates XON, XOFF, or one or two user-defined characters.
- (NO,*chars*) indicates one or two user-defined characters but not XON or XOFF.

The default is CHAREC=XONOFF,*chars*.

DIAL=YES|NO

Required. This keyword describes the dial characteristics of the line. Code DIAL=YES for switched lines and DIAL=NO for nonswitched lines. The default is DIAL=NO.

LNCTL=SS|BSC

Required. Specifies the real NTO device as either a BSC or a start-stop device. The default is LNCTL=SS.

REPLYTO=*count*|NONE

Specifies the reply time-out value, in seconds, for the lines in this group. REPLYTO=NONE is recommended for all SS devices on a point-to-point line. REPLYTO=23.5 is recommended for all SS devices on a multipoint line.

TEXTTO=*count*|NONE

Specifies the text time-out value, in seconds, for the lines in the line group. TEXTTO=NONE is recommended for all SS devices. However, if TEXTTO=NONE is specified on a 2740-1 device that has the “time-out 15” feature, then the device will hang if it sits idle with an outstanding BID for more than 15 seconds.

WTTYEOT=*user-defined ending sequence*

WTTY only. Specifies the message-ending characters recognized by NCP when receiving data from a WTTY device. This keyword must be specified so that NCP interprets the user-defined ending sequence as an EOT indicator.

Real TERMINAL Definition Statement

One TERMINAL definition statement is coded for each device. However, two TERMINAL definition statements must be coded for TWX devices (even though there is only one physical device) with CALL=INOUT defined on the real LINE definition statement. One TERMINAL definition statement defines the characteristics of the CALL-IN terminal. The second TERMINAL definition statement defines the characteristics of the CALL-OUT terminal. See “Coding Examples for NTO Devices” on page 35 and Appendix A, “Resource Definition Example with NTO” for examples.

symbol

Required. Provides a resource label for the real NTO device. *symbol* may be any valid assembler-language symbol. The first character may not be \$. *symbol* also may not be represented by NTOSSCP or CXNxxxx, where xxxx is a number. NTO generates those labels for other keywords. If you use these as a value for *symbol*, an error message is produced. This value must match the label specified on the NTO.SSTERM keyword of the virtual PU definition statement. Other restrictions also apply as indicated in *NCP, SSP, and EP Resource Definition Guide*.

BHSET=DYNAMIC

Specifies that no block handler set is initially assigned to the NTO device, but one may be assigned dynamically from the host processor. NTO restricts the keyword to this value.

CTERM=YES|NO

Required for dial support. Generates the NCP control block that identifies the TWX device as CALL-OUT or CALL-IN.

- Code CTERM=YES when CALL=IN is defined on the LINE definition statement.
- Code CTERM=NO when CALL=OUT is defined on the LINE definition statement.
- When CALL=INOUT is defined on the LINE definition statement, code CTERM=YES on the set of keywords for the CALL-IN terminal and CTERM=NO on the set of keywords for the CALL-OUT terminal.

The default is CTERM=NO.

CUIDLEN=TWX|0

TWX only. Specifies the length of the ID sequence NCP sends to the NTO device represented by this definition statement. CUIDLEN=0 is the default value. This keyword is valid only for a TWX device that passes a unique ID sequence. See the description of the NTO.ID keyword on page 32.

DIALNO=telephone number

Required for dial-out support. Specifies the NCP dial-out telephone number. Code DIALNO only when CALL=OUT or CALL=INOUT on the real LINE definition statement. For CALL=INOUT, code DIALNO for the call-out terminal.

TERM=2740-1|2741|TWX|WTTY|MTA|3780

Required. Specifies the type of station represented by this TERMINAL definition statement. The values on this keyword are the only valid options for NTO. The default is TERM=TWX.

FEATURE=BREAK

Specifies whether the station can interrupt its transmission for the controller upon receiving a break signal from NCP. This keyword is required by most subsystems. See Chapter 7, "Defining NTO Devices to Subsystems and Application Programs," for coding considerations.

Virtual GROUP Definition Statement

VIROWNER=CXNNTO

Required. Because NTO, user-written generation applications, and NCP are generated together, NTO must be able to distinguish between virtual definitions for user-written generation applications and NTO devices that exist in the generation definition. NDF provides the VIROWNER keyword to determine the owner of the virtual definitions. VIROWNER=CXNNTO signifies NTO resources are being defined.

LNCTL=SDLC

Required. Specifies that this line group supports NTO devices as SNA devices.

VIRTUAL=YES

Required. Specifies that this line group supports NTO devices as virtual devices.

Virtual LINE Definition Statement

One virtual LINE definition statement is specified for each line supported by NTO. All parameters relating to the physical characteristics of the line are ignored, such as polling and session control. This information is obtained from the real BSC/SS line definitions.

symbol

Required. Provides the label for the virtual line supported by NTO. *symbol* can be any valid assembler language name. The first character cannot be \$. *symbol* also may not be represented by NTOSSCP or CXNxxxx, where xxxx is a number. NTO generates those labels for other keywords. If you use these as a value for *symbol*, an error message is produced. Other restrictions also apply as indicated in *NCP, SSP, and EP Resource Definition Guide*.

AUTO=YES

Required for dial-out support. Specifies that autocall is used on the dial-out line.

CALL=IN|OUT|INOUT

Required for dial support. Defines the dial capabilities of the device. CALL=OUT|INOUT may be coded for TWX devices only. CALL=IN may be coded for any device. The default is CALL=INOUT.

NTO.CALLOUT=terminal name

Required for dial-out support. Provides the name of the line the TERMINAL definition statement defines as the call-out terminal.

NTO.SSLINE=symbol

Required. Names the BSC/SS LINE definition in the NCP generation definition. This BSC/SS line is paired with the virtual SDLC line on which NTO.SSLINE is coded.

To include the selective FID0 trace facility in your network: NTO.SSLINE can be specified as NTO.SSLINE=TRLINK for the selective FID0 trace facility. By specifying TRLINK, you indicate that a corresponding real BSC start-stop definition in the NCP generation definition is not required. When NTO.SSLINE=TRLINK you are coding a dummy virtual LINE definition statement for the selective FID0 trace facility.

For a description of all selective FID0 trace facility coding, see “Defining the Selective FID0 Trace Facility” on page 35.

NTO.ID=number

Switched lines only. Specifies the hexadecimal representation of the station ID to be returned to the host in the Request Contact when a dial-in connection is made. The first four digits must be 0100. You may choose the remaining eight digits. The resulting number must be unique in the network and constructed either from the IDNUM and IDBLK keywords of the PU definition statement specified in the VTAM switched major node definition, or from the ORDER keyword of the INVLIST definition statement specified in TCAM. The presence of the ID implies to NTO that this station is on a switched link.

Note: All stations that call in to an NTO line are identified by the same NTO.ID number except those on an MTA line (see the MTA keyword) or TWX terminals that pass an ID sequence. If an ID sequence is received when a dial-in connection is made (IDSEQ=PASS on the TERMINAL definition statement), the first 20 bits of the TWX ID replace the last 20 bits of the NTO.ID keyword.

Because the IBM 3101 Communications Terminal supported as a TWX does not pass a unique ID sequence, you may code IDSEQ=NONE on the TERMINAL definition statement. If you do not code this keyword, IDSEQ=NONE is assumed.

NTO.MTA=((lctype,digit) , . . .)

MTA only. Specifies the last hexadecimal digit of the ID parameter for each type of terminal and line control supported by MTA. This keyword applies only to switched stations. Line control type can only be one of those indicated in Table 10.

Table 10. Line Control Types

lctype	Meaning
2740A	IBM 2740 basic
2740D	IBM 2740 with Transmit Control Feature
2740E	IBM 2740 with Transmit Control and Checking Features
2740F	IBM 2740 with Checking Feature
2741	IBM 2741
TWX	TWX or IBM 3101 supported as a TWX.

Note: If the MTA keyword is omitted or the terminal type for the calling station is not listed, the ID specified in the NTO.ID keyword will be sent to the host unmodified. For example, a user could code NTO.ID=010000712345, NTO.MTA=((TWX,2)) if the access method needs to treat TWX terminals on an MTA line in a specified manner, but does not need to distinguish among other terminals. In this example, when a TWX station calls in, NTO.ID=010000712342 will be sent to the host. Also, if any other station calls in, NTO.ID=010000712345 will be sent to the host. In VTAM, this ID is constructed from the IDNUM and IDBLK keywords of the PU definition statement. In TCAM, this ID is constructed from the ORDER keyword of the INVLIST definition statement.

NTO.TRALL=YES|NO

Specifies the selective FID0 trace facility for the NTO real line defined by this keyword. If not specified, the default value is NTO.TRALL=YES.

Note: Specifying NTO.TRALL=YES has no effect on determining whether internal trace records are recorded on behalf of the line.

Virtual PU Definition Statement

One PU definition statement is specified for each nonswitched or switched point-to-point line.

symbol

Required. Provides a resource name for the physical unit. *symbol* can be any valid assembler-language symbol. The first character cannot be \$. Also, *symbol* may not be represented by NTOSSCP or CXNxxxx, where xxxx is a number. NTO generates those labels for other keywords. If you use any of them as a value for *symbol*, an error message is produced. Other restrictions also apply as indicated in *NCP, SSP, and EP Resource Definition Guide*.

NTO.SSTERM=*symbol*

Required for nonswitched lines only. Associates an NTO device with user control block names. *symbol* must match the name of a BSC/SS TERMINAL definition statement in the NCP generation definition. For switched stations, NTO will locate the proper control block using the BSC/SS line named in the NTO.SSLINE keyword.

To include the selective FID0 trace facility in your network: NTO.SSTERM can be specified as NTO.SSTERM=TRLINK for the selective FID0 trace facility. By specifying TRLINK, you indicate that a real BSC start-stop TERMINAL definition statement in the NCP generation definition is not required. When NTO.SSTERM=TRLINK you are coding a dummy virtual PU definition statement for the selective FID0 trace facility.

For a description of all selective FID0 trace facility coding, see “Defining the Selective FID0 Trace Facility” on page 35.

NTO.EDIT=*char*|37

Specifies the hexadecimal representation of the data character that NTO is to insert following data received from the terminal and ended by attention. NTO.EDIT=37 (EOT) is the default.

MAXLU=1

Required for switched group only. Specifies the number of logical units associated with any physical unit in the group. NTO requires that you specify this keyword as 1 for switched groups. For nonswitched groups, this keyword is optional.

MAXOUT=1

Required for VTAM. NTO assumes this value for the keyword. If you specify a different value, NTO does not use it, but VTAM does. Therefore, code this value as shown for VTAM to support the NTO device.

PASSLIM=1

Required for VTAM. NTO assumes this value for the keyword. If you specify a different value, NTO does not use it, but VTAM does. Therefore, code this value as shown for VTAM to support the NTO device.

PUTYPE=1

Required. Specifies the virtual physical unit for the NTO device as a physical unit type 1.

NTO.WTTYTO=YES|NO

Required for WTTY only. If NTO.WTTYTO=YES, any data received from the WTTY device before the time-out is passed to the host without any error indication. If NTO.WTTYTO=NO, all WTTY time-outs are reported as errors and any data received is discarded. NTO.WTTYTO=NO is the default value.

Virtual LU Definition Statement (Nonswitched Devices Only)

A virtual LU definition statement is used in NCP generation only for a nonswitched NTO device. Code virtual LU definition statements for switched NTO devices in a VTAM switched major node definition. See Chapter 5, “Defining NTO Devices to VTAM,” for further information.

symbol

Required. Provides a resource name for the logical unit. *symbol* can be any valid assembler-language symbol. The first character cannot be \$. Also,

symbol may not be represented by NTOSSCP or CXNxxxx, where xxxx is a number. NTO generates those labels for other keywords. If you use these as a value for *symbol*, an error message is produced. (This name must not be specified in the service order table.) Other restrictions also apply as indicated in *NCP, SSP, and EP Resource Definition Guide*.

LOCADDR=0

Required. Specifies the local address of the virtual logical unit for the NTO device.

TERM=2740-1|2741|TWX|WTTY|3780

Required for VTAM only. Specifies the type of nonswitched NTO device supported by the PU definition statement. It can be used by application programs that want to inquire about a device type.

This keyword is not required for TCAM because TCAM does not read NCP definition statements. In TCAM, device type information is provided by the RTRM keyword of the TERMINAL definition statement. The default is TERM=TWX.

Defining the Selective FID0 Trace Facility

NTO provides a selective FID0 trace facility for recording FID0 PIU activity for a defined group of NTO lines through one dummy NTO trace line. To support this dummy trace line, define a virtual definition in the NCP generation definition. Unlike other virtual definitions for NTO support, this dummy virtual definition has no real BSC/SS counterpart in the NCP generation definition.

Code the dummy virtual definition in the NCP generation definition as if it were a nonswitched NTO device. This definition includes the virtual GROUP, virtual LINE, virtual PU, and virtual LU definition statements. To create the dummy virtual definition specify:

```
symbol GROUP
  VIROWNER=CXNNT0,
  LNCTL=SDLC,
  VIRTUAL=YES,
  MAXLU=1,
  PUTYPE=1
symbol LINE
  NTO.SSLINE=TRLINK,
  ISTATUS=INACTIVE
symbol PU
  NTO.SSTERM=TRLINK
symbol LU
  LOCADDR=0
```

Coding Examples for NTO Devices

The following section provides coding examples for specific NTO devices, including:

- Switched devices:
 - IBM 3101 in TWX-compatible mode (CR3101L)
 - IBM 3101 in TWX-compatible mode (CROUTL)

IBM 3101 in TWX-compatible mode (CRINOUTL)

- Nonswitched devices:

IBM 2740 Communications Terminal on a multipoint line (CR2740ML)

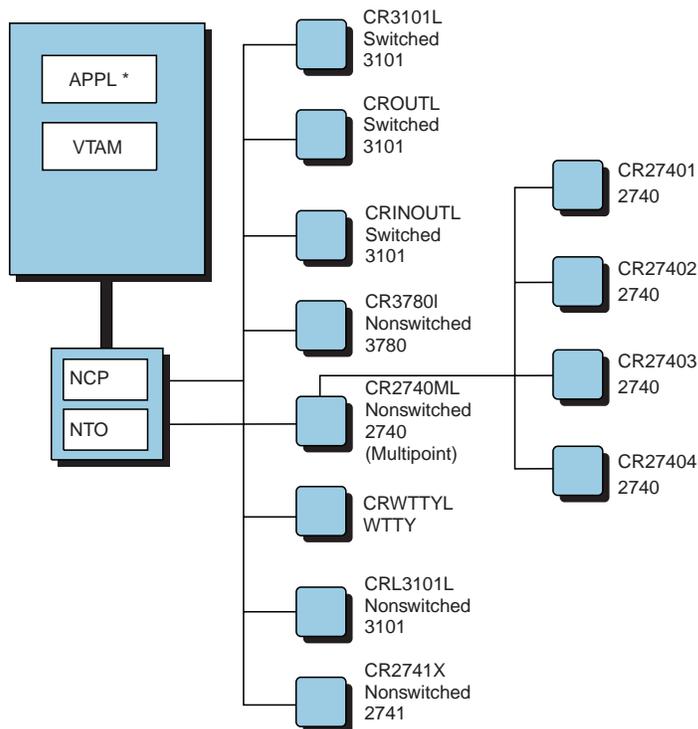
IBM 2741 Communications Terminal (CR2741X)

IBM 3780 Communications Terminal (CR3780L)

IBM 3101 in TWX-compatible mode (CRL3101L)

World Trade Teletypewriter Terminal (CRWTTYL)

Use these samples as a guide to updating your NCP generation definition with definitions for NTO devices. Do not code directly from these examples; your network configuration or individual device characteristics will be different. Figure 5 shows the BSC and start-stop terminals used in the coding examples.



* APPL could be any IBM subsystem or a user-written application program.

Note: The symbolic names associated with each device in this figure correspond to the names assigned to the device on the real LINE definition statement in the sample NTO/NCP definitions.

Figure 5. NTO Devices in Coding Examples

The sample definition statements sometimes include keywords not described in this chapter. You might need to refer to *NCP, SSP, and EP Resource Definition Reference* to code these keywords correctly.

Sample NCPNAU Definition Statement

```
NTONRFC NCPNAU NOTIFY=1,  
            NTO.TRACEML=NO,  
            NTO.TRCTABL=2000,  
            VIROWNER=CXNNT0
```

Sample Real Definitions for NTO Devices

The following are sample real definitions for NTO devices.

For IBM 2740s on a Nonswitched, Multipoint Line

```
CR2740MG GROUP CRETRY=3,  
              LNCTL=SS,  
              REPLYTO=NONE,  
              TERM=2740-1,  
              TEXTTO=NONE,  
              CHAREC=XONOFF,  
              DIAL=NO,  
              PECHAR=FF,  
              TYPE=NCP  
CR2740ML LINE ADDRESS=(009),  
              CLOCKNG=INT,  
              DUPLEX=FULL,  
              ISTATUS=INACTIVE,  
              MONITOR=YES,  
              PAUSE=3,  
              POLIMIT=(3,NOWAIT),  
              POLLED=YES,  
              RETRIES=(3,1,2),  
              SERVLIM=4,  
              SESSION=4,  
              SPEED=1200,  
              TRANSFER=2,  
              ATTACH=MODEM,  
              AVGPB=136,  
              CODE=EBCD,  
              CUTOFF=NO,  
              DATRATE=LOW,  
              ETRATIO=30,  
              FEATURE=NOIMEND,  
              LNQTCNT=1,  
              POLLTO=ERROR,  
  
              SERVPRI=OLD,  
              SPDSEL=NO  
SERVICE ORDER=(CR27401,CR27402,CR27403,CR27404)  
CR27401  TERMINAL ADDR=A1,  
          FEATURE=(CHECK,SCTL),  
          POLL=A1,  
          PT3EXEC=YES,  
          CONV=NO,  
          CRDLAY=NO,  
          ENDTRNS=EOT,  
          INHIBIT=NONE,  
          LGRAPHS=(REJECT,REJECT)  
CR27402  TERMINAL ADDR=A2,  
          FEATURE=(CHECK,SCTL),  
          POLL=A2,
```

```

PT3EXEC=YES,
CONV=NO,
CRDLAY=NO,
ENDTRNS=EOT,
INHIBIT=NONE,
LGRAPHS=(REJECT,REJECT)
CR27403  TERMINAL ADDR=A3,
FEATURE=(CHECK,SCTL),
POLL=A3,
PT3EXEC=YES,
CONV=NO,
CRDLAY=NO,
ENDTRNS=EOT,
INHIBIT=NONE,
LGRAPHS=(REJECT,REJECT)
CR27404  TERMINAL ADDR=A4,
FEATURE=(CHECK,SCTL),
POLL=A4,
PT3EXEC=YES,
CONV=NO,
CRDLAY=NO,
ENDTRNS=EOT,
INHIBIT=NONE,
LGRAPHS=(REJECT,REJECT)

```

For an IBM 2741 on a Nonswitched Point-to-Point Line

```

CR2741G GROUP CRETRY=3,
LNCTL=SS,
REPLYTO=NONE,
TERM=2741,
TEXTTO=NONE,
CHAREC=XONOFF,
DIAL=NO,
PECHAR=FF,
TYPE=NCP
CR2741X LINE ADDRESS=(010),
BHSET=DYNAMIC,
CLOCKNG=INT,
DUPLEX=FULL,
ISTATUS=INACTIVE,
MONITOR=YES,
RETRIES=(3,1,2)
SPEED=134,
ATTACH=MODEM,
AVGPB=136,
CODE=COR,
CUTOFF=NO,
DATRATE=LOW,
DIALALT=NONE,
ETRATIO=30,
FEATURE=NOIMEND,
LNQTCNT=1,
PARCHK=NOCHECK,
POLLED=NO,
SPDSEL=NO
CR2741Z TERMINAL FEATURE=(ATTN,BREAK),
PT3EXEC=YES,

```

```
ATTN=ENABLED,  
CONV=NO,  
CRDLAY=NO,  
ENDTRNS=EOT,  
INHIBIT=NONE,  
LGRAPHS=(REJECT,REJECT)
```

For an IBM 3780 on a Nonswitched Point-to-Point Line

```
CR3780G GROUP DIAL=NO,  
LNCTL=BSC,  
REPLYTO=23.5,  
TEXTTO=NONE,  
CRETRY=7,  
TTDCNT=15,  
TYPE=NCP,  
WACKCNT=15,  
WAKDLAY=2.2  
CR3780L LINE ADDRESS=(016),  
CLOCKNG=INT,  
DUPLEX=HALF,  
ISTATUS=INACTIVE,  
RETRIES=(3,1,2),  
SPEED=1200,  
ATTACH=MODEM,  
AVGPB=136,  
CODE=EBCDIC,  
CUTOFF=NO,  
DATRATE=LOW,  
DIALALT=NONE,  
ETRATIO=30,  
POLLED=NO,  
SPDSEL=NO,  
YIELD=YES  
CR3780 TERMINAL BHSET=HEDIT16,  
TERM=3780,  
BHEXEC=ALL,  
CONV=NO,  
EXEC=YES,  
FEATURE=(NOBREAK,NOATTN),  
INHIBIT=NONE,  
LGRAPHS=(REJECT,REJECT),  
PT3EXEC=YES
```

For an IBM 3101 (TWX) on a Nonswitched Point-to-Point Line

```
CRL3101G GROUP ATTN=ENABLED,  
CHAREC=(XOFF,8D),  
DIAL=NO,  
LNCTL=SS,  
REPLYTO=23.5,  
TEXTTO=NONE,  
CODE=DIC1,  
CRETRY=2,  
PECHAR=FF,  
TYPE=NCP  
CRL3101L LINE ADDRESS=(015),  
CLOCKNG=INT,  
DUPLEX=FULL,
```

```

        ISTATUS=INACTIVE,
        MONITOR=YES,
        RETRIES=(3,1,2)
        SPEED=1200,
        ATTACH=MODEM,
        AVGPB=136,
        CUTOFF=NO,
        DATRATE=LOW,
        DIALALT=NONE,
        ETRATIO=30,
        FEATURE=NOIMEND,
        LNQCNT=1,
        PARCHK=NOCHECK,
        PARGEN=EVEN,
        POLLED=NO,
        SPDSEL=NO
CRL3101  TERMINAL BHSET=HEDIT16,
        CRDLAY=YES,
        FEATURE=(BREAK,ATTN),
        TERM=TWX,
        BHEXEC=ALL,
        CONV=NO,
        ENDTRNS=EOT,
        EXEC=YES,
        INHIBIT=NONE,
        LGRAPHS=(REJECT,REJECT),
        PT3EXEC=YES

```

For an IBM 3101 (TWX) on a Switched Point-to-Point Line (Dial-in)

```

CR3101G  GROUP ATTN=ENABLED,
        CHAREC=(XOFF,8D),
        DIAL=YES,
        LNCTL=SS,
        REPLYTO=NONE,
        TEXTTO=NONE,
        CODE=DIC1,
        CRETRY=2,
        FRAMING=11,
        PECHAR=FF,
        TYPE=NCP
CR3101L  LINE ADDRESS=(014),
        CALL=IN,
        CLOCKNG=INT,
        DUPLEX=FULL,
        ISTATUS=INACTIVE,
        MONITOR=YES,
        RETRIES=(3,1,2),
        RING=NO,
        SPEED=AUTOICC1,
        ANSTONE=NO,
        ATTACH=MODEM,
        AVGPB=136,
        CUTOFF=NO,
        DATRATE=LOW,
        DIALSET=NONE,
        ETRATIO=30,

```

```

FEATURE=NOIMEND,
LNQTCNT=1,
PARCHK=NOCHECK,
PARGEN=EVEN,
POLLED=NO,
SECURE=NO,
SPDSEL=NO
CR3101  TERMINAL BHSET=HEDIT16,
        CRDLAY=YES,
        CTERM=YES,
        FEATURE=(BREAK,ATTN),
        IDSEQ=PASS,
        TERM=TWX,
        BHEXEC=ALL,
        CONV=NO,
        CUIDLEN=0,
        DIALSET=NONE,
        ENDTRNS=EOT,
        EXEC=YES,
        INHIBIT=NONE,
        LGRAPHS=(REJECT,REJECT),
        SRT=(65535,255),
        PT3EXEC=YES

```

For an IBM 3101 (TWX) on a Switched Point-to-Point Line (Dial-out)

```

CROUTG  GROUP  ATTN=ENABLED,
              CHAREC=(XOFF,8D),
              CODE=DIC1,
              DIAL=YES,
              LNCTL=SS,
              REPLYTO=23.5,
              TEXTTO=NONE,
              CRETRY=2,
              FRAMING=11,
              PECHAR=FF,
              TYPE=NCP
CROUTL  LINE   ADDRESS=(013),
              AUTO=034,
              CALL=OUT,
              CLOCKNG=INT,
              DIALSET=DIALOUT,
              DUPLEX=FULL,
              ISTATUS=INACTIVE,
              MONITOR=YES,
              RETRIES=(3,1,2)
              RING=NO,
              SPEED=110,
              ATTACH=MODEM,
              AVGPB=136,
              CUTOFF=NO,
              DATRATE=LOW,
              ETRATIO=30,
              FEATURE=NOIMEND,
              LNQTCNT=1,
              PARGEN=EVEN,
              POLLED=NO,

```

```

        PARCHK=NOCHECK,
        REDIAL=(3,0,0,0),
        SECURE=NO,
        SPDSEL=NO
CROUTT  TERMINAL  BHSET=HEDIT16,
        CRDLAY=YES,
        CTERM=NO,
        DIALNO=(9|||890|||4582,14),
        FEATURE=(BREAK,ATTN),
        TERM=TWX,
        BHEXEC=ALL,
        CONV=NO,
        CUIDLEN=0,
        ENDTRNS=EOT,
        EXEC=YES,
        IDSEQ=NONE,
        INHIBIT=NONE,
        LGRAPHS=(REJECT,REJECT),
        PT3EXEC=YES,
        SRT=(65535,255)

```

For an IBM 3101 (TWX) on a Switched Point-to-Point Line (Dial-inout)

```

CRINOUTG GROUP  ATTN=ENABLED,
                CHAREC=(XOFF,8D),
                DIAL=YES,
                LNCTL=SS,
                REPLYTO=23.5,
                TEXTTO=NONE,
                CODE=DIC1,
                CRETRY=2,LED,
                FRAMING=11,
                PECHAR=FF,
                TYPE=NCP
CRINOUTL LINE   ADDRESS=(012),
                AUTO=035,
                CALL=INOUT,
                CLOCKNG=INT,
                DIALSET=DINOUT,
                DUPLEX=FULL,
                ISTATUS=INACTIVE,
                MONITOR=YES,
                RETRIES=(3,1,2),
                RING=NO,
                SPEED=110,
                ANSTONE=NO,
                ATTACH=MODEM,
                AVGPB=136,
                CUTOFF=NO,
                DATRATE=LOW,
                ETRATIO=30,
                FEATURE=NOIMEND,
                LNQTCNT=1,
                PARCHK=NOCHECK,
                PARGEN=EVEN,
                POLLED=NO,
                REDIAL=(3,0,0,0),

```

```

        SECURE=NO,
        SPDSEL=NO
CRINOUTI TERMINAL BHSET=HEDIT16,
        CRDLAY=YES,
        CTERM=YES,
        FEATURE=(BREAK,ATTN),
        IDSEQ=PASS,
        TERM=TWX,
        BHEXEC=ALL,
        CONV=NO,
        CUIDLEN=0,
        DIALSET=NONE,
        ENDTRNS=EOT,
        EXEC=YES,
        INHIBIT=NONE,
        LGRAPHS=(REJECT,REJECT),
        PT3EXEC=YES,
        SRT=(65535,255)
CRINOUTO TERMINAL BHSET=HEDIT16,
        CRDLAY=YES,
        CTERM=NO,
        DIALNO=(4582,4),
        FEATURE=(BREAK,ATTN),
        IDSEQ=IGNORE,
        TERM=TWX,
        BHEXEC=ALL,
        CUIDLEN=0,
        CONV=NO,
        ENDTRNS=EOT,
        EXEC=YES,
        INHIBIT=NONE,
        LGRAPHS=(REJECT,REJECT),
        PT3EXEC=YES,
        SRT=(65535,255)

```

For a WTTY Terminal on a Nonswitched Point-to-Point Line

```

CRWTTYG  GROUP  CRETRY=3,
          LNCTL=SS,
          TERM=WTTY,
          TEXTTO=NONE,
          WTTYTO=080208,
          CHAREC=XONOFF,
          DIAL=NO,
          PECHAR=FF,
          TYPE=NCP,
CRWTTYL  LINE  ADDRESS=(011),
          BHSET=DYNAMIC,
          CLOCKNG=INT,
          DUPLEX=FULL,
          ISTATUS=INACTIVE,
          MONITOR=YES,
          RETRIES=(3,1,2),
          SPEED=110,
          ATTACH=MODEM,
          AVGPB=136,
          CODE=ITA2,
          CUTOFF=NO,

```

```

DATRATE=LOW,
DIALALT=NONE,
ETRATIO=30,
FEATURE=NOIMEND,
LNQTCNT=1,
PARCHK=NOCHECK,
POLLED=NO,
SPDSEL=NO
CRWTTY   TERMINAL FEATURE=(ATTN,BREAK),
          PT3EXEC=YES,
          ATTN=ENABLED,
          CONV=NO,
          ENDTRNS=EOT,
          INHIBIT=NONE,
          LGRAPHS=(REJECT,REJECT)

```

Sample Virtual Definitions for NTO Devices on a Nonswitched Line

The following are sample virtual definitions for NTO devices on a nonswitched line.

Virtual GROUP Definition Statement for an IBM 2740, 2741, and 3780 on a Nonswitched Line

```

CVLEASEG GROUP ISTATUS=INACTIVE,
              LNCTL=SDLC,
              MAXLU=1,
              PUTYPE=1,
              USSTAB=HELLO,
              VIROWNER=CXNNT0,
              VIRTUAL=YES,
              DIAL=NO,
              TEXTT0=3.0,
              TYPE=NCP

```

Virtual LINE, PU and LU Definition Statements for IBM 2740s on a Nonswitched Multipoint Line

```

CV2740ML LINE NTO.SSLINE=CR2740ML,
              ATTACH=MODEM,
              CHNLZ=NO,
              ETRATIO=30,
              LPDATS=NO,
              MODULO=8,
              NTO, TRALL=YES
              SERVICE ORDER=(CP27401,CP27402,CP27403,CP27404)
CP27401  PU  NTO.SSTERM=CR27401,
              NTO.EDIT=37,
              PUNTFY=1
CT27401  LU  LOCADDR=0,
              SSCPFM=USSSCS,
              LUNTFY=1
CP27402  PU  NTO.SSTERM=CR27402,
              NTO.EDIT=37,
              PUNTFY=1
CT27402  LU  LOCADDR=0,
              SSCPFM=USSSCS,
              LUNTFY=1
CP27403  PU  NTO.SSTERM=CR27403
              NTO.EDIT=37,

```

```

CT27403 LU PUNTFY=1
          LOCADDR=0,
          SSCPFM=USSSCS,
          LUNTFY=1
CP27404 PU NTO.SSTERM=CR27404
          NTO.EDIT=37,
          PUNTFY=1
CT27404 LU LOCADDR=0,
          SSCPFM=USSSCS,
          LUNTFY=1

```

Virtual LINE, PU, and LU Definition Statements for an IBM 2741 on a Nonswitched Line

```

CV2741X LINE NTO.SSLINE=CR2741X,
            ATTACH=MODEM,
            CHNLZ=NO,
            ETRATIO=30,
            LPDATS=NO,
            MODULO=8,
            NTO.TRALL=YES
CV2741Z PU NTO.SSTERM=CR2741Z,
            NTO.EDIT=37,
            PUNTFY=1
CV2741T LU LOCADDR=0,
            SSCPFM=USSSCS,
            LUNTFY=11

```

Virtual LINE, PU, and LU Definition Statements for an IBM 3780 on a Nonswitched Line

```

CV3780L LINE NTO.SSLINE=CR3780L,
            ATTACH=MODEM,
            CHNLZ=NO,
            ETRATIO=30,
            LPDATS=NO,
            MODULO=8,
            NTO.TRALL=YES
CV3780P PU NTO.SSTERM=CR3780,
            NTO.EDIT=37,
            PUNTFY=1
CV3780 LU LOCADDR=0,
            SSCPFM=USSSCS,
            LUNTFY=1

```

Virtual LINE, PU, and LU Definition Statements for an IBM 3101 on a Nonswitched Line

```

CV3101L  LINE  NTO.SSLINE=CRL3101L,
              ATTACH=MODEM,
              CHNLZ=NO,
              ETRATIO=30,
              LPDATS=NO,
              MODULO=8,
              NTO.TRALL=YES
CV3101P  PU    NTO.SSTERM=CRL3101,
              NTO.EDIT=37,
              PUNTFY=1
CV3101   LU    LOCADDR=0,
              SSCPFM=USSSCS,
              LUNTFY=1

```

Virtual LINE, PU, and LU Definition Statements for a WTTY on a Nonswitched Line

```

CVWTTYL  LINE  NTO.SSLINE=CRWTTYL,
              ATTACH=MODEM,
              CHNLZ=NO,
              ETRATIO=30,
              LPDATS=NO,
              MODULO=8,
              NTO.TRALL=YES
CVWTTYP  PU    NTO.SSTERM=CRWTTY,
              NTO.EDIT=37,
              PUNTFY=1
CVWTTY   LU    LOCADDR=0,
              SSCPFM=USSSCS,
              LUNTFY=1

```

Sample Virtual Definitions for NTO Devices on a Switched Line

The following are sample virtual definitions for NTO devices on a switched line.

Virtual GROUP Definition Statement for an IBM 3101 on a Switched Line

```

CVDIALG  GROUP  DIAL=YES,
                ISTATUS=INACTIVE,
                LNCTL=SDLC,
                MAXLU=1,
                MODETAB=LOG3780,
                PUTYPE=1,
                USSTAB=HELLO,
                VIRTUAL=YES,
                VIROWNER=CXNNT0,
                TEXTT0=3.0,
                TYPE=NCP

```

Virtual LINE and PU Definition Statements for IBM 3101s Defined as a TWX on a Switched Line

```

CVINOUTL LINE AUTO=YES,
              CALL=INOUT,
              NTO.CALLOUT=CRINOUTO,
              NTO.ID=010011111111,
              NTO.SSLINE=CRINOUTL,
              ATTACH=MODEM,
              ETRATIO=30,
              LPDATS=NO,
              NTO.TRALL=YES
CVINOUTP PU  LUNTFY=1,
              NTO.EDIT=37,
              PUNTFY=1
CVOUTL  LINE AUTO=YES,
              CALL=OUT,
              NTO.ID=010022222222,
              NTO.SSLINE=CROUTL,
              ATTACH=MODEM,
              ETRATIO=30,
              NTO.TRALL=YES
CVOUTP  PU  LUNTFY=1,
              NTO.EDIT=37,
              PUNTFY=1
CV2605L LINE CALL=IN,
              NTO.ID=010033333333,
              NTO.SSLINE=CR3101L,
              ATTACH=MODEM,
              ETRATIO=30,
              NTO.TRALL=YES
CV2605P PU  LUNTFY=1,
              NTO.EDIT=37,
              PUNTFY=1

```

Virtual Definitions for the Selective FIDO Trace Line

```

HTRACEG GROUP LNCTL=SDLC,
              MAXLU=1,
              PUTYPE=1
              VIROWNER=CXNNTO,
              VIRTUAL=YES
HTRACEL LINE ISTATUS=INACTIVE,
              NTO.SSLINE=TRLINK
HTRACEP PU  NTO.SSTERM=TRLINK
HTRACE  LU  LOCADDR=0

```

Chapter 5. Defining NTO Devices to VTAM

This chapter is divided into the following major sections:

- “Coding Required VTAM Keywords” describes the VTAM keywords that you define to support NTO.
- “Coding VTAM Definition Statements Based on NTO Restrictions” shows how to examine those NTO restrictions placed on VTAM definition statements
- “Coding Optional VTAM Keywords” explains the keywords that you may choose to code in your system.
- “Defining Nonswitched NTO Resources in an NCP Major Node” and “Defining NTO Resources in the VTAM Switched Major Node” highlight the VTAM considerations needed for nonswitched and switched NTO resources.

Coding Required VTAM Keywords

When you define NTO resources to VTAM, follow the instructions in *VTAM Resource Definition Reference*. To define an IBM 3767 Communication Terminal, you may require two types of major nodes: an NCP major node and a switched major node. The NCP major node contains the definitions for nonswitched NTO resources. The switched major node contains additional definitions for switched NTO resources.

Regardless of the major node type, if VTAM is to support NTO, use the following VTAM keywords. You can code these keywords on either NCP or VTAM definition statements.

- BATCH=NO¹
- LOCADDR=0
- MAXLU=1
- MAXOUT=1¹
- PACING=(1,1)
- PASSLIM=1¹
- PUTYPE=1
- SSCPFM=USSSCS (for 2740 or 2741)|USSNTO (for TWX or WTTY)|USS3780 (for BSC 3780)
- MAXDATA.

The value specified in MAXDATA should reflect system and terminal requirements. The value required by the IBM 3767 might not be the appropriate value.

¹ This is the default value for the keyword. If you do not code this keyword, VTAM will assume the value needed for NTO support.

Coding VTAM Definition Statements Based on NTO Restrictions

When you define the switched major node in VTAM for the switched NTO devices, code the virtual PU and virtual LU as if you do not have NTO. However, NTO restricts the values specified on some keywords. This section describes those keywords.

Virtual PU Definition Statement

IDNUM=yyyyy, IDBLK=xxx

Specifies the station ID for the NTO device (ID=0100xxxxyyyyy). (See the description of the NTO.ID keyword in Chapter 4, "Defining NTO Devices to NCP.") The station ID for the NTO device is constructed from the IDBLK (xxx) and the IDNUM (yyyyy) values and must match the last eight characters on the ID specified on the NTO.ID keyword in the NCP definition statements.

If the NTO device is a TWX terminal that passes an ID sequence when the dial-in connection is made, the ID forwarded to VTAM is the ID specified on the NTO.ID keyword with the last 20 bits of IDNUM replaced by the first 20 bits of the TWX ID.

If an NTO.MTA keyword also appears, code an additional switched PU and LU definition statement pair for each terminal type listed in the NTO.MTA keyword. IDBLK and the first four digits of the IDNUM must be identical to those in the first PU specified. The last digit of the IDNUM must match a digit listed in the MTA keyword.

Note: Unlike the 3767 ID, the NTO ID may identify only an NTO line and not a station. Identification of a terminal through NTO then must be done through communication with the terminal, for example, through a logon sequence.

Virtual LU Definition Statement

TERM=2740-1|2741|TWX|WTTY|3780

Specifies the type of NTO terminal supported by the LU definition statement. These values are the only ones valid for NTO support.

Coding Optional VTAM Keywords

You can specify the following VTAM-only keywords on the virtual GROUP, virtual LINE, virtual PU, and virtual LU definition statements. For nonswitched NTO resources, code these definition statements in NCP. For switched NTO resources, code the virtual PU and virtual LU definition statements in the VTAM switched major node definition.

ISTATUS=ACTIVE|INACTIVE

Specify ISTATUS=INACTIVE on real definitions. If you want the NTO device initially active, specify the real definition with ISTATUS=INACTIVE and the virtual definition with ISTATUS=ACTIVE. ISTATUS=ACTIVE is the default.

MODETAB=logon mode table name,

USSTAB=USS definition table name

NTO uses the standard 3767 BIND parameters. Any necessary modifications to block handlers or set destination mode data must be included as user parameters on the BIND. Appendix D, "BIND Format and Validity Checking of the BIND RU," describes the user data fields on the BIND.

DLOGMOD=*default logon mode entry name*

The logon mode entry name specifies which entry in the applicable logon mode table provides session parameters for the application program. The name specified in the DLOGMOD keyword is used by default if an entry name is not otherwise provided. If you do not code this keyword and the logon mode entry name is not otherwise provided, the first entry in the applicable logon mode table is used.

FEATUR2=(*keyword,keyword . . .*),

LOGTAB=*interpret table name*

This keyword specifies the features present on the NTO terminal. You may need FEATUR2=LOWERCSE and LOGTAB=*interpret table name* (use the interpret function of USS) to support VSPC (Virtual Storage Personal Computing).

Defining Nonswitched NTO Resources in an NCP Major Node

For nonswitched NTO resources, VTAM uses the NCP generation definition to create an NCP major node for the network. The virtual GROUP, virtual LINE, virtual PU, and virtual LU definition statements specified in the NCP generation contain the VTAM-required keywords (discussed earlier in this chapter) for NTO support. After the NTO and NCP generation definition is generated and free of errors, the definition is filed in the SYS1.VTAMLST library (MVS). (Chapter 4, "Defining NTO Devices to NCP," describes the NTO requirements for NCP.)

Defining NTO Resources in the VTAM Switched Major Node

For switched NTO devices, you define a switched major node in VTAM. For every switched BSC start-stop terminal supported through NTO on a switched virtual PU definition statement, you code a virtual PU and virtual LU in a VTAM switched major node definition.

Note: For MTA devices, a virtual PU and LU set of definition statements must be defined in VTAM for each NTO device supported under the MTA configuration.

Chapter 6. Defining NTO Devices to TCAM

This chapter is divided into three major sections:

- “Understanding TCAM Operating Considerations” helps you modify TCAM to support NTO.
- “Modifying TCAM Definition Statements” lists TCAM keywords that have restrictions in NTO.
- “Understanding Message Handler Considerations” describes the TCAM message handler in supporting NTO devices.

Understanding TCAM Operating Considerations

TCAM can support non-SNA devices with either NTO or FID0 support. You could define your network so that some non-SNA devices are supported with NTO, while others are supported using TCAM FID0. You could also configure your network so that a single non-SNA device may be operated either with or without NTO, and may be switched back and forth by a sequence of operator commands. If you want to support a given device both ways, define the device and its supporting line twice, once for FID0 support and once for NTO support. However, only one definition can be active at a time. By issuing an F DEACT operator command for one of the definitions and an F ACTIV operator command for the other, the operator controls which type of non-SNA support (FID0 or NTO) will be used. TCAM maintains no correspondence between the real and virtual definitions.

When supporting NTO, first follow the instructions for defining an IBM 3767 Communication Terminal as described in *TCAM Installation*, and then modify that definition. For each virtual LINE, virtual PU, and virtual LU in the NCP generation definition, code a TERMINAL definition statement in NCP to support NTO. Also, supply a TERMINAL definition statement for the virtual LU on a switched line, which is not defined in the NCP generation definition. You do not have to supply TERMINAL definition statements for real devices, unless you use the TCAM FID0 support.

Modifying TCAM Definition Statements

Although you follow the instructions for defining an IBM 3767 Communications Terminal, some TCAM keywords have NTO restrictions. This section describes how to code those keywords.

INVLIST Definition Statement

ORDER=(entry, . . .)

Specifies the invitation-list entries for the NTO line. For NTO stations, INVLIST is used only for specifying ID sequences used in doing ID verification for switched stations. If you plan to have TCAM perform ID verification, code one entry on this keyword for each unique ID sequence used on the line. Each entry must have a station name, a + sign (to indicate an active entry), and an ID sequence. This ID sequence must match the last eight characters of the NTO.ID keyword specified in the virtual LINE definition statement, so that TCAM can correlate the ID sequence to the device.

TCAM has two methods of recognizing the device on that line. Normally, SNA-switched stations calling in to TCAM are identified by the ID sequence received on the request contact RU flowing from NCP. Similarly, NTO devices may be identified by their ID sequences, but only if those sequences are unique. Of the non-SNA devices supported through NTO, the only device that can pass a unique ID is the TWX. The last five digits of the NTO line ID are overlaid by the TWX ID. For all other devices, which do not pass a unique ID, the calling station may identify itself with header information in the message that is acted on by the ORIGIN message handler macro instruction. In either case, unique or not unique, TCAM correlates the NTO ID sequence to the NTO device.

TERMINAL Definition Statement

TERM=LINE|PUNT|LUNT

This keyword specifies the NTO device in TCAM generation.

TERM=LINE specifies the BSC start-stop line for the group.

TERM=PUNT identifies the NTO device as a remote SNA PU.

TERM=LUNT identifies the NTO device as an SNA LU that is either switched or nonswitched.

Note: All LU keywords (TERM=LUNT) must follow their PU keyword (TERM=PUNT).

RTRM=2740|2741|3335|WTTY (use with TERM=LUNT)

Specify the RTRM keyword on the TERMINAL definition statement when you use the TERM=LUNT keyword. The RTRM keyword describes the NTO device represented by this TERMINAL definition statement. For example, RTRM=2740 describes a logical unit as an IBM 2740 Communications Terminal.

UTERM=YES|NO

If you have coded UTERM=YES on the PU TERMINAL definition statement (TERM=PUNT) for FIDO (non-SNA) support, you do not have to remove it. This keyword has no effect on NTO.

Understanding Message Handler Considerations

TCAM message handlers supporting NTO devices must allow for the data stream of a real device in order to inspect or modify message data. The appearance of the NTO device to the message handler is that of an SNA 3767 logical unit in all respects except the data stream, which is that of the non-SNA (real) device. If necessary, a message handler may distinguish among real device types by using the IEDSHOW definition statement with the TSTATUS keyword. Table 11 shows the real device type returned in byte 7 of the format area:

Table 11 (Page 1 of 2). Value Returned by IEDSHOW Definition Statement

Value Returned	Real Device Type
X'40'	2740
X'20'	TWX
X'08'	WTTY

Table 11 (Page 2 of 2). Value Returned by IEDSHOW Definition Statement

Value Returned	Real Device Type
X'04'	2741
X'00'	SNA LU

For further information on the use of IEDSHOW, refer to *TCAM Installation Reference*.

Chapter 7. Defining NTO Devices to Subsystems and Application Programs

Use this chapter to identify the changes you may need to make to the IBM-supported subsystems and application programs that communicate with NTO.

Supporting Subsystems and Application Programs

Subsystems that support NTO are CICS/VS, IMS/VS, TSO, VM/VCNA, TCAM V3, and VSPC. See Chapter 6, "Defining NTO Devices to TCAM," for TCAM considerations. An application program that operates with NTO is VSCS.

Table 12 lists devices supported by the subsystems and application programs. For details of device support and restrictions, consult the subsystem books listed in the "Bibliography" on page 141.

Table 12. Subsystem and Application Program Support for NTO Devices

	TSO/VTAM	TSO/TCAM ²	VSPC	CICS/VS	VM/VCNA	IMS/VS	VSCS
IBM 2740						•	
IBM 2741 ¹	•	•	•		•	•	•
TWX ¹	•	•	•	•	•	•	•
WTTY	•	•		•			

¹ In this book, *IBM 2741* refers to any NTO device supported as an IBM 2741, and *TWX* refers to any NTO device supported as a TWX. See "Identifying NTO Device Characteristics for Resource Definition" on page 13 for a list of these devices.

² TSO/TCAM runs only with TCAM V2R4.

Using CICS/VS to Support NTO Devices

CICS/VS supports the TWX and WTTY devices through NTO. Each device appears to CICS/VS as an SDLC 3767 device. With NTO, the terminal control interface for TWX and WTTY terminals is through the SNA terminal control of CICS/VS. The supported devices seem like half-duplex flip-flop or half-duplex contention logical units to CICS/VS.

The choice of half-duplex flip-flop or half-duplex contention logical unit support is important for the use of TWX and WTTY terminals. These devices have no keyboard lock. NTO simulates a keyboard lock when there is no invite request at the terminal. With contention mode, NTO has an invite request at the terminal and keyboard lock simulation is avoided. The application program interface does not change for contention mode support, except that you need to use the DFHTC TYPE=SIGNAL definition statement to detect an inbound break request without data.

System Generation with CICS/VS

For NTO support, generate CICS/VS with SNA support by specifying VTAM=YES on the DFHSG TYPE=INITIAL definition statement. You generate a terminal control program with either:

- Half-duplex flip-flop logical unit support by specifying:
DFSHG PROGRAM=TCP,
ACCMETH=VTAM,
VTAMDEV=INTLU,...
- Half-duplex contention logical unit support by specifying:
DFHSG PROGRAM=TCP,
ACCMETH=VTAM,
VTAMDEV=3767C,...

For more information on defining generation definition statements, refer to *CICS/VS System Programmer's Reference*.

Terminal Control Table

Generate the terminal control table (TCT) with SNA support by specifying the following for each NTO device.

```
DFHTCT TYPE=INITIAL,  
ACCMETH=VTAM,...
```

```
DFHTCT TYPE=TERMINAL,  
TRMTYPE={TLX}, (for WTTYs)  
          {TWX} (for TWXs)  
SESTYPE={INTLU} (flip-flop)  
          {CONTLU} (contention)
```

Specify the following TCT keyword for an NTO device if you wish to use a BIND image other than the default BIND image provided by CICS/VS for that device.

```
LOGMODE={NAME} (for same-subarea sessions)  
         { 0} (for cross-domain sessions)
```

Note: When you specify LOGMODE=0 on the DFHTCT TYPE=TERMINAL definition statement, the BIND image set up in the NCP logmode table will be used. To define the BIND image in the NCP logmode table, specify DLOGMOD=*name* on the NCP LU definition statement.

The DFHTCT TYPE=TERMINAL definition statement also requires other keywords that apply to an SNA network. For more information about specifying other TCT options, refer to *CICS/VS System Programmer's Reference* and to *CICS/VS 3767/3770 Guide*.

User-Written Exit Routines

If user-written exit routines are required for the terminal control program (TCP), the following options on the DFHSG PROGRAM=TCP definition statement link to them:

```
ZATTACH=symbolic name (Attach exit)  
ZINPUT=symbolic address (Input exit)  
ZOUTPUT=symbolic address (Output exit)
```

In addition to these, terminal errors are handled by DFHZNAC and its corresponding user-written exit routine, DFHZNEP, as if for an SDLC 3767. Finally, SIGNAL codes received by CICS/VS are detected by DFHZNAC.

BIND Parameters and CICS/VS

The BIND parameters are similar to those existing for SDLC 3767 support, except for the user extension to the BIND. This BIND format is defined to provide support compatible with existing non-SNA support. For more information on the BIND format, refer to *CICS/VS 3767/3770 Guide*.

Using IMS/VS to Support NTO Devices

IMS/VS supports TWX and IBM 2740 and 2741 Communications Terminals through NTO. IMS/VS provides Message Format Service/secondary logical unit type-1 console support for these NTO terminals.

All terminals supported by IMS/VS must have the break feature. For a description of the break feature, refer to the FEATURE keyword of the TERMINAL definition statement in *NCP, SSP, and EP Resource Definition Reference*.

For more information on IMS/VS, refer to *IMS/VS General Information*.

Using TSO to Support NTO Devices

TSO/VTAM supports the IBM 2741 Communications Terminal, WTTY, and TWX through NTO in contention mode. TSO/VTAM also supports these same terminals on MTA lines where applicable. All terminals supported by TSO/VTAM must have the break feature.

TSO/TCAM supports the IBM 2741 Communications Terminal, WTTY, and TWX through NTO in contention mode. TSO/TCAM supports only those terminals that have the break feature.

Note: The break feature is the transmit interrupt feature on the 2741. For a description of the break feature, refer to the FEATURE keyword of the TERMINAL definition statement in *NCP, SSP, and EP Resource Definition Reference*.

You can either write new command processors based on SDLC 3767 BIND parameters and session protocols, or convert existing command processors to support NTO devices. You may need to make modifications 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.

TSO and Block Handlers

Neither TSO/VTAM nor TSO/TCAM can activate block handlers through the user extension to the BIND. For information on TSO activation of block handlers, refer to *OS2/VS2 TSO Guide to Writing a Terminal Monitor Program or a Command Processor*.

TSO Coding Requirements

For TSO/VTAM and TSO/TCAM to successfully communicate with an NTO device, specify the following keywords on the appropriate definition statements:

CODE=

Keyword on the real GROUP, real LINE, or TERMINAL definition statements in the NCP generation definition. The value you specify enables NCP to translate the line code received from the device into EBCDIC before passing it to NTO. Conversely, when NCP receives data in EBCDIC from NTO for the device, it translates the data into line code that can be understood by the device.

CHAREC= (*TWX devices*)

WTTYEOT= (*WTTY devices*)

Keywords on the real GROUP, real LINE, and TERMINAL definition statements in the NCP generation definition. These keywords specify the message-ending characters recognized by NCP when receiving data from a device. You specify these keywords so that NCP interprets the data-ending sequence as an EOT.

NTO.EDIT=

Keyword on the virtual PU definition statement in the NCP generation definition. NTO replaces an ATTENTION signal from a device (when that device is sending data to TSO) with the value you specify on this keyword.

Using VM/VCNA to Support NTO Devices

The VM/VCNA support of NTO is the same as the support for logical uni type-1 devices. VM/VCNA supports IBM 2741 and TWX devices under NTO in half-duplex, flip-flop mode. The IBM 3101 is supported only in LINE mode/CONSOLE mode. Because these devices appear to be logical unit type-1, the 3767 logmode should be used.

The support consists of identifying an NTO device at logon time and processing unique inbound and outbound data streams. VM/VCNA uses the session protocols and error recovery procedures for existing logical unit type-1 support.

All terminals supported by VM/VCNA must have the break feature. For a description of the break feature, refer to the FEATURE keyword of the TERMINAL definition statement in *NCP, SSP, and EP Resource Definition Reference*.

For more information on VM/VCNA, refer to *VM/VCNA Installation, Operation, and Terminal Use*.

Using VSCS to Support NTO Devices

VSCS is an application program in a VM operating system that is packaged with VTAM. It allows SNA network terminals to be virtual machine consoles. With VSCS, virtual machine users can use SNA networking.

VSCS supports link-attached non-SNA start-stop devices, such as the IBM 2741 and TWX. There are no special resource definition considerations. If the device is defined to VTAM, it is also defined to VSCS.

For more information on VSCS, refer to *VTAM Resource Definition Reference*.

Using VSPC to Support NTO Devices

VSPC R2 supports the IBM 2741 Communications Terminal and TWX through NTO. Refer to *VSPC Terminals* for any VSPC device dependencies. VSPC uses only flip-flop mode and supports these same terminals on MTA lines. It can support NTO devices when the real LINE or MTALST NCP definition statements are specified with the appropriate keywords:

- CODE=ASCII (TWX)
- CODE=COR2|BCD2|EBCD (2741).

Note: VSPC supports NTO through VTAM or TCAM V2R4 in MVS.

VSPC support of these NTO devices requires that you consider the following:

- 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.

All NTO lines supported by VSPC must be generated to use the interpret function of USS. The VSPC installer must generate the following for USS:

- Interpret tables must be used for terminals that connect to VSPC. You specify the tables by coding LOGTAB=*tablename* in the LU definition statement, where *tablename* is the name of the VSPC logon interpret table.
- Lowercase USS messages must be used since APL (A Programming Language) BSC start-stop terminals cannot handle uppercase messages. Specify lowercase by coding the FEATUR2=LOWERCSE keyword on the LU definition statement.
- Do not provide a USS message 0 for NTO terminals in the VSPC environment. This message prevents IBM 2741 devices that do not have reverse break capability from logging on.

For additional NTO considerations for USS, refer to *VTAM Resource Definition Reference*.

Using User-Written Application Programs to Support NTO Devices

To convert existing VTAM application programs to support the NTO devices, complete the following steps:

1. Gain an understanding of SNA concepts.
2. Convert application programs in basic mode to record mode definition statements.
3. Examine the session protocols and device characteristics for compatibility with both the application program and the NTO devices.
4. Evaluate I/O dependencies within the application program code for consistency with the new SNA environment.
5. Examine device-dependent code in the application program.

In TCAM, there are no conversion considerations for existing application programs or message handlers except for a device-dependent data stream. The application program must be examined for device-dependent code.

When developing a new application program, do the following:

1. Gain an understanding of SNA concepts, especially protocols for session establishment, communication, and termination.
2. Write the application program to meet NTO device requirements (such as device character sets).

Chapter 8. Generating NTO

This chapter supplies you with an overview of the entire NTO and NCP generation process.

Assembling and generating your NTO and NCP involves both NTO and NCP procedures. This book covers in detail only those procedures which specifically affect the NTO assembly and generation. To examine the entire NCP generation process, refer to *NCP, SSP, and EP Resource Definition Guide* and to *NCP, SSP, and EP Generation and Loading*.

Outlining NTO Generation with NDF

To help you understand the NTO and NCP generation process, use the the flowchart shown in Figure 6 on page 64. The flowchart shows the following:

1. NDF and NTO process NCP generation statements with NTO keywords. This produces an NDF listing and link-edit input.
2. The NDF output is link-edited to NCP and NTO object modules.
3. The NCP load module is generated.

Assembling the NTO and NCP Generation Statements

The NCP generation statements with NTO definitions and keywords must be assembled to produce the NTO and NCP generation definition. You assemble the statements using JCL or an EXEC depending on the operating system you work under. Refer to *NCP, SSP, and EP Generation and Loading Guide* for detailed directions.

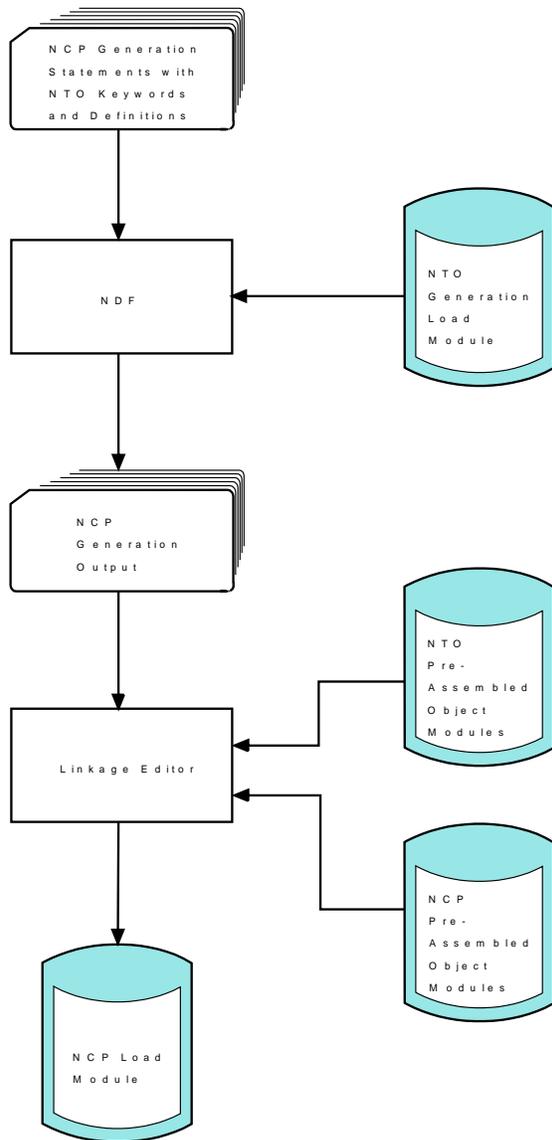


Figure 6. Overview of Generation with the NCP Definition Facility (NDF)

Appendix A. Resource Definition Example with NTO

This appendix provides a sample definition that contains NTO in a combined NTO and NCP generation definition. Use it as a guide in developing your own installation procedures. Do not copy it word for word or use it in its current form. For more information on coding generation definitions, refer to *NCP, SSP, and EP Resource Definition Guide*; to *NCP, SSP, and EP Resource Definition Reference*; to *NCP, SSP, and EP Generation and Loading Guide*; and to *VTAM Resource Definition Reference*.

Configuration of Network A

This example illustrates a network with NTO R11 installed in an IBM 3745 Communication Controller. The sample network uses a group of NTO devices on nonswitched lines. This network includes:

- A host processor
- A host access method (VTAM V4R4)
- An IBM 3745 Communication Controller with NCP V7R7 and NTO R11
- Nonswitched devices:
 - IBM 2740 Communications Terminal (A79NTO02 and A79NTO04)
 - IBM 3780 Communications Terminal (A79NTO03)
 - IBM 3101 in TWX-compatible mode (A79NTO00)

Figure 7 on page 66 shows the sample network configuration. The NTO devices present can communicate with the access method through NCP.

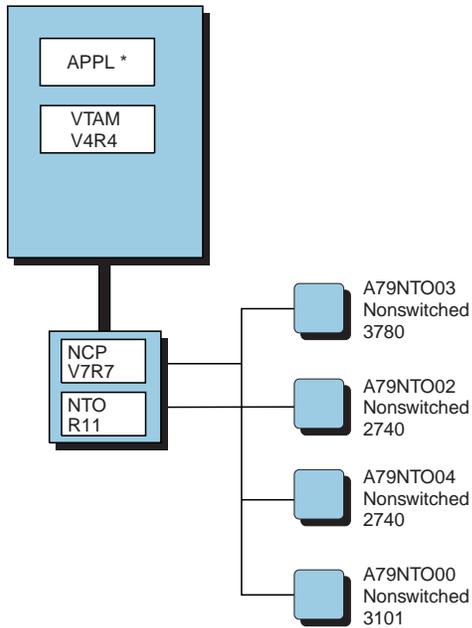
NTO and NCP Generation Definition for Network A

The sample NTO and NCP generation definition includes NTO definitions and keywords and the real and virtual statements used to define NTO resources. It also includes the NCP generation definition required to define NCP to the network. These are not related to NTO, but are included in this sample to show a complete generation definition.

Note: Use the example as a guide to developing your own NCP generation definition. Do not code directly from this example; your configuration will be different. For more information on coding NCP generation definitions refer to *NCP, SSP, and EP Resource Definition Guide*; to *NCP, SSP, and EP Generation and Loading Guide*; and to *NCP, SSP, and EP Resource Definition Reference*.

Definition of NTO in Network A

The NTO definition process supports BSC and start-stop terminals in the sample network. The NTO definition statements and keywords are described in Chapter 4, "Defining NTO Devices to NCP."



* APPL could be any IBM subsystem or a user-written application program.

Note: The symbolic names associated with each device in this figure correspond to the names assigned to the device on the real LINE definition statement in the sample NTO/NCP definitions.

Figure 7. Sample NTO Network

```

*****
*                               OPTIONS STATEMENT
*****
*
*                               OPTIONS NEWDEFN=(YES,PACK),USERGEN=(CXNNT0)
*
*****
*                               PCCU STATEMENT
*****
*
APCCU81  PCCU  AUTOSYN=YES,BACKUP=YES,CDUMPDS=CSPDUMP,CONFGDS=CRNCKPT, *
          DUMPDS=SYS009,GWCTL=SHR,MAXDATA=8192,MDUMPDS=MOSSDUMP, *
          NCPLUB=SYS005,OWNER=A81N,SUBAREA=81
*
*****
*                               BUILD STATEMENT
*****
*
NT03745  BUILD  ADSESS=400, *
          AUXADDR=500, *
          BRANCH=8000, *
          BACKUP=500, *
          BFRS=128, *
          CATRACE=(YES,255), *

```

```

CNLSQMAX=10000,
CNLSQTIM=100,
CSMSG=C3D9C9E340E2C9E340D4C5E2E2C1C7C540C6D6D940E2E24040*
40C2C340E3C5D9D4C9D5C1D3,
CWall=26,
DYNPOOL=(79,78),
ENBLTO=30.0,
ERLIMIT=16,
IPSNAP=(ROUTE,DATAGRAM),
IPRATE=(25,30),
IPPOOL=NCP,
LOADLIB=NCPLOAD,
LTRACE=8,
MAXSSCP=8,
MAXSUBA=100,
MODEL=3745,
NAMTAB=120,
NCPTRACE=ON,
NEWNAME=NT03725,
NETID=NETA,
NPA=(YES,DR),
NTUNECOL=YES,
NUMHSAS=16,
OLT=YES,
PWROFF=YES,
SALIMIT=511,
SESSACC=(YES,ALL,,512,64,,10,11,12,13,14,15),
SLOWDOWN=12,
SUBAREA=79,
TRACE=(YES,100),
TRANSFR=205,
TYPGEN=NCP,
USGTIER=5,
VERSION=V7R7F,
VRPOOL=30,
VSUBNETS=YES,
VTAMTOPO=IGNORE
*
*****
*
VTAM SYSTEM CONTROLS STATEMENT
*****
*
SYSCNTRL OPTIONS=(BACKUP,BHSASSC,ENDCALL,LNSTAT,MODE,NAKLIM,
RCNTRL,RCOND,RECMD,RIMM,SESINIT,SESSION,SSPAUSE,STORDSP,
XMTLMT)
*
*****
*
NTO NCPNAU STATEMENT
*****
*
NTONNAU NCPNAU NOTIFY=1,
NTO.TRACEML=YES,
NTO.TRCTABL=2500,
NAUCB=NTOSSCP,
NAUFVT=CXNFVTN,
TYPE=SSCP,
VIROWNER=CXNNTO
*

```

```

*****
*                               HOST STATEMENT
*****
*
HOSTA81  HOST MAXBFRU=100,UNITSZ=256,SUBAREA=81,BFRPAD=0
*
*****
*                               PATH STATEMENTS
*****
*
      PATH  DESTSA=78,
            ER0=(78,1),ER1=(78,1),ER2=(78,1),ER3=(78,1),
            ER4=(78,1),ER5=(78,1),ER6=(78,1),ER7=(78,1),
            VR0=0,VR1=1,VR2=2,VR3=3,
            VR4=4,VR5=5,VR6=6,VR7=7,
            VRPWS00=(15,45),VRPWS01=(15,45),VRPWS02=(15,45),
            VRPWS10=(15,45),VRPWS11=(15,45),VRPWS12=(15,45),
            VRPWS20=(15,45),VRPWS21=(15,45),VRPWS22=(15,45),
            VRPWS30=(15,45),VRPWS31=(15,45),VRPWS32=(15,45),
            VRPWS40=(15,45),VRPWS41=(15,45),VRPWS42=(15,45),
            VRPWS50=(15,45),VRPWS51=(15,45),VRPWS52=(15,45),
            VRPWS60=(15,45),VRPWS61=(15,45),VRPWS62=(15,45),
            VRPWS70=(15,45),VRPWS71=(15,45),VRPWS72=(15,45)
*
*
      PATH  DESTSA=81,
            ER0=(81,1),ER1=(81,1),ER2=(81,1),ER3=(81,1),
            ER4=(81,1),ER5=(81,1),ER6=(80,1),ER7=(81,1),
            VR0=0,VR1=1,VR2=2,VR3=3,
            VR4=4,VR5=5,VR6=6,VR7=7,
            VRPWS00=(15,45),VRPWS01=(15,45),VRPWS02=(15,45),
            VRPWS10=(15,45),VRPWS11=(15,45),VRPWS12=(15,45),
            VRPWS20=(15,45),VRPWS21=(15,45),VRPWS22=(15,45),
            VRPWS30=(15,45),VRPWS31=(15,45),VRPWS32=(15,45),
            VRPWS40=(15,45),VRPWS41=(15,45),VRPWS42=(15,45),
            VRPWS50=(15,45),VRPWS51=(15,45),VRPWS52=(15,45),
            VRPWS60=(15,45),VRPWS61=(15,45),VRPWS62=(15,45),
            VRPWS70=(15,45),VRPWS71=(15,45),VRPWS72=(15,45)
*
*
*****
*                               DYNAMIC POOLS
*****
*
      PUDRPOOL  NUMBER=2000
      LUDRPOOL  NUMTYP1=250,NUMTYP2=1500,NUMILU=1500
*
*****
*                               SDLCST STATEMENTS SUBAREA LINKS
*****
*
A79PRI   SDLCST  MODE=PRI,GROUP=S79PRI
A79SEC   SDLCST  MODE=SEC,GROUP=S79SEC
*
*****
*                               NTO REAL NONSWITCHED 3101
*****
*
NTOGO    GROUP  ATTN=ENABLED,
          CHAREC=(XONOFF,8D),

```

```

CODE=ASCII,
DIAL=NO,
LNCTL=SS,
REPLYTO=23.5,
TEXTTO=23.5,
TYPE=NCP
*
A79NT000 LINE ADDRESS=000,
CLOCKNG=EXT,
DUPLEX=FULL,
ISTATUS=INACTIVE,
MONITOR=YES,
RETRIES=(3,1,2),
SPEED=1200,
USE=NCP
*
ORA71000 TERMINAL BHSET=HEDIT16,
CRDLAY=YES,
CTERM=NO,
FEATURE=(BREAK,ATTN),
TERM=TWX
*
*****
* NTO REAL NONSWITCHED 2740
*****
*
NTOG2 GROUP DIAL=NO,
LNCTL=SS,
TYPE=NCP
*
A79NT002 LINE ADDRESS=002, CODE=EBCD,
CLOCKNG=EXT,
DUPLEX=FULL,
ISTATUS=INACTIVE,
MONITOR=YES,
RETRIES=(3,1,2),
SPEED=1200,
USE=NCP
*
ORA71002 TERMINAL BHSET=HEDIT16,
CTERM=NO,
TERM=2740-1
*
A79NT004 LINE ADDRESS=004, CODE=EBCD,
CLOCKNG=EXT,
DUPLEX=FULL,
ISTATUS=INACTIVE,
MONITOR=YES,
RETRIES=(3,1,2),
SPEED=1200,
USE=NCP
*
ORA71004 TERMINAL BHSET=HEDIT16,
CTERM=NO,
TERM=2740-1
*
*****
* NTO REAL NONSWITCHED 3780

```

```

*****
*
NTOG3   GROUP LNCTL=BSC,
        TYPE=NCP,
        WACKCNT=25
*
A79NT003 LINE ADDRESS=003,
          CODE=EBCDIC,
          DUPLEX=HALF,
          ISTATUS=INACTIVE,
          POLLED=NO,
          SPEED=4800,
          YIELD=YES
*
A79TE03  TERMINAL DIRECTN=INOUT,
        TERM=3780
*
*****
*
NTO VIRTUAL NONSWITCHED 3101
*****
*
NTOVG0   GROUP DIAL=NO,
              ISTATUS=INACTIVE,
              LNCTL=SDLC,
              MAXLU=1,
              TYPE=NCP,
              USSTAB=HELLO,
              VIROWNER=CXNNT0,
              VIRTUAL=YES
*
A79N00   LINE LINECB=CXNL1,
              LINEFVT=CXNFVTV,
              NTO.SSLINE=A79NT000
*
A79P00   PU LUCB=(CXNU1,CXNU1,CXNU1),
           LUFVT=(CXNFVTL,CXNFVT1,CXNFVT2),
           NTO.SSTERM=ORA71000,
           PUCB=CXNP1,
           PUFVT=CXNFVTP,
           PUTYPE=1
*
A79T00   LU DLOGMOD=TWXFLIP,LOCADDR=0,MODETAB=DEVTWX,
        TERM=TWX
*
*****
*
NTO VIRTUAL NONSWITCHED 2740
*****
*
NTOVG2   GROUP DIAL=NO,
              ISTATUS=INACTIVE,
              LNCTL=SDLC,
              MAXLU=1,
              TYPE=NCP,
              USSTAB=HELLO,
              VIROWNER=CXNNT0,
              VIRTUAL=YES
*
A79N02   LINE LINECB=CXNL1,

```

```

LINEFVT=CXNFVTV,
NTO.SSLINE=A79NT002
*
A79P02  PU  LUCB=(CXNU1,CXNU1,CXNU1),
          LUFVT=(CXNFVTL,CXNFVT1,CXNFVT2),
          NTO.SSTERM=ORA71002,
          PUCB=CXNP1,
          PUFVT=CXNFVTP,
          PUTYPE=1
*
A79T02  LU  DLOGMOD=LOG2740,LOCADDR=0,MODETAB=MANETAB,
          TERM=2740-1
*
A79N04  LINE LINECB=CXNL1,
          LINEFVT=CXNFVTV,
          NTO.SSLINE=A79NT004
*
A79P04  PU  LUCB=(CXNU1,CXNU1,CXNU1),
          LUFVT=(CXNFVTL,CXNFVT1,CXNFVT2),
          NTO.SSTERM=ORA71004,
          PUCB=CXNP1,
          PUFVT=CXNFVTP,
          PUTYPE=1
*
A79T04  LU  DLOGMOD=LOG2740,LOCADDR=0,MODETAB=MANETAB,
          TERM=2740-2
*
*****
*           NTO VIRTUAL NONSWITCHED 3780
*****
*
NTOVG3  GROUP DIAL=NO,
          LNCTL=SDLC,
          MAXLU=1,
          MODETAB=NTOLGMOD,DLOGMOD=PRF3780,
          PUTYPE=1,
          TYPE=NCP,
          USSTAB=HELLO,
          VIROWNER=CXNNT0,
          VIRTUAL=YES,
          VPACING=0
*
A79N03  LINE ISTATUS=INACTIVE,
          LINECB=CXNL1,
          LINEFVT=CXNFVTV,
          NTO.SSLINE=A79NT003
*
A79P03  PU  LUCB=(CXNU1,CXNU1,CXNU1),
          LUFVT=(CXNFVTL,CXNFVT1,CXNFVT2),
          MAXLU=1,
          NTO.SSTERM=A79TE03,
          PUCB=CXNP1,
          PUFVT=CXNFVTP,
          SSCPFM=USS3780
*
A79T03  LU  LOCADDR=0,
          TERM=3780
*

```

```

*****
*                               NTO VIRTUAL FID0 TRACE
*****
*
NTOTRCG  GROUP LNCTL=SDLC,
          MAXLU=1,
          PUTYPE=1,
          VIROWNER=CXNNT0,
          VIRTUAL=YES
*
NTOTRCL  LINE  ISTATUS=INACTIVE,
          NTO.SSLINE=TRLINK
*
NTOTRCP  PU    NTO.SSTERM=TRLINK
NTOTRCLU LU    LOCADDR=0
*
*****
*                               GROUP STATEMENTS PRIMARY/SECONDARY SDLCST
*****
*
S79PRI   GROUP ACTIVTO=420,
          DIAL=NO,
          LNCTL=SDLC,
          MODE=PRI,
          REPLYTO=3
S79SEC   GROUP ACTIVTO=420,
          DIAL=NO,
          LNCTL=SDLC,
          MODE=SEC
*
*****
*                               NPM DEFINITIONS
*****
*
A79XNPAX GROUP LNCTL=SDLC,NPARSC=YES,VIRTUAL=YES
A79NPAL  LINE
A79NPPU  PU
A79NPA1  LU
A79NPA2  LU
A79NPA3  LU
A79NPA4  LU
A79NPA5  LU
*
*****
*                               SDLC SUBAREA NONSWITCHED
*****
*
A79TSS1  GROUP ACTIVTO=60.0,
          ISTATUS=INACTIVE,
          DIAL=NO,
          LNCTL=SDLC,
          MODULO=128,
          PAUSE=(5,5),
          REPLYTO=10,
          TYPE=NCP
*
A79L16   LINE  ADDRESS=(0016,FULL),
          CLOCKNG=EXT,

```

```

DUPLEX=FULL,
ETRATIO=30,
MAXDATA=521,
MAXPU=1,
MODULO=128,
NRZI=YES,
RETRIES=(9,10,10),
SERVLIM=254,
SDLCST=(A79PRI,A79SEC),
SPEED=56000
*
A79P16  PU  ANS=CONT,
PASSLIM=40,
PUTYPE=4,
SRT=(10000,50),
TGN=1
*
A79L20  LINE ADDRESS=(0020,FULL),
CLOCKNG=EXT,
DUPLEX=FULL,
ETRATIO=30,
MAXDATA=521,
MAXPU=1,
MODULO=128,
NRZI=YES,
RETRIES=(9,10,10),
SERVLIM=254,
SDLCST=(A79PRI,A79SEC),
SPEED=56000
*
A79P20  PU  ANS=CONT,
PASSLIM=40,
PUTYPE=4,
SRT=(10000,50),
TGN=2
*
*****
*          NTRI PHYSICAL
*****
*
A79PGRP1 GROUP ECLTYPE=(PHY,ANY),
ADAPTER=TIC2,
ANS=CONTINUE,
USSTAB=AUSSTAB,
ISTATUS=ACTIVE,
RETRIES=(20,5,5),
XID=NO
*
A79TR88  LINE ADDRESS=(1088,FULL),INTFACE=(TR88,1500),
TRSPEED=16,
TITIMER=100,
DYNWIND=(8,,),
LOCADD=400000791088,
PORTADD=88,
UACB=(X$P2AX,X$P2AR)
*
A79PU88A PU  XMONLNK=YES
A79PU88B PU  PUTYPE=1,NETWORK=IP,ARPTAB=(100,10,NOTCANON)

```

```

*
*****
*
*           NTRI LOGICAL PERIPHERAL
*
*****
*
A79BNNG1 GROUP ECLTYPE=LOGICAL,
                ANS=CONTINUE,
                AUTOGEN=250,
                CALL=INOUT,
                MODETAB=AMODETAB,
                ISTATUS=ACTIVE,
                PHYPORT=NONE,
                USSTAB=AUSSTAB,
                RETRIES=(10,10,10,20),
                XMITDLY=NONE
*
*****
*
*           NTRI LOGICAL SUBAREA
*
*****
*
A79INNG1 GROUP ECLTYPE=(LOGICAL,SUBAREA),
                ANS=CONTINUE,
                MODETAB=AMODETAB,
                ISTATUS=ACTIVE,
                T2TIMER=(1.5,2.0,30),
                LOCALTO=13.5,
                REMOTTO=18.2,
                PHYPORT=88,
                MLTGPRI=200,
                SDLCST=(A79PRI,A79SEC),
                USSTAB=AUSSTAB
*
A79LG1A LINE TGN=1
A79PG1A PU  ADDR=04400000122208,TGCONF=MULTI
A79LG2A LINE TGN=1
A79PG2A PU  ADDR=04400000132176,TGCONF=MULTI
A79LG3A LINE TGN=1
A79PG3A PU  ADDR=04400000801092,TGCONF=MULTI
A79LG4A LINE TGN=1
A79PG4A PU  ADDR=04400000831088,TGCONF=MULTI
A79LG5A LINE TGN=1
A79PG5A PU  ADDR=04400000841092,TGCONF=MULTI
*
*****
*
*           FRAME RELAY PHYSICAL
*
*****
*
A79PGBZ GROUP FRELAY=PHYSICAL,ISTATUS=ACTIVE,SPEED=9600
A79F2242 LINE ADDRESS=(2242,FULL),PORTADD=42,CIR=YES,CLLM=YES
A79LMI42 PU  LMI=CCITT
A79PU42B PU  DLCI=18
*
*****
*
*           FRAME RELAY PHYSICAL
*
*****
*
A79PGBY GROUP FRELAY=PHYSICAL,ISTATUS=ACTIVE,SPEED=9600
A79F2244 LINE ADDRESS=(2244,FULL),PORTADD=44

```

```

A79LMI44 PU    LMI=CCITT
A79PU44B PU    DLCI=20
*
*****
*
*                FRAME RELAY PHYSICAL
*
*****
*
A79PGBW GROUP FRELAY=PHYSICAL, ISTATUS=ACTIVE, SPEED=56000
A79F2280 LINE ADDRESS=(2280, FULL), PORTADD=80, CIR=(YES, 7, 18), *
                CLLM=(YES, 8)
DLCIXX  DLCI  ID=DEFAULT, CIR=(1, 1, 2)
DLCI80A  DLCI  ID=(10, H), CIR=(6, 6, 1)
DLCI80B  DLCI  ID=(11, H), CIR=(3, ., 1)
DLCI80C  DLCI  ID=(20, D), CIR=(2, 2, .5)
A79LMI80 PU    LMI=ANSI
*
*****
*
*                FRAME RELAY LOGICAL SUBAREA
*
*****
*
A79LGBW GROUP FRELAY=LOGICAL, LOCALTO=20, ISTATUS=ACTIVE, MAXOUT=11, *
                SDLCST=(A79PRI, A79SEC), MODULO=128, PHYSRSC=A79LMI80
A79FT80D LINE  ISTATUS=ACTIVE
A79FP80D PU    PUTYPE=4, TGN=1, ADDR=14, PIUCHECK=YES
*
*****
*
*                FRAME RELAY LOGICAL PERIPHERAL
*
*****
*
A79FRBGW GROUP FRELAY=(LOGICAL, PER), *
                ANS=CONTINUE, *
                AUTOGEN=15, *
                CALL=INOUT, *
                DYNPU=YES, *
                DYNPUFX=DF, *
                ISTATUS=ACTIVE, *
                LOCALTO=6, *
                MODETAB=AMODETAB, *
                PHYSRSC=A79LMI80, *
                USSTAB=AMODETAB, *
                XID=YES
*
*****
*
*                FRAME RELAY SUBPORT SET
*
*****
*
DLCI14  FRSESET SUBPORTS=(A79PU42B, A79PU44B)
*
*****
*
*                ISDN PHYSICAL
*
*****
*
A79ISDPG GROUP ISDN=PHYSICAL, MAXDLCI=250, *
                ISTATUS=ACTIVE, *
                LMI=CCITT, *
                MAXFRAME=2048, *
                NPACOLL=NO, *

```

```

DIAL=NO,ISDNDSCT=NO
*
A79I2368 LINE ADDRESS=(2368,FULL),OWNER=A81N,
CLOCKNG=EXT,
ISDNLPN=8037373731303030,
ISDNLSA=8000,
PORTADD=68,
NRZI=NO,
SPEED=2048000
*
A79P2368 PU ANS=CONTINUE
*
*****
* ISDN B CHANNEL
*****
*
A79ICHN1 GROUP ISDN=(LOGICAL,B),
PHYSRSC=A79P2368,
NPACOLL=NO,
DIAL=YES
*
A79I2369 LINE ADDRESS=(2369,FULL),
CALL=IN,
ID=07902369
A79P2369 PU ANS=CONTINUE
*
A79I2370 LINE ADDRESS=(2370,FULL),
CALL=IN,
ID=07902370
A79P2370 PU ANS=CONTINUE
*
A79I2371 LINE ADDRESS=(2371,FULL),
CALL=IN,
ID=07902371
A79P2371 PU ANS=CONTINUE
*
A79I2372 LINE ADDRESS=(2372,FULL),
CALL=IN,
ID=07902372
A79P2372 PU ANS=CONTINUE
*
A79I2373 LINE ADDRESS=(2373,FULL),
CALL=IN,
ID=07902373
A79P2373 PU ANS=CONTINUE
*
A79I2374 LINE ADDRESS=(2374,FULL),
CALL=IN,
ID=07902374
A79P2374 PU ANS=CONTINUE
*
A79I2375 LINE ADDRESS=(2375,FULL),
CALL=IN,
ID=07902375
A79P2375 PU ANS=CONTINUE
*
A79I2376 LINE ADDRESS=(2376,FULL),
CALL=IN,

```

```

ID=07902376
A79P2376 PU ANS=CONTINUE
*
A79I2377 LINE ADDRESS=(2377,FULL), *
CALL=IN, *
ID=07902377
A79P2377 PU ANS=CONTINUE
*
A79I2378 LINE ADDRESS=(2378,FULL), *
CALL=IN, *
ID=07902378
A79P2378 PU ANS=CONTINUE
*
A79I2379 LINE ADDRESS=(2379,FULL), *
CALL=IN, *
ID=07902379
A79P2379 PU ANS=CONTINUE
*
A79I2380 LINE ADDRESS=(2380,FULL), *
CALL=IN, *
ID=07902380
A79P2380 PU ANS=CONTINUE
*
A79I2381 LINE ADDRESS=(2381,FULL), *
CALL=IN, *
ID=07902381
A79P2381 PU ANS=CONTINUE
*
A79I2382 LINE ADDRESS=(2382,FULL), *
CALL=IN, *
ID=07902382
A79P2382 PU ANS=CONTINUE
*
A79I2383 LINE ADDRESS=(2383,FULL), *
CALL=IN, *
ID=07902383
A79P2383 PU ANS=CONTINUE
*
A79I2384 LINE ADDRESS=(2384,FULL), *
CALL=IN, *
ID=07902384
A79P2384 PU ANS=CONTINUE
*
A79I2385 LINE ADDRESS=(2385,FULL), *
CALL=IN, *
ID=07902385
A79P2385 PU ANS=CONTINUE
*
A79I2386 LINE ADDRESS=(2386,FULL), *
CALL=IN, *
ID=07902386
A79P2386 PU ANS=CONTINUE
*
A79I2387 LINE ADDRESS=(2387,FULL), *
CALL=IN, *
ID=07902387
A79P2387 PU ANS=CONTINUE

```

```

*
A79I2388 LINE ADDRESS=(2388,FULL),
CALL=IN,
ID=07902388
A79P2388 PU ANS=CONTINUE
*
A79I2389 LINE ADDRESS=(2389,FULL),
CALL=IN,
ID=07902389
A79P2389 PU ANS=CONTINUE
*
A79I2390 LINE ADDRESS=(2390,FULL),
CALL=IN,
ID=07902390
A79P2390 PU ANS=CONTINUE
*
A79I2391 LINE ADDRESS=(2391,FULL),
CALL=IN,
ID=07902391
A79P2391 PU ANS=CONTINUE
*
A79I2392 LINE ADDRESS=(2392,FULL),
CALL=IN,
ID=07902392
A79P2392 PU ANS=CONTINUE
*
A79I2393 LINE ADDRESS=(2393,FULL),
CALL=IN,
ID=07902393
A79P2393 PU ANS=CONTINUE
*
A79I2394 LINE ADDRESS=(2394,FULL),
CALL=IN,
ID=07902394
A79P2394 PU ANS=CONTINUE
*
A79I2395 LINE ADDRESS=(2395,FULL),
CALL=IN,
ID=07902395
A79P2395 PU ANS=CONTINUE
*
A79I2396 LINE ADDRESS=(2396,FULL),
CALL=IN,
ID=07902396
A79P2396 PU ANS=CONTINUE
*
A79I2397 LINE ADDRESS=(2397,FULL),
CALL=IN,
ID=07902397
A79P2397 PU ANS=CONTINUE
*
A79I2398 LINE ADDRESS=(2398,FULL),
CALL=IN,
ID=07902398
A79P2398 PU ANS=CONTINUE
*
*****
*
ISDN LOGICAL PERIPHERAL

```

```

*****
*
A79ISBG1 GROUP ISDN=(LOGICAL,PER),OWNER=A81N,
                PHYSRSC=NONE,
                NPACOLL=NO,
                RETRIES=(10,10,10),
                T1TIMER=20,
                PUTYPE=2,
                CALL=INOUT,
                DIAL=YES
*
A79IBL01 LINE ADDRESS=NONE,AUTOCOPY=(98,A79IBL02,D)
A79IBP01 PU   PUTYPE=2,NEXT=(A79IBP02)
                ENDAUTO
*
*****
*
                ISDN LOGICAL SUBAREA
*****
*
A79ISIG1 GROUP ISDN=(LOGICAL,SUB),OWNER=A81N,
                PHYSRSC=NONE,
                RETRIES=(10,10,10),
                T1TIMER=20,
                PUTYPE=4,
                NPACOLL=NO,
                SDLCST=(A79PRI,A79SEC),
                CALL=INOUT,
                DIAL=YES
*
A79IIL01 LINE ADDRESS=NONE,AUTOCOPY=(98,A79IIL02,D)
A79IIP01 PU   PUTYPE=4,NEXT=(A79IIP02)
                ENDAUTO
*
*****
*
                ESCON CHANNEL PHYSICAL
*****
*
A79PSOC GROUP LNCTL=CA,
                MONLINK=NO,
                SPEED=144000000,
                NPACOLL=YES,
                SRT=(32768,32768),
                XMONLNK=YES
*
A79S2176 LINE ADDRESS=2176
A79P2176 PU ANS=CONTINUE,PUTYPE=1
*
*****
*
                ESCON CHANNEL LOGICAL
*****
*
A79LSOC GROUP LNCTL=CA,PHYSRSC=A79P2176,NPACOLL=YES,
                DELAY=0.2,MAXPU=16,MODETAB=AMODETAB,DLOGMOD=INTERACT,
                SPEED=144000000,SRT=(21000,20000),PUDR=YES,
                TIMEOUT=150.0,TRANSFR=18,CASDL=0.0
*
A79LSOC2 LINE ADDRESS=NONE,
                HOSTLINK=2,

```

```

MONLINK=CONT
*
A79L2S1 PU ADDR=01,ANS=CONTINUE,PUDR=NO,PUTYPE=5,TGN=1
*
A79L2S3 PU ADDR=03,ANS=CONT,PUDR=NO,PUTYPE=2,CONNTYPE=APPN,CPCP=YES
*
A79L2S4 PU ADDR=04,PUTYPE=1,P2PDEST=17.45.79.1,PROTOCOL=RIP, *
LADDR=17.45.79.2,ARPTAB=(10,,NOTCANON), *
METRIC=1,SNETMASK=255.255.255.0
*
*****
* CHANNEL ADAPTERS
*****
*
A79CAG1 GROUP LNCTL=CA,CA=TYPE7,NCPCA=ACTIVE,MONLINK=CONT, *
TIMEOUT=60.0,ISTATUS=ACTIVE
*
A79CA1 LINE ADDRESS=P1,CASDL=420,DELAY=0.0
*
A79CP1 PU PUTYPE=5,TGN=1
*
A79CA3 LINE ADDRESS=P3,CASDL=420,DELAY=0.0,MONLINK=NO
*
A79CP3 PU PUTYPE=2,CONNTYPE=APPN,CPCP=YES
*
*****
* IP OVER TOKEN RING
*****
*
IPLOCAL LADDR=17.45.11.3,INTFACE=TR88,METRIC=1, *
SNETMASK=255.255.255.0
*****
* EXPLICIT IP ROUTE
*****
*
IPROUTE DESTADDR=0.0.0.0,DISP=PERM,HOSTRT=NO, *
INTFACE=TR88,METRIC=2,NEXTADDR=17.45.11.7
*
*****
* NTO BLOCK HANDLERS
*****
*
BH01PT1 STARTBH BHEXEC=PT1
DATETIME DATE=YES,DATEFMT=YY.DDD,INSERT=ALL,TIME=YES
ENDBH
*
BH01PT3 STARTBH BHEXEC=PT3
EDIT
DATETIME DATE=YES,DATEFMT=YY.DDD,INSERT=ALL,TIME=YES
ENDBH
*
BH03PT2 STARTBH BHEXEC=PT2
EDIT BKSP=5B
DATETIME DATE=YES,DATEFMT=YY/MM/DD,INSERT=ALL,PT2EXEC=AFTER, *
TIME=YES
ENDBH
*
HBH001 STARTBH BHEXEC=PT2

```

```

REMOVCTL
ENDBH
*
HBH002  STARTBH BHEXEC=PT2
        DATETIME DATE=YES,DATEFMT=MM/DD/YY,INSERT=FIRST
        ENDBH
*
HHEDIT16 STARTBH BHEXEC=PT3
        EDIT BKSP=16
        ENDBH
*
HHEDIT50 STARTBH BHEXEC=PT3
        EDIT BKSP=50
        ENDBH
*
SET004  BHSET EXEC=YES,PT1=BH01PT1,PT2=BH03PT2,PT3=BH01PT3
SET007  BHSET EXEC=YES,PT1=BH01PT1,PT3=BH01PT3
HBHSET1 BHSET EXEC=YES,PT2=HBH001
HEDIT2  BHSET PT3=HBH002
HEDIT16 BHSET PT3=HHEDIT16
HEDIT50 BHSET PT3=HHEDIT50
*
*****
*                GENEND STATEMENT
*****
*
GENEND  GENEND INIT=(CXNNINI,ECLINIT),
        TMRTICK=ECLTICK
END

```

Appendix B. Migrating to a Combined NTO and NCP Generation Definition

This appendix is divided into these main sections:

- “Understanding Migration” describes what changes must be made to use the NDF standard attachment facility for generation.
- “Migrating Your NTO Definition Statements” allows you to adapt your NTO generation definition.
- “Changing the NCP Definition Statements” allows you to modify your NCP generation definition.
- “Checking the NCP Generation Definition” allows you to verify completion of migration tasks.
- “Migration Example (NTO R3 to NTO R4)” provides a sample network that contains a previous NTO release migrated to the combined NTO and NCP generation definition.

Understanding Migration

NTO operates under NCP and provides a one-to-one mapping of NTO devices and lines to their SNA network definitions. These definitions are specified by coding real and virtual device definitions in NCP generation definition statements and in the access method definition statements.

Prior to NTO R4, NTO and NCP each had a unique set of generation definitions. Real and virtual devices were coded in the NCP generation definition, while NTO devices were defined in the NTO generation definition. For example, prior to R4, a second mapping was required to describe the BSC/SS devices to NTO. This NTO generation definition consisted of the NTO macro instructions: NETOBLD, NETOLINE, NETOPU, and NETOEND. The values assigned in the NTO and NCP mappings were correlated and run as separate NTO and NCP generation procedures.

NTO R4 and later releases need only one generation definition and procedure since each utilizes the standard attachment facility of NDF. This affects NTO releases prior to R4 and NCP generation definitions in the following ways:

- The unique set of NTO macro instructions is no longer needed. Most of the information from these macro instructions already exists on NCP definition statements and keywords. What NTO information cannot be found there is added as new keywords.
- Keywords linking NCP and NTO generation definitions are no longer required since NTO R4 and later releases need only one set of definition statements.
- A definition statement and keyword is added to the NCP generation definition for NDF support.

This combined NTO and NCP generation does everything the previous generation method did—describes network device characteristics, creates control blocks, and generates error messages—and also performs additional error checking to make NTO easier to install.

If you have a pre-R4 NTO and decide to use a later release of NTO, migrate your current generation definitions. NTO and NCP system generation also affects the resource definition and generation procedures.

The following sections explain how to make changes to NTO releases prior to R4 and to NCP generation definitions in order to generate NTO R4 or later releases.

Migrating Your NTO Definition Statements

Before R4, the following definition statements were used to define devices to NTO:

- NETOBLD
- NETOLINE
- NETOPU
- NETOEND.

When coded and assembled, these four definition statements produced output used to create NTO control blocks. With the standard attachment facility of NDF, NTO no longer needs a unique set of definition statements to create this output. All the information carried by the definition statements is:

- Coded on existing NCP definition statements using new NTO keywords
- Found on existing NCP definition statements
- Passed internally to NDF.

The prefix, **NTO.**, precedes any NTO keyword that contains information that cannot be found anywhere else in the NCP generation definition.

Table 13 lists the NTO definition statements and their keywords, what you need to do with each keyword, and where the information each contains is processed with NDF. Each of the keywords with the **NTO.** prefix is coded and handled as in earlier releases. See Chapter 4, “Defining NTO Devices to NCP,” for specific coding considerations.

Table 13. Migrating NTO Definition Statements

NTO Definition Statement	Migrated to	Information from
NETOBLD NAME NAUCB TRACEML TRCTABL	NCPNAU	Symbol on NCPNAU Value created internally by NTO Value of NTO.TRACEML Value of NTO.TRCTABL
NETOLINE NAME LINECB SSLINE ID MTA TRALL	Virtual LINE	Symbol on virtual LINE Value created internally by NTO Value of NTO.SSLINE Value of NTO.ID Value of NTO.MTA Value of NTO.TRALL
NETOPU PUCB LUCB SSTERM EDIT	Virtual PU	Value created internally by NTO Value created internally by NTO Value of NTO.SSTERM Value of NTO.EDIT
NETOEND	GENEND	No keywords

Changing the NCP Definition Statements

Migrating an earlier NTO release to R4 or later changes the NCP generation definition. Because one set of generation definitions contains all the information that used to be handled in two, you add and delete information in some NCP definition statements. The next two sections help you make these changes.

Adding Keywords

Two types of keywords are added to NCP definition statements: new keywords and keywords with the **NTO.** prefix.

First, you add USERGEN to the OPTIONS definition statement and VIROWNER to the NCPNAU and virtual GROUP definition statements associated with NTO resources.

USERGEN=CXNNTO

Required for NDF Support. NTO creates a load module that processes the definition statements and uses the NDF generation capabilities to produce the appropriate NTO generation output. To get NDF to load this module so that processing can take place, NDF must be notified that NTO keywords exist in the NCP generation definition. You code USERGEN on the OPTIONS definition statement to do this.

Note: This OPTIONS definition statement must be the *first* statement in the generation definition.

VIROWNER=CXNNTO

Required on NCPNAU and Virtual GROUP. Because NTO, user-written generation applications, and NCP are generated together, NTO must be able to distinguish between its own virtual definitions and those of user-written generation applications. NDF provides the VIROWNER keyword to determine the owner of the virtual definitions. VIROWNER=CXNNTO signifies NTO resources are being defined. If NTO finds keywords with the **NTO.** prefix on an NCP definition statement that is missing VIROWNER=CXNNTO or the value is not CXNNTO, NTO generates an error.

Second, you add NTO keywords with the **NTO.** prefix to the NCP generation definition. Add these keywords to the virtual definition statements in the NCP generation definition associated with the NTO generation definition. Add only the keywords with the **NTO.** prefix that were on your NTO generation definition. See Table 14 on page 86 for the definition statement to which you add these keywords.

Deleting Keywords

Since NTO R4 and later releases allow a combined NTO and NCP generation definition, several NCP keywords in the definition can be eliminated. Some NCP keywords insure that the NCP control blocks point to the correct NTO control blocks. Using NDF, NTO passes these pointers internally making the NCP keywords unnecessary. Therefore, you no longer need to code these keywords. NTO generates other values you used to code and passes each at the correct time to NCP. If you do not delete the keywords, NTO overrides your value and uses the value it produces. Note that NDF sends a message to your list file each time a keyword value is generated internally by NTO. The file shows what value the keyword receives. Table 14 on page 86 lists the keywords you can delete from your NCP generation definition.

Table 14. Adding and Deleting Keywords on Your NCP Generation Definition

NCP Definition Statement	Keyword to Delete	Keyword to Add
OPTIONS	None	USERGEN
NCPNAU	NAUFVT NAUCB TYPE	VIROWNER NTO.TRACEML NTO.TRCTABL
Virtual Group	None	VIROWNER
Virtual LINE	LINECB LINEFVT ¹	NTO.SSLINE NTO.ID NTO.MTA NTO.TRALL
Virtual PU	PUCB PUFVT ¹	NTO.SSTERM NTO.EDIT
Virtual LU	LUCB LUFVT ¹	None
GENEND ²	INIT INCHI INCINIT ORDHI ORDINIT SRCHI	None

¹ The LINEFVT, PUFVT, and LUFVT keywords belong to the virtual LINE, PU, and LU definition statements respectively. However, these keywords are often coded on different definition statements in the generation definition. Be sure to delete these keywords wherever they occur.

² The GENEND keywords may contain values for several user-written generation applications. Delete only the keyword values for NTO. Leave the other values coded as usual.

Checking the NCP Generation Definition

In summary, to use NDF, merge your NTO and NCP generation definitions. Follow this checklist to make sure all the changes are made to your NCP generation definition.

- ___ Add the OPTIONS definition statement and code the keyword USERGEN=CXNNT0 on it.
- ___ Add the VIROWNER=CXNNT0 keyword to the NCPNAU definition statement.
- ___ Delete the NAUFVT, NAUCB, and TYPE keywords from NCPNAU.
- ___ Move the NTO.TRACEML and NTO.TRCTABL keywords from the NETOBLD definition statement (NTO generation definition) to NCPNAU.
- ___ Add the VIROWNER=CXNNT0 keyword to the virtual GROUP definition statement.
- ___ Delete the LINEFVT and LINECB keywords from the virtual LINE definition statement.
- ___ Move the NTO.SSLINE, NTO.ID, NTO.MTA, and NTO.TRALL keywords from the NETOLINE definition statement (NTO generation definition) to the virtual LINE.

- Delete the PUFVT and PUCB keywords from the virtual PU definition statement.
- Move the NTO.SSTERM and NTO.EDIT keywords from the NETOPU definition statement (NTO generation definition) to the virtual PU.
- Delete the LUFVT and LUCB keywords from the virtual LU definition statement.
- Delete the NTO values coded on the INIT, INCHI, INCINIT, ORDHI, ORDINIT, and SRCHI keywords of the GENEND definition statement.
- Discard the NTO generation definition.

Note: The LINEFVT, PUFVT, and LUFVT keywords belong to the virtual LINE, PU, and LU definition statements, respectively. However, these keywords are often coded on different definition statements in the generation definition. Be sure to delete these keywords wherever they occur.

For a description of the keywords, see Chapter 4, “Defining NTO Devices to NCP.” For an example of a complete migration coding scenario, see “Migration Example (NTO R3 to NTO R4).”

Migration Example (NTO R3 to NTO R4)

Use this example as a guide to developing your own NCP generation definition. Do not code directly from this example; your configuration will be different. For more information on coding generation definitions, refer to *NCP, SSP, and EP Generation and Loading Guide*; *NCP, SSP, and EP Resource Definition Guide*; *NCP, SSP, and EP Resource Definition Reference*; and *VTAM Resource Definition Reference*.

Configuration of Network B

This example illustrates a network with NTO R3 installed in an IBM 3725 Communication Controller. The sample network uses a group of NTO devices on switched and nonswitched lines. This network includes:

- A host processor
- A host access method (VTAM V3)
- An IBM 3725 Communication Controller with NCP V4 and NTO R3
- Switched devices:
 - IBM 2740 Communications Terminal (HR2740L)
 - IBM 2741 Communications Terminal (HRS2741L)
 - IBM 3101 in TWX-compatible mode (HR3101L)
 - IBM 3101 in TWX-compatible mode (HR3101L2).
- Nonswitched devices:
 - IBM 2740 Communications Terminal on a multipoint line (HRL2740L)
 - IBM 2741 Communications Terminal (HR2741L)
 - IBM 3780 Communications Terminal (HR3780L)
 - IBM 3780 Communications Terminal (HRL02D)
 - IBM 3780 Communications Terminal (HRL02E)
 - IBM 3780 Communications Terminal (HRL0AF)
 - World Trade Teletypewriter Terminal (HRWTTYL).

Figure 8 on page 88 shows the configuration of the sample network with NTO. The NTO devices can communicate with the access method through NCP.

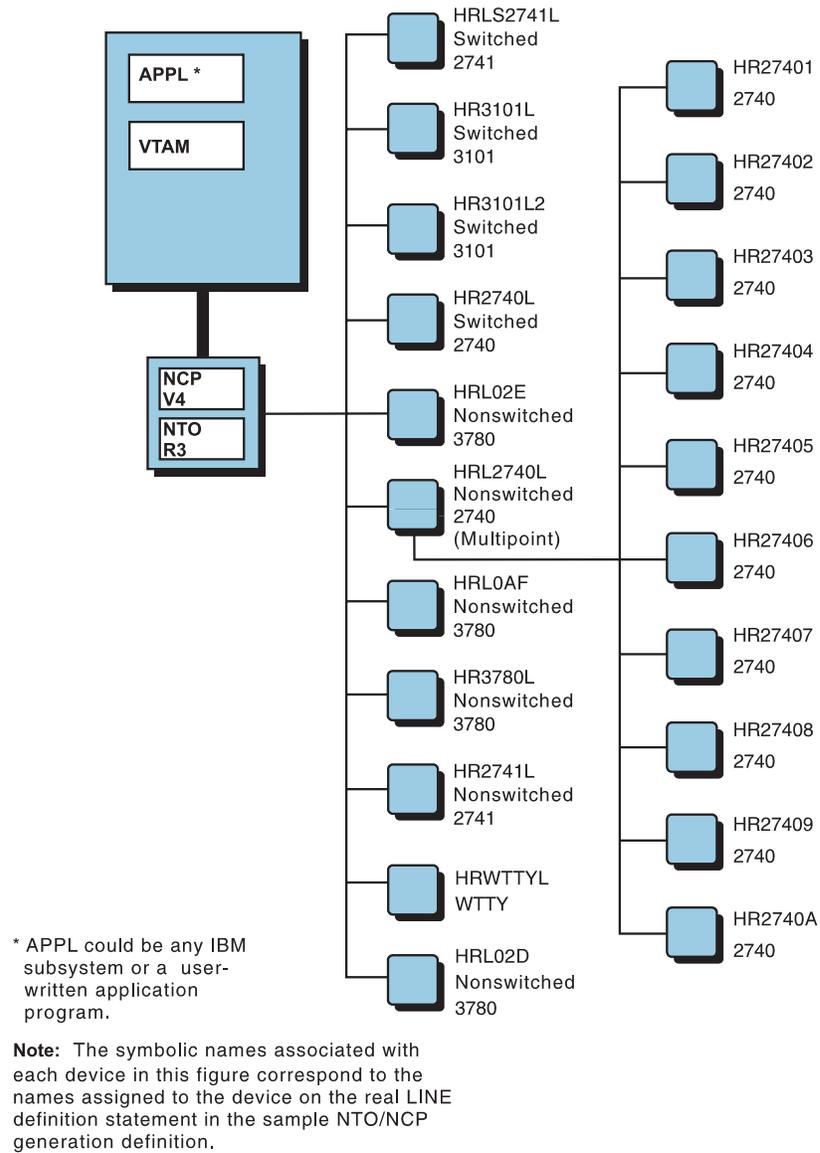


Figure 8. Sample Network B

NCP Generation Definition for Network B

The sample NCP generation definition includes the real and virtual statements to define NTO resources. It also includes NCP generation statements required to define NCP to the network. These are not related to NTO, but are included in this sample to show a complete generation definition. Use the first part of this appendix to examine how the definition statements are handled in a migration.

Definition of NTO In Network B

The NTO definition process supports BSC and start-stop terminals in the sample network. Use the first part of this appendix to examine how the definition statements are migrated.

NETWORK B - NCP V4 STATEMENTS

```
HPCCU1  PCCU  CUADDR=0C5,
          DUMPDS=VTAMDUMP,
          CONFGDS=HRNCKPT,
          AUTOSYN=YES,
          MAXDATA=4096,
          SUBAREA=11,OWNER=CDRM11,BACKUP=YES
HPCCU2  PCCU  CUADDR=0C6,
          DUMPDS=VTAMDUMP,
          CONFGDS=HRNCKPT,
          AUTOSYN=YES,
          MAXDATA=4096,
          SUBAREA=10,OWNER=CDRM10,BACKUP=YES
NCPNTO  BUILD MEMSIZE=1024,
          BFRS=96,
          VERSION=V4,
          CA=(TYPE5,TYPE5,TYPE5,TYPE5),
          NCPA=(ACTIVE,ACTIVE,ACTIVE,ACTIVE),
          MODEL=3725,
          MAXSUBA=15,
          MAXSSCP=6,
          NEWNAME=NCPNTO,
          NUMHSAS=6,
          PNLTEST=YES,
          SUBAREA=8,
          TYPGEN=NCP,
          TRACE=(YES,100),
          OLT=YES,
          LTRACE=8,
          VRPOOL=30,
          VRACT=YES,
          CATRACE=(YES,100),
          DELAY=(0.2,0.2,0.2,0.2),
          MTARTO=23.5,
          MTARTRY=10,
          PARTIAL=NO,
          TYP SYS=OS
          SYSCNTRL OPTIONS=(RIMM,
          RCOND,
          LNSTAT,
          SESINIT,
          DVSINIT,
          NAKLIM,
          SESSION,
          SSPAUSE,
          STORDSP,
          XMTLMT,
          MODE,
```

```

        RECMD,
        RCNTRL,
        BACKUP,
        BHSASSC,
        DLRID,
        RDEVQ,
        ENDCALL)
NTOGEN  NCPNAU  NAUFVT=CXNFVTN,
        NAUCB=SSCPNTO,
        TYPE=SSCP,
        NOTIFY=1
*-----*
*-----*
HOST11  HOST   INBFRS=6,
        MAXBFRU=32,
        UNITSZ=128,
        BFRPAD=0,
        STATMOD=YES,
        SUBAREA=11
HOST10  HOST   INBFRS=6,
        MAXBFRU=32,
        UNITSZ=128,
        BFRPAD=0,
        STATMOD=YES,
        SUBAREA=10
*-----*
*-----*
        PATH  DESTSA=(10),
        ER0=(10,1),ER1=(10,1),ER2=(10,1),ER3=(10,1),
        ER4=(10,1),ER5=(10,1),ER6=(10,1),ER7=(10,1),
        VR0=0,VR1=1,VR2=2,VR3=3,VR4=4,VR5=5,VR6=6,VR7=7
        PATH  DESTSA=(11),
        ER0=(11,1),ER1=(11,1),ER2=(11,1),ER3=(11,1),
        ER4=(11,1),ER5=(11,1),ER6=(11,1),ER7=(11,1),
        VR0=0,VR1=1,VR2=2,VR3=3,VR4=4,VR5=5,VR6=6,VR7=7

```

NTO REAL DEFINITIONS

WTTY DEFINITIONS

```

HRWTTYG  GROUP LNCTL=SS,
           TYPE=NCP,
           TEXTTO=NONE,
           WTTYEOT=080208,
           BHSET=DYNAMIC,
           EXEC=NO
HRWTTYL  LINE ADDRESS=(020),
           SPEED=110,
           CODE=ITA2,
           DUPLEX=FULL,
           MONITOR=YES,
           SCLSET=NO,
           ISTATUS=INACTIVE
HRLWTTY  TERMINAL TERM=WTTY,
           FEATURE=(ATTN,BREAK),
           ATTN=ENABLED

```

NONSWITCHED SS 2740 MOD 1 2740 #1

```

HRL2740G GROUP CRETRY=4,
           TYPE=NCP,
           DIAL=NO,
           LNCTL=SS,
           REPLYTO=23.5,
           TEXTTO=NONE
HRL2740L LINE ADDRESS=(019),
           TYPE=NCP,
           SPEED=134,
           CLOCKNG=INT,
           CODE=EBCD,
           ISTATUS=INACTIVE,
           DUPLEX=FULL,
           DIRECTN=INOUT,
           POLLED=YES,
           SERVPRI=OLD,
           TRANSFR=2,
           PAUSE=3,
           POLIMIT=(3,QUEUE),
           RETRIES=NONE,
           ENDTRNS=EOT,
           BHSET=DYNAMIC,
           SERVLIM=10,
           SESSION=10
           SERVICE ORDER=(HR27401,HR27402,HR27403,HR27404,HR27405,HR2740
           6,HR27407,HR27408,HR27409,HR2740A)
HR27401  TERMINAL TERM=2740-1,
           ADDR=C1,
           FEATURE=(CHECK,SCTL),
           POLL=C1
HR27402  TERMINAL TERM=2740-1,
           ADDR=C2,
           FEATURE=(CHECK,SCTL),
           POLL=C2
HR27403  TERMINAL TERM=2740-1,
           ADDR=C3,

```

```

                FEATURE=(CHECK,SCTL),
                POLL=C3
HR27404 TERMINAL TERM=2740-1,
                ADDR=C4,
                FEATURE=(CHECK,SCTL),
                POLL=C4
HR27405 TERMINAL TERM=2740-1,
                ADDR=C5,
                FEATURE=(CHECK,SCTL),
                POLL=C5
HR27406 TERMINAL TERM=2740-1,
                ADDR=C6,
                FEATURE=(CHECK,SCTL),
                POLL=C6
HR27407 TERMINAL TERM=2740-1,
                ADDR=C7,
                FEATURE=(CHECK,SCTL),
                POLL=C7
HR27408 TERMINAL TERM=2740-1,
                ADDR=D1,
                FEATURE=(CHECK,SCTL),
                POLL=D1
HR27409 TERMINAL TERM=2740-1,
                ADDR=D2,
                FEATURE=(CHECK,SCTL),
                POLL=D2
HR2740A TERMINAL TERM=2740-1,
                ADDR=D3,
                FEATURE=(CHECK,SCTL),
                POLL=D3

```

SWITCHED SS 2740 MOD 1 2740 #2

```

HR2740G GROUP LNCTL=SS,
              TYPE=NCP,
              DIAL=YES,
              REPLYTO=NONE,
              TEXTTO=NONE
HR2740L LINE ADDRESS=(018),
              SPEED=134,
              MONITOR=YES,
              CODE=EBCD,
              BHSET=DYNAMIC,
              ISTATUS=INACTIVE,
              DUPLEX=FULL
HR2740 TERMINAL TERM=2740-1,
                FEATURE=(CHECK,XCTL),
                CTERM=YES,
                PT3EXEC=YES

```

NONSWITCHED SS 2741 2741 #2

```

HR2741G GROUP DIAL=NO,
              CRETRY=3,
              TEXTTO=NONE,
              REPLYTO=NONE,
              LNCTL=SS
HR2741L LINE ADDRESS=(017),
              POLLED=NO,
              MONITOR=YES,
              TYPE=NCP,
              BHSET=DYNAMIC,
              SPEED=134,
              TERM=2741,
              DUPLEX=FULL,
              CLOCKNG=INT,
              CODE=COR,
              CUTOFF=NO,
              ISTATUS=INACTIVE,
              RETRIES=(3,1,2)
HRL2741 TERMINAL TERM=2741,
                ATTN=ENABLED,
                CDATA=NO,
                DIRECTN=INOUT,
                PT3EXEC=YES,
                FEATURE=(ATTN,BREAK)

```

SWITCHED SS 2741 2741 #4

```

HRS2741G GROUP DIAL=YES,
              TEXTTO=NONE,
              REPLYTO=NONE,
              LNCTL=SS
HRS2741L LINE ADDRESS=(016),
              MONITOR=YES,
              TYPE=NCP,
              CALL=IN,
              ISTATUS=INACTIVE,
              BHSET=DYNAMIC,
              SPEED=134,
              CLOCKNG=INT,
              CODE=BCD,
              POLLED=NO,
              RETRIES=(3,1,2),
              DUPLEX=FULL
HRL2604 TERMINAL TERM=2741,
                ATTN=ENABLED,
                CDATA=NO,
                PT3EXEC=YES,
                DIRECTN=INOUT,
                FEATURE=(ATTN,BREAK),
                CTERM=YES

```

TWX TERMINALS

TWX 3101 #1

HR3101G GROUP DIAL=YES,TYPE=NCP,
 CHAREC=(XOFF,8D),
 REPLYTO=NONE,
 TEXTTO=NONE,
 ATTN=ENABLED,
 CODE=ASCII,
 LNCTL=SS
 HR3101L LINE ADDRESS=(015),MONITOR=YES,
 SPEED=110,
 CALL=IN,
 CLOCKNG=INT,
 ISTATUS=INACTIVE,
 DUPLEX=FULL,
 RING=NO,
 RETRIES=(3,1,2)
 HRS2605L TERMINAL TERM=TWX,CRDLAY=YES,
 FEATURE=(BREAK,ATTN),
 CTERM=YES,
 BHSET=HEDIT16,
 DIRECTN=INOUT

TWX --- 3101 TERMINALS

HR3101G2 GROUP DIAL=YES,TYPE=NCP,
 CHAREC=(XOFF,8D),
 REPLYTO=23.5,
 TEXTTO=NONE,
 ATTN=ENABLED,
 CODE=ASCII,
 LNCTL=SS
 HR3101L2 LINE ADDRESS=(014),MONITOR=YES,
 SPEED=110,
 CALL=IN,
 CLOCKNG=INT,
 ISTATUS=INACTIVE,
 DUPLEX=FULL,
 RING=NO,
 RETRIES=(3,1,2)
 HRS2606L TERMINAL TERM=TWX,CRDLAY=YES,
 FEATURE=(BREAK,ATTN),
 CTERM=YES,
 BHSET=HEDIT16,
 DIRECTN=INOUT

BSC 3780 DEFINITIONS

```

HR3780G  GROUP LNCTL=BSC,
           TYPE=NCP,
           WACKCNT=25,
           DUPLEX=HALF,
           YIELD=NO,
           CLOCKNG=EXT
HR3780L  LINE ADDRESS=(013),
           SPEED=2400,
           CODE=EBCDIC
HR3780   TERMINAL TERM=3780
HRL02D   LINE ADDRESS=(012),
           SPEED=4800,
           CODE=EBCDIC,
           CLOCKNG=EXT
HRL02DL  TERMINAL TERM=3780
HRL02E   LINE ADDRESS=(011),
           SPEED=4800,
           CODE=EBCDIC,
           CLOCKNG=EXT
HRL02EL  TERMINAL TERM=3780
HRL0AF   LINE ADDRESS=(010),
           SPEED=4800,
           CODE=EBCDIC,
           CLOCKNG=EXT
HRL0AFL  TERMINAL TERM=3780

```

NTO VIRTUAL REAL DEFINITIONS

```

*
*GROUP MACRO FOR NONSWITCHED 2740, 2741 AND 3780.
*
HVLEASEG  GROUP VIRTUAL=YES,
           DIAL=NO,
           TYPE=NCP,
           MAXLU=1,
           ISTATUS=INACTIVE,
           LNCTL=SDLC,
           LINEFVT=CXNFVTV,
           PUFVT=CXNFVTP,
           LUFVT=(CXNFVTL,CXNFVT1,CXNFVT2),
           USSTAB=HELLO,
           PUTYPE=1,
           MODETAB=CXR3780
*
*MACROS FOR NONSWITCHED 2740 #1
*
HV2740L  LINE  LINECB=L2740L
           SERVICE ORDER=(HV2740P1,HV2740P2,HV2740P3,HV2740P4,HV27
           40P5,HV2740P6,HV2740P7,HV2740P8,HV2740P9,HV2740PA)
HV2740P1 PU   PUCB=L2740P1
HV27401  LU   LUCB=(L27401,L27401,L27401),
           LOCADDR=0,
           SSCPFM=USSSCS,
           TERM=2740-1
*

```

```

* MULTIPOINT ADDITIONS
*
HV2740P2 PU      PUCB=L2740P2
HV27402 LU      LUCB=(L27402,L27402,L27402),
                LOCADDR=0,
                SSCPFM=USSSCS,
                TERM=2740-1
*
HV2740P3 PU      PUCB=L2740P3
HV27403 LU      LUCB=(L27403,L27403,L27403),
                LOCADDR=0,
                SSCPFM=USSSCS,
                TERM=2740-1
*
HV2740P4 PU      PUCB=L2740P4
HV27404 LU      LUCB=(L27404,L27404,L27404),
                LOCADDR=0,
                SSCPFM=USSSCS,
                TERM=2740-1
*
HV2740P5 PU      PUCB=L2740P5
HV27405 LU      LUCB=(L27405,L27405,L27405),
                LOCADDR=0,
                SSCPFM=USSSCS,
                TERM=2740-1
*
HV2740P6 PU      PUCB=L2740P6
HV27406 LU      LUCB=(L27406,L27406,L27406),
                LOCADDR=0,
                SSCPFM=USSSCS,
                TERM=2740-1
*
HV2740P7 PU      PUCB=L2740P7
HV27407 LU      LUCB=(L27407,L27407,L27407),
                LOCADDR=0,
                SSCPFM=USSSCS,
                TERM=2740-1
*
HV2740P8 PU      PUCB=L2740P8
HV27408 LU      LUCB=(L27408,L27408,L27408),
                LOCADDR=0,
                SSCPFM=USSSCS,
                TERM=2740-1
*
HV2740P9 PU      PUCB=L2740P9
HV27409 LU      LUCB=(L27409,L27409,L27409),
                LOCADDR=0,
                SSCPFM=USSSCS,
                TERM=2740-1
*
HV2740PA PU      PUCB=L2740PA
HV2740A LU      LUCB=(L2740A,L2740A,L2740A),
                LOCADDR=0,
                SSCPFM=USSSCS,
                TERM=2740-1
*
*MACROS FOR NONSWITCHED 2741 #2
*

```

```

HV2741L LINE LINECB=L2741L
HV2741P PU PUCB=L2741P
HV2741 LU LUCB=(L2741,L2741,L2741),
          LOCADDR=0,
          SSCPFM=USSSCS,
          TERM=2741

*
*MACROS FOR NONSWITCHED WTTY
*
HVWTTYL LINE LINECB=WTTYL
HVWTTYP PU PUCB=WTTYPLU
HVWTTY LU LUCB=(WTTYLU,WTTYLU,WTTYLU),
          LOCADDR=0,
          SSCPFM=USSNTO,
          TERM=WTTY

*
*MACROS FOR NONSWITCHED 3780
*
HV37801L LINE LINECB=L37801L
HV37801P PU PUCB=L37801P,
          PUTYPE=1
HV37801 LU LUCB=(L37801,L37801,L37801),
          LOCADDR=0,
          SSCPFM=USS3780,
          TERM=3780

*
HV02DL LINE LINECB=L37802L
HV02DP PU PUCB=L37802P,
          PUTYPE=1
HV02D LU LUCB=(L37802,L37802,L37802),
          LOCADDR=0,
          SSCPFM=USS3780,
          TERM=3780

*
HV02EL LINE LINECB=L37803L
HV02EP PU PUCB=L37803P,
          PUTYPE=1
HV02E LU LUCB=(L37803,L37803,L37803),
          LOCADDR=0,
          SSCPFM=USS3780,
          TERM=3780

*
HV0AFL LINE LINECB=L37804L
HV0AFP PU PUCB=L37804P,
          PUTYPE=1
HV0AFA LU LUCB=(L37804,L37804,L37804),
          LOCADDR=0,
          SSCPFM=USS3780,
          TERM=3780

*
*GROUP MACRO FOR SWITCHED 2740, 2741, AND TWO 3101'S.
*
HVDIALG GROUP VIRTUAL=YES,
          DIAL=YES,
          TYPE=NCP,
          MAXLU=1,
          ISTATUS=INACTIVE,
          LNCTL=SDLC,

```

```

LINEFVT=CXNFVTV,
PUFVT=CXNFVTP,
LUFVT=(CXNFVTL,CXNFVT1,CXNFVT2),
USSTAB=HELLO,
MODETAB=CXR3780
*
*MACROS FOR SWITCHED 2740 #1
*
HV2740DL LINE LINECB=D2740L
HV2740DP PU PUCB=D2740P,
LUCB=(D2740,D2740,D2740)
*
*MACROS FOR SWITCHED 2741 #4
*
HV2604L LINE LINECB=D2604L
HV2604P PU PUCB=D2604P,
LUCB=(D2604,D2604,D2604)
*
*MACROS FOR SWITCHED 3101 #1
*
HV2605L LINE LINECB=D2605L
HV2605P PU PUCB=D2605P,
LUCB=(D2605,D2605,D2605)
*
*MACROS FOR SWITCHED 3101 #2
*
HV2606L LINE LINECB=D2606L
HV2606P PU PUCB=D2606P,
LUCB=(D2606,D2606,D2606)
*
*NTO SELECTIVE TRACE ALL LINE DEFINITIONS
*
HTRACEG GROUP LNCTL=SDLC,
VIRTUAL=YES,
MAXLU=1,
PUTYPE=1,
LINEFVT=CXNFVTTV,
PUFVT=CXNFVTTP,
LUFVT=(CXNFVTTP,CXNFVTTP,CXNFVTTP)
HTRACEL LINE LINECB=TRA1,
ISTATUS=INACTIVE
HTRACEP PU PUCB=TRA1PU
HTRACE LU LUCB=(TRA1LU,TRA1LU,TRA1LU),LOCADDR=0
*****
HHEDIT16 STARTBH BHEXEC=PT3
EDIT BKSP=16
ENDBH
HEDIT16 BHSET PT3=HHEDIT16
GENEND INIT=CXNNINI,INCINIT=CXNMINCI,ORDINIT=CXNMORDI,
INCHI=(CXNMINC),
ORDHI=(CXNMORD),
SRCHI=(NCPNTON)
END

```

NETWORK B - NTO R3 MACRO INSTRUCTIONS

NETOBLD NAME=NTOGEN,
TRCTABL=2000,
TRACEML=YES,
NAUCB=SSCPNTO

*

*NONSWITCHED DEVICE DEFINITIONS:-----

*

*FOR NONSWITCHED 2740...

NETOLINE NAME=HV2740L,
SSLINE=HRL2740L,
LINECB=L2740L
NETOPU PUCB=L2740P1,
LUCB=L27401,
SSTERM=HR27401
NETOPU PUCB=L2740P2,
LUCB=L27402,
SSTERM=HR27402
NETOPU PUCB=L2740P3,
LUCB=L27403,
SSTERM=HR27403
NETOPU PUCB=L2740P4,
LUCB=L27404,
SSTERM=HR27404
NETOPU PUCB=L2740P5,
LUCB=L27405,
SSTERM=HR27405
NETOPU PUCB=L2740P6,
LUCB=L27406,
SSTERM=HR27406
NETOPU PUCB=L2740P7,
LUCB=L27407,
SSTERM=HR27407
NETOPU PUCB=L2740P8,
LUCB=L27408,
SSTERM=HR27408
NETOPU PUCB=L2740P9,
LUCB=L27409,
SSTERM=HR27409
NETOPU PUCB=L2740PA,
LUCB=L2740A,
SSTERM=HR2740A

*

*FOR NONSWITCHED 2741...

NETOLINE NAME=HV2741L,
SSLINE=HR2741L,
LINECB=L2741L
NETOPU PUCB=L2741P,
LUCB=L2741,
SSTERM=HRL2741

*

*FOR NONSWITCHED WTTY...

NETOLINE NAME=HVWTTYL,
SSLINE=HRWTTYL,

```

                LINECB=WTTYL
NETOPU      PUCB=WTTYPLU,
            LUCB=WTTYLU,
            SSTERM=HRLWTTY
*
*FOR NONSWITCHED 3780...
    NETOLINE  NAME=HV37801L,
              SSLINE=HR3780L,
              LINECB=L37801L
NETOPU      PUCB=L37801P,
            LUCB=L37801,
            SSTERM=HR3780
*
*FOR NONSWITCHED 3780...
    NETOLINE  NAME=HV02DL,
              SSLINE=HRL02D,
              LINECB=L37802L
NETOPU      PUCB=L37802P,
            LUCB=L37802,
            SSTERM=HRL02DL
*
*FOR NONSWITCHED 3780...
    NETOLINE  NAME=HV02EL,
              SSLINE=HRL02E,
              LINECB=L37803L
NETOPU      PUCB=L37803P,
            LUCB=L37803,
            SSTERM=HRL02EL
*
*FOR NONSWITCHED 3780...
    NETOLINE  NAME=HV0AFL,
              SSLINE=HRL0AF,
              LINECB=L37804L
NETOPU      PUCB=L37804P,
            LUCB=L37804,
            SSTERM=HRL0AFL
*
*SWITCHED DEVICE DEFINITIONS:-----
*
*
*FOR SWITCHED 2740...
    NETOLINE  NAME=HV2740DL,
              SSLINE=HR2740L,
              LINECB=D2740L,
              ID=010011111000
NETOPU      PUCB=D2740P,
            LUCB=D2740
*
*FOR SWITCHED 2741...
    NETOLINE  NAME=HV2604L,
              SSLINE=HRS2741L,
              LINECB=D2604L,
              ID=010011111110
NETOPU      PUCB=D2604P,
            LUCB=D2604
*
*FOR SWITCHED 3101...

```

```

NETOLINE NAME=HV2605L,
          SSLINE=HR3101L,
          LINECB=D2605L,
          ID=010011111111
NETOPU   PUCB=D2605P,
          LUCB=D2605

```

*

*FOR SWITCHED 3101...

```

NETOLINE NAME=HV2606L,
          SSLINE=HR3101L2,
          LINECB=D2606L,
          ID=010011111100
NETOPU   PUCB=D2606P,
          LUCB=D2606

```

*

*FOR SELECTIVE TRACE ALL LINE

*

```

NETOLINE NAME=HTRACEL,
          SSLINE=TRLINK,
          LINECB=TRA1
NETOPU   PUCB=TRA1PU,
          LUCB=TRA1LU,
          SSTERM=TRLINK
NETOEND
END

```

NTO MIGRATION DEFINITIONS

```

OPTIONS USERGEN=CXNNT0
HPCCU1  PCCU CUADDR=0C5,
            DUMPDS=VTAMDUMP,
            CONFGDS=HRNCKPT,
            AUTOSYN=YES,
            MAXDATA=4096,
            SUBAREA=11,OWNER=CDRM11,BACKUP=YES
HPCCU2  PCCU CUADDR=0C6,
            DUMPDS=VTAMDUMP,
            CONFGDS=HRNCKPT,
            AUTOSYN=YES,
            MAXDATA=4096,
            SUBAREA=10,OWNER=CDRM10,BACKUP=YES
NCPNT0  BUILD MEMSIZE=1024,
            BFRS=96,
            VERSION=V4,
            CA=(TYPE5,TYPE5,TYPE5,TYPE5),
            NCPA=(ACTIVE,ACTIVE,ACTIVE,ACTIVE),
            MODEL=3725,
            MAXSUBA=15,
            MAXSSCP=6,
            NEWNAME=NCPNT0,
            NUMHSAS=6,
            PNLTEST=YES,
            SUBAREA=8,
            TYPGEN=NCP,
            TRACE=(YES,100),

```

```

        OLT=YES,
        LTRACE=8,
        VRPOOL=30,
        VRACT=YES,
        CATRACE=(YES,100),
        DELAY=(0.2,0.2,0.2,0.2),
        MTARTO=23.5,
        MTARTRY=10,
        PARTIAL=NO,
        TYPYSYS=OS
SYSCTRL OPTIONS=(RIMM,
        RCOND,
        LNSTAT,
        SESINIT,
        DVSINIT,
        NAKLIM,
        SESSION,
        SSPAUSE,
        STORDSP,
        XMTLMT,
        MODE,
        RECMD,
        RCNTRL,
        BACKUP,
        BHSASSC,
        DLRID,
        RDEVQ,
        ENDCALL)
NTOGEN  NCPNAU  VIROWNER=CXNNT0,
        NTO.TRACEML=YES,
        NTO.TRCTABL=2000,
        NOTIFY=1
-----*
-----*
HOST11  HOST  INBFRS=6,
        MAXBFRU=32,
        UNITSZ=128,
        BFRPAD=0,
        STATMOD=YES,
        SUBAREA=11
HOST10  HOST  INBFRS=6,
        MAXBFRU=32,
        UNITSZ=128,
        BFRPAD=0,
        STATMOD=YES,
        SUBAREA=10
-----*
-----*
        PATH  DESTSA=(10),
        ER0=(10,1),ER1=(10,1),ER2=(10,1),ER3=(10,1),
        ER4=(10,1),ER5=(10,1),ER6=(10,1),ER7=(10,1),
        VR0=0,VR1=1,VR2=2,VR3=3,VR4=4,VR5=5,VR6=6,VR7=7
        PATH  DESTSA=(11),
        ER0=(11,1),ER1=(11,1),ER2=(11,1),ER3=(11,1),
        ER4=(11,1),ER5=(11,1),ER6=(11,1),ER7=(11,1),
        VR0=0,VR1=1,VR2=2,VR3=3,VR4=4,VR5=5,VR6=6,VR7=7

```

NTO REAL DEFINITIONS

WTTY DEFINITIONS

```

HRWTTYG  GROUP LNCTL=SS,
           TYPE=NCP,
           TEXTTO=NONE,
           WTTYEOT=080208,
           BHSET=DYNAMIC,
           EXEC=NO
HRWTTYL  LINE ADDRESS=(020),
           SPEED=110,
           CODE=ITA2,
           DUPLEX=FULL,
           MONITOR=YES,
           SCLSET=NO,
           ISTATUS=INACTIVE
HRLWTTY  TERMINAL TERM=WTTY,
           FEATURE=(ATTN,BREAK),
           ATTN=ENABLED

```

NONSWITCHED SS 2740 MOD 1 2740 #1

```

HRL2740G GROUP CRETRY=4,
           TYPE=NCP,
           DIAL=NO,
           LNCTL=SS,
           REPLYTO=23.5,
           TEXTTO=NONE
HRL2740L LINE ADDRESS=(019),
           TYPE=NCP,
           SPEED=134,
           CLOCKNG=INT,
           CODE=EBCD,
           ISTATUS=INACTIVE,
           DUPLEX=FULL,
           DIRECTN=INOUT,
           POLLED=YES,
           SERVPRI=OLD,
           TRANSFR=2,
           PAUSE=3,
           POLIMIT=(3,QUEUE),
           RETRIES=NONE,
           ENDTRNS=EOT,
           BHSET=DYNAMIC,
           SERVLIM=10,
           SESSION=10

```

```

SERVICE ORDER=(HR27401,HR27402,HR27403,HR27404,HR27405,HR2740
6,HR27407,HR27408,HR27409,HR2740A)
HR27401 TERMINAL TERM=2740-1,
        ADDR=C1,
        FEATURE=(CHECK,SCTL),
        POLL=C1
HR27402 TERMINAL TERM=2740-1,
        ADDR=C2,
        FEATURE=(CHECK,SCTL),
        POLL=C2
HR27403 TERMINAL TERM=2740-1,
        ADDR=C3,
        FEATURE=(CHECK,SCTL),
        POLL=C3
HR27404 TERMINAL TERM=2740-1,
        ADDR=C4,
        FEATURE=(CHECK,SCTL),
        POLL=C4
HR27405 TERMINAL TERM=2740-1,
        ADDR=C5,
        FEATURE=(CHECK,SCTL),
        POLL=C5
HR27406 TERMINAL TERM=2740-1,
        ADDR=C6,
        FEATURE=(CHECK,SCTL),
        POLL=C6
HR27407 TERMINAL TERM=2740-1,
        ADDR=C7,
        FEATURE=(CHECK,SCTL),
        POLL=C7
HR27408 TERMINAL TERM=2740-1,
        ADDR=D1,
        FEATURE=(CHECK,SCTL),
        POLL=D1
HR27409 TERMINAL TERM=2740-1,
        ADDR=D2,
        FEATURE=(CHECK,SCTL),
        POLL=D2
HR2740A TERMINAL TERM=2740-1,
        ADDR=D3,
        FEATURE=(CHECK,SCTL),
        POLL=D3

```

SWITCHED SS 2740 MOD 1 2740 #2

```

HR2740G GROUP LNCTL=SS,
        TYPE=NCP,
        DIAL=YES,
        REPLYTO=NONE,
        TEXTTO=NONE
HR2740L LINE ADDRESS=(018),
        SPEED=134,
        MONITOR=YES,
        CODE=EBCD,
        BHSET=DYNAMIC,

```

ISTATUS=INACTIVE,
 DUPLEX=FULL
HR2740 TERMINAL TERM=2740-1,
 FEATURE=(CHECK,XCTL),
 CTERM=YES,
 PT3EXEC=YES

 NONSWITCHED SS 2741 2741 #2

HR2741G GROUP DIAL=NO,
 CRETRY=3,
 TEXTTO=NONE,
 REPLYTO=NONE,
 LNCTL=SS
HR2741L LINE ADDRESS=(017),
 POLLED=NO,
 MONITOR=YES,
 TYPE=NCP,
 BHSET=DYNAMIC,
 SPEED=134,
 TERM=2741,
 DUPLEX=FULL,
 CLOCKNG=INT,
 CODE=COR,
 CUTOFF=NO,
 ISTATUS=INACTIVE,
 RETRIES=(3,1,2)
HRL2741 TERMINAL TERM=2741,
 ATTN=ENABLED,
 CDATA=NO,
 DIRECTN=INOUT,
 PT3EXEC=YES,
 FEATURE=(ATTN,BREAK)

 SWITCHED SS 2741 2741 #4

HRS2741G GROUP DIAL=YES,
 TEXTTO=NONE,
 REPLYTO=NONE,
 LNCTL=SS
HRS2741L LINE ADDRESS=(016),
 MONITOR=YES,
 TYPE=NCP,
 CALL=IN,
 ISTATUS=INACTIVE,
 BHSET=DYNAMIC,
 SPEED=134,
 CLOCKNG=INT,
 CODE=BCD,
 POLLED=NO,
 RETRIES=(3,1,2),

DUPLEX=FULL
HRL2604 TERMINAL TERM=2741,
ATTN=ENABLED,
CDATA=NO,
PT3EXEC=YES,
DIRECTN=INOUT,
FEATURE=(ATTN,BREAK),
CTERM=YES

TWX TERMINALS

TWX 3101 #1

HR3101G GROUP DIAL=YES,TYPE=NCP,
CHAREC=(XOFF,8D),
REPLYTO=NONE,
TEXTTO=NONE,
ATTN=ENABLED,
CODE=ASCII,
LNCTL=SS
HR3101L LINE ADDRESS=(015),MONITOR=YES,
SPEED=110,
CALL=IN,
CLOCKNG=INT,
ISTATUS=INACTIVE,
DUPLEX=FULL,
RING=NO,
RETRIES=(3,1,2)
HRS2605L TERMINAL TERM=TWX,CRDLAY=YES,
FEATURE=(BREAK,ATTN),
CTERM=YES,
BHSET=HEDIT16,
DIRECTN=INOUT

TWX --- 3101 TERMINALS

HR3101G2 GROUP DIAL=YES,TYPE=NCP,
CHAREC=(XOFF,8D),
REPLYTO=23.5,
TEXTTO=NONE,
ATTN=ENABLED,
CODE=ASCII,
LNCTL=SS
HR3101L2 LINE ADDRESS=(014),MONITOR=YES,
SPEED=110,
CALL=IN,
CLOCKNG=INT,
ISTATUS=INACTIVE,
DUPLEX=FULL,
RING=NO,
RETRIES=(3,1,2)
HRS2606L TERMINAL TERM=TWX,CRDLAY=YES,
FEATURE=(BREAK,ATTN),

CTERM=YES,
BHSET=HEDIT16,
DIRECTN=INOUT

BSC 3780 DEFINITIONS

HR3780G GROUP LNCTL=BSC,
TYPE=NCP,
WACKCNT=25,
DUPLEX=HALF,
YIELD=NO,
CLOCKNG=EXT
HR3780L LINE ADDRESS=(013),
SPEED=2400,
CODE=EBCDIC
HR3780 TERMINAL TERM=3780
HRL02D LINE ADDRESS=(012),
SPEED=4800,
CODE=EBCDIC,
CLOCKNG=EXT
HRL02DL TERMINAL TERM=3780
HRL02E LINE ADDRESS=(011),
SPEED=4800,
CODE=EBCDIC,
CLOCKNG=EXT
HRL02EL TERMINAL TERM=3780
HRL0AF LINE ADDRESS=(010),
SPEED=4800,
CODE=EBCDIC,
CLOCKNG=EXT
HRL0AFL TERMINAL TERM=3780

NTO VIRTUAL DEFINITIONS

*GROUP MACRO FOR NONSWITCHED 2740, 2741 AND 3780.

*

HVLEASEG GROUP VIROWNER=CXNNT0,
VIRTUAL=YES,
DIAL=NO,
TYPE=NCP,
MAXLU=1,
ISTATUS=INACTIVE,
LNCTL=SDLC,
USSTAB=HELLO,
PUTYPE=1,
MODETAB=CXR3780

*

*MACROS FOR NONSWITCHED 2740 #1

*

HV2740L LINE NTO.SSLINE=HRL2740L
SERVICE ORDER=(HV2740P1,HV2740P2,HV2740P3,HV2740P4,HV27

```

40P5,HV2740P6,HV2740P7,HV2740P8,HV2740P9,HV2740PA)
HV2740P1 PU      NTO.SSTERM=HR27401
HV27401  LU      LOCADDR=0,
                SSCPFM=USSSCS,
                TERM=2740-1
*
*  MULTIPOINT ADDITIONS
*
HV2740P2 PU      NTO.SSTERM=HR27402
HV27402  LU      LOCADDR=0,
                SSCPFM=USSSCS,
                TERM=2740-1
*
HV2740P3 PU      NTO.SSTERM=HR27403
HV27403  LU      LOCADDR=0,
                SSCPFM=USSSCS,
                TERM=2740-1
*
HV2740P4 PU      NTO.SSTERM=HR27404
HV27404  LU      LOCADDR=0,
                SSCPFM=USSSCS,
                TERM=2740-1
*
HV2740P5 PU      NTO.SSTERM=HR27405
HV27405  LU      LOCADDR=0,
                SSCPFM=USSSCS,
                TERM=2740-1
*
HV2740P6 PU      NTO.SSTERM=HR27406
HV27406  LU      LOCADDR=0,
                SSCPFM=USSSCS,
                TERM=2740-1
*
HV2740P7 PU      NTO.SSTERM=HR27407
HV27407  LU      LOCADDR=0,
                SSCPFM=USSSCS,
                TERM=2740-1
*
HV2740P8 PU      NTO.SSTERM=HR27408
HV27408  LU      LOCADDR=0,
                SSCPFM=USSSCS,
                TERM=2740-1
*
HV2740P9 PU      NTO.SSTERM=HR27409
HV27409  LU      LOCADDR=0,
                SSCPFM=USSSCS,
                TERM=2740-1
*
HV2740PA PU      NTO.SSTERM=HR2740A
HV2740A  LU      LOCADDR=0,
                SSCPFM=USSSCS,
                TERM=2740-1
*
*MACROS FOR NONSWITCHED 2741 #2
*
HV2741L  LINE    NTO.SSLINE=HR2741L
HV2741P  PU      NTO.SSTERM=HRL2741
HV2741   LU      LOCADDR=0,

```

```

                SSCPFM=USSSCS,
                TERM=2741
*
*MACROS FOR NONSWITCHED WTTY
*
HVWTTYL  LINE  NTO.SSLINE=HRWTTYL
HVWTTYP  PU    NTO.SSTERM=HRLWTTY
HVWTTY   LU    LOCADDR=0,
                SSCPFM=USSNTO,
                TERM=WTTY
*
*MACROS FOR NONSWITCHED 3780
*
HV37801L LINE  NTO.SSLINE=HR3780L
HV37801P PU    NTO.SSTERM=HR3780
                PUTYPE=1
HV37801  LU    LOCADDR=0,
                SSCPFM=USS3780,
                TERM=3780
*
HV02DL  LINE  NTO.SSLINE=HRL02D
HV02DP  PU    NTO.SSTERM=HRL02DL
                PUTYPE=1
HV02D   LU    LOCADDR=0,
                SSCPFM=USS3780,
                TERM=3780
*
HV02EL  LINE  NTO.SSLINE=HRL02E
HV02EP  PU    NTO.SSTERM=HRL02EL
                PUTYPE=1
HV02E   LU    LOCADDR=0,
                SSCPFM=USS3780,
                TERM=3780
*
HV0AFL  LINE  NTO.SSLINE=HRL0AF
HV0AFP  PU    NTO.SSTERM=HRL0AFL
                PUTYPE=1
HV0AFA  LU    LOCADDR=0,
                SSCPFM=USS3780,
                TERM=3780
*
*GROUP MACRO FOR SWITCHED 2740, 2741, AND TWO 3101'S.
*
HVDIALG  GROUP VIROWNER=CXNNT0,
                VIRTUAL=YES,
                DIAL=YES,
                TYPE=NCP,
                MAXLU=1,
                ISTATUS=INACTIVE,
                LNCTL=SDLC,
                USSTAB=HELLO,
                MODETAB=CXR3780
*
*MACROS FOR SWITCHED 2740 #1
*
HV2740DL LINE  NTO.SSLINE=HR2740L,
                NTO.ID=010011111000
HV2740DP PU

```

```

*
*MACROS FOR SWITCHED 2741 #4
*
HV2604L  LINE  NTO.SSLINE=HRS2741L,
            NTO.ID=010011111110
HV2604P  PU
*
*MACROS FOR SWITCHED 3101 #1
*
HV2605L  LINE  NTO.SSLINE=HR3101L,
            NTO.ID=010011111111
HV2605P  PU
*
*MACROS FOR SWITCHED 3101 #2
*
HV2606L  LINE  NTO.SSLINE=HR3101L2,
            NTO.ID=010011111100
HV2606P  PU
*
*NTO SELECTIVE TRACE ALL LINE DEFINITIONS
*
HTRACEG  GROUP VIROWNER=CXNNT0,
            LNCTL=SDLC,
            VIRTUAL=YES,
            MAXLU=1,
            PUTYPE=1,
HTRACEL  LINE  NTO.SSLINE=TRLINK
            ISTATUS=INACTIVE
HTRACEP  PU    NTO.SSTERM=TRLINK
HTRACE   LU    LOCADDR=0
*****
HHEDIT16 STARTBH BHEXEC=PT3
            EDIT BKSP=16
            ENDBH
HEDIT16  BHSET PT3=HHEDIT16
            GENEND
            END

```

Appendix C. NTO Messages and Codes

This appendix is divided into two sections:

- “Message Format” helps you to understand the format of NTO messages.
- “Messages” provides the meaning, severity, and appropriate response to error messages.

Message Format

The communication controller assembler program produces diagnostic error messages during the NTO and NCP generation. Messages coming from NTO processing carry a message identifier beginning with CXN.

The format of the messages is **CXNnnna text**, where:

CXN is the identifier for NTO generation messages.

nnn is the message serial number.

a indicates the severity of the error message.

The following letters are used in place of **a**:

I Information-only message

W Warning of a minor error that must be corrected to complete the NTO generation

E Serious error that must be corrected to complete the NTO generation.

text is the text of the message explaining the error condition.

Messages

Each message listing provides descriptions for the following items:

Severity	Indicates the severity code for the message. The severity code can have the following values: <ul style="list-style-type: none">0 Provides information only.4 A warning that stops the generation of the load module but does not stop NTO validation of the generation definition.8 An error that stops generation of the load module and NTO validation of the generation definition.
Explanation	Describes what the message means and why it occurred.
System Action	Describes what the system does in response to the error. Severity code 0 does not terminate system generation. Severity codes 4 and 8 do terminate system generation and require programmer response to continue.
Programmer Response	Provides instruction about what the system programmer must do in order to correct the error and resume generation.

The following messages can be issued during NTO definition in NCP.

CXN001W DUPLICATE SUBOPERAND VALUE *aaa* SPECIFIED ON *bbb*, IGNORED FOR STATEMENT KEYWORD VALIDATION

Severity: 4

Explanation: *aaa* was specified on two suboperands of the *bbb* keyword. Keyword values on *bbb* must be unique.

System Action: The first *aaa* is used for statement keyword validation. The second *aaa* is ignored. NTO statement keyword validation continues.

Programmer Response: Determine which *aaa* is required and delete the other. Resubmit the generation definition.

CXN002W INVALID VALUE CODED ON *aaa*, DEFAULT VALUE *bbb* USED FOR STATEMENT KEYWORD VALIDATION

Severity: 4

Explanation: The value for the *aaa* keyword was coded incorrectly. NTO uses *bbb* for further statement keyword validation.

System Action: The invalid value is overridden. NTO statement keyword validation continues.

Programmer Response: Correct the value coded on *aaa*. Resubmit the generation definition.

CXN003E ONLY ONE NCPNAU DEFINITION STATEMENT NEEDED WITH VIROWNER=CXNNT0. AT LEAST ONE NCPNAU DEFINITION STATEMENT NEEDED WITH VIROWNER=CXNNT0

Severity: 8

Explanation: NTO requires one and only one NCPNAU statement with VIROWNER=CXNNT0 coded on it. This definition must precede the first GROUP definition statement.

System Action: Load module generation is terminated. NTO statement keyword validation stops.

Programmer Response: Ensure that the NCPNAU statement with VIROWNER=CXNNT0 is coded once and that it exists before any GROUP definitions. Resubmit the generation definition.

CXN004W INVALID SUBOPERAND *aaa* SPECIFIED ON *bbb*, IGNORED FOR STATEMENT KEYWORD VALIDATION

Severity: 4

Explanation: Suboperand *aaa* specified on *bbb* is invalid. *aaa* either had too many characters, invalid characters, or started with an invalid character.

System Action: Value *aaa* is ignored and NTO statement keyword validation continues.

Programmer Response: Correct the type and number of characters of *aaa*. Resubmit the generation definition.

CXN005W *aaa* IS VALID ONLY IF VIROWNER=CXNNT0 IS SPECIFIED ON *bbb*,
 IGNORED FOR STATEMENT KEYWORD VALIDATION

Severity: 4

Explanation: *aaa* was coded and the VIROWNER=CXNNT0 keyword was missing from the *bbb* definition statement.

System Action: *aaa* is ignored and NTO statement keyword validation continues.

Programmer Response: Either delete *aaa* or add VIROWNER=CXNNT0 to *bbb*. Resubmit the generation definition.

CXN006W PARAMETERS CONFLICT, *aaa* INVALID IF *bbb=ccc* SPECIFIED, IGNORED
 FOR STATEMENT KEYWORD VALIDATION

Severity: 4

Explanation: *aaa* is invalid when used with *bbb=ccc*. *aaa* is ignored for statement keyword validation.

System Action: NTO statement keyword validation continues.

Programmer Response: Determine whether *aaa* or *ccc* is incorrect. Correct the error and resubmit the generation definition.

CXN007E PARAMETERS CONFLICT, *aaa* REQUIRED IF *bbb=ccc* CODED

Severity: 8

Explanation: *aaa* was omitted from the device definition. When *bbb=ccc* is coded, *aaa* is required.

System Action: Load module generation is terminated. NTO statement keyword validation stops.

Programmer Response: Specify a valid symbol for *aaa* and resubmit the generation definition.

CXN008E *aaa* NOT SPECIFIED, REQUIRED

Severity: 8

Explanation: *aaa* was omitted from the NTO device definition.

System Action: Load module generation is terminated. NTO statement keyword validation stops.

Programmer Response: Specify keyword *aaa* and resubmit the generation definition.

CXN009E INVALID VALUE SPECIFIED FOR *aaa*

Severity: 8

Explanation: A keyword value for *aaa* was either invalid or had too many operands specified.

System Action: Load module generation is terminated. NTO statement keyword validation stops.

Programmer Response: Correct the keyword value for *aaa* and resubmit the generation definition.

CXN010E *aaa* SPECIFIED FOR MORE THAN ONE *bbb*, UNIQUE VALUES REQUIRED

Severity: 8

Explanation: *aaa* was specified on more than one *bbb* keyword. Each occurrence of *bbb* must have a unique value.

System Action: Load module generation is terminated. NTO statement keyword validation stops.

Programmer Response: Ensure that all occurrences of *bbb* have unique values. Correct the duplication and resubmit the generation definition.

CXN011E *aaa* NOT A DEFINED BSC OR SS DEVICE

Severity: 8

Explanation: The value coded for *aaa* was not defined to NCP as a real BSC or SS device. NTO requires that *aaa* be defined to NCP.

System Action: Load module generation is terminated. NTO statement keyword validation stops.

Programmer Response: Check the value for *aaa*. Change the value or define a BSC or SS device with that name to NCP. Resubmit the generation definition.

CXN012E CONFLICTING DIAL CHARACTERISTICS ON CORRESPONDING REAL DEVICE *aaa*, INVALID

Severity: 8

Explanation: The dial characteristics coded for the virtual device and real device *aaa* are different.

System Action: Load module generation is terminated. NTO statement keyword validation stops.

Programmer Response: Check that the dial characteristics for the virtual and real devices are the same. Resubmit the generation definition.

CXN013I TERMINAL TYPE SPECIFIED ON REAL DEVICE *aaa* IS NOT RECOMMENDED FOR NTO

Severity: 0

Explanation: NTO recommends certain values for its real device definitions. *aaa* is not one of those values.

System Action: NTO does not consider this an error, but the wrong value may cause problems.

Programmer Response: Check that the correct value is coded on the NTO keyword and the real device definition. Resubmit the generation definition if a change was made.

CXN014E VALUES SPECIFIED FOR NTO.SSLINE *aaa* AND NTO.SSTERM *bbb* ARE NOT DEFINED AS CORRESPONDING REAL DEVICES, REQUIRED**Severity:** 8**Explanation:** *aaa* and *bbb* must match a set of real LINE and TERMINAL labels. A pair of real definitions cannot be split up into different NTO virtual definitions.**System Action:** Load module generation is terminated. NTO statement keyword validation stops.**Programmer Response:** Check the real device definitions and those on NTO.SSLINE and NTO.SSTERM. Correct the set in error and resubmit the generation definition.

CXN015E PARAMETERS CONFLICT, *aaa=bbb* VALID ONLY IF *ccc=ddd*, REQUIRED**Severity:** 8**Explanation:** The keyword *aaa=bbb* can only be coded if *ccc=ddd*.**System Action:** Load module generation is terminated. NTO statement keyword validation stops.**Programmer Response:** Change either *aaa=bbb* or *ccc=ddd* so that both represent the correct value for the resource in question. Resubmit the generation definition.

CXN016E FIRST FOUR CHARACTERS SPECIFIED FOR NTO.ID ARE *aaaa*, 0100 REQUIRED**Severity:** 8**Explanation:** The first four characters of any value coded for NTO.ID must be 0100.**System Action:** Load module generation is terminated. NTO statement keyword validation stops.**Programmer Response:** Change the first four characters for NTO.ID to 0100. Resubmit the generation definition.

CXN017I *aaa=bbb* IS RECOMMENDED FOR ALL NTO VIRTUAL RESOURCES**Severity:** 0**Explanation:** *aaa* should be coded *bbb* when defining NTO virtual resources.**System Action:** Generation does not stop, but other problems may arise if a correction is not made.**Programmer Response:** Correct the value for *aaa* and resubmit the generation definition.

CXN018W TOO MANY OPERANDS SPECIFIED ON *aaa*, ONLY THE FIRST *bbb* VALUE(S) WILL BE USED FOR STATEMENT KEYWORD VALIDATION**Severity:** 4**Explanation:** Keyword *aaa* has too many values specified for it. Only *bbb* values will be used.**System Action:** NTO statement keyword validation continues.**Programmer Response:** Determine which operands can be deleted and delete them so that a maximum of *bbb* values are coded. Resubmit the generation definition.

CXN019E NTO HAS DETECTED NCP DEFINITION STATEMENTS OUT OF SEQUENCE

Severity: 8

Explanation: NTO detected a sequence error in the NCP definition statements. This message will only be output the first time NTO detects an error of this kind.

System Action: NTO statement keyword validation and creation of table 1 input halts.

Programmer Response: Find the corresponding NDF message and follow the instructions associated with it. Resubmit the generation.

CXN020E CXNNT0 WAS SPECIFIED ON NCPNAU BUT NO NTO RESOURCES WERE DEFINED. REMOVE VIROWNER=CXNNT0 FROM NCPNAU

Severity: 8

Explanation: An NTO generation was indicated by specifying VIROWNER=CXNNT0 on the NCPNAU statement. However, no NTO resources were detected in the generation. This may cause an abend when NCP is loaded in the communication controller.

System Action: NTO statement keyword validation and creation of table 1 input halts.

Programmer Response: Remove VIROWNER=CXNNT0 from the NCPNAU statement if this is not an NTO generation, or define NTO resources and run the generation again.

CXN021E THIS LINE DEFINITION SHOULD BE FOLLOWED BY A PU DEFINITION

Severity: 8

Explanation: For a real line definition, a PU definition must come before an LU definition. For a virtual line definition, a PU definition must be the next statement.

System Action: NTO statement keyword validation and creation of table 1 input halts.

Programmer Response: Add a valid PU definition following the line. Resubmit the generation.

CXN022E A VIRTUAL SWITCHED LINE DEFINITION MUST BE FOLLOWED BY A PU DEFINITION NO LU IS ALLOWED

Severity: 8

Explanation: A virtual switched line definition must be followed by a PU definition. No LU is allowed for virtual switched line definitions.

System Action: NTO statement keyword validation and creation of table 1 input halts.

Programmer Response: Replace the LU definition with a PU definition. Resubmit the generation.

CXN023E AN INVALID LU IS DEFINED

Severity: 8

Explanation: An LU definition may not follow a virtual GROUP definition for a switched line, a virtual PU definition for a switched line, or a virtual LU definition for a nonswitched line.

System Action: NTO statement keyword validation and creation of table 1 input halts.

Programmer Response: Remove the invalid LU definition. Resubmit the generation.

CXN024E A LINE DEFINITION IS MISSING FOLLOWING A GROUP STATEMENT**Severity:** 8**Explanation:** A virtual GROUP statement must be followed by a LINE definition. A real GROUP statement must have a LINE definition prior to a TERMINAL definition. One of these situations was violated.**System Action:** NTO statement keyword validation and creation of table 1 input halts.**Programmer Response:** Add a valid LINE definition following GROUP. Resubmit the generation.

CXN025E A VIRTUAL NONSWITCHED LINE IS NOT FOLLOWED BY A PU/LU PAIR**Severity:** 8**Explanation:** Virtual definitions for nonswitched lines must be followed by a PU definition and an LU definition before encountering another LINE definition, GROUP definition, or the end of the generation.**System Action:** NTO statement keyword validation and creation of table 1 input halts.**Programmer Response:** Add definitions for a PU and an LU following the virtual LINE definition. Resubmit the generation.

CXN026E A VIRTUAL PU FOR A NONSWITCHED LINE DEFINITION MUST BE FOLLOWED BY AN LU DEFINITION**Severity:** 8**Explanation:** The only valid definition that may follow a virtual PU definition for a nonswitched line is an LU definition.**System Action:** NTO statement keyword validation and creation of table 1 input halts.**Programmer Response:** Add an LU definition following the PU definition. Resubmit the generation.

CXN027E CONSECUTIVE VIRTUAL PU DEFINITIONS ARE NOT ALLOWED FOR SWITCHED LINES**Severity:** 8**Explanation:** Multipoint switched lines are not allowed with NTO; therefore, you may not have more than one PU on a switched line.**System Action:** NTO statement keyword validation and creation of table 1 input halts.**Programmer Response:** Remove all but one of the PU definitions. Resubmit the generation.

Appendix D. BIND Format and Validity Checking of the BIND RU

This appendix describes the BIND formats for the NTO devices and the validity checking of the BIND request unit (RU) by NTO. It is divided into two sections:

- “BIND Format for NTO Devices”
- “Validity Checking of the BIND RU”

NTO performs Set Destination Mode when it processes the BIND request unit (RU). The data used is obtained from the user data field in the BIND RU or from default values. These default values are equivalent to the following system generation options on the NCP TERMINAL definition statement:

```
ATTN=ENABLED
CDATA=NO
ENDTRNS=EOT
INHIBIT=ERPR.
```

The following keywords are recommended, if the NTO device or subsystem can support them:

```
ATTN=ENABLED
FEATURE=(ATTN,BREAK).1
```

The following figures and tables describe the BIND format:

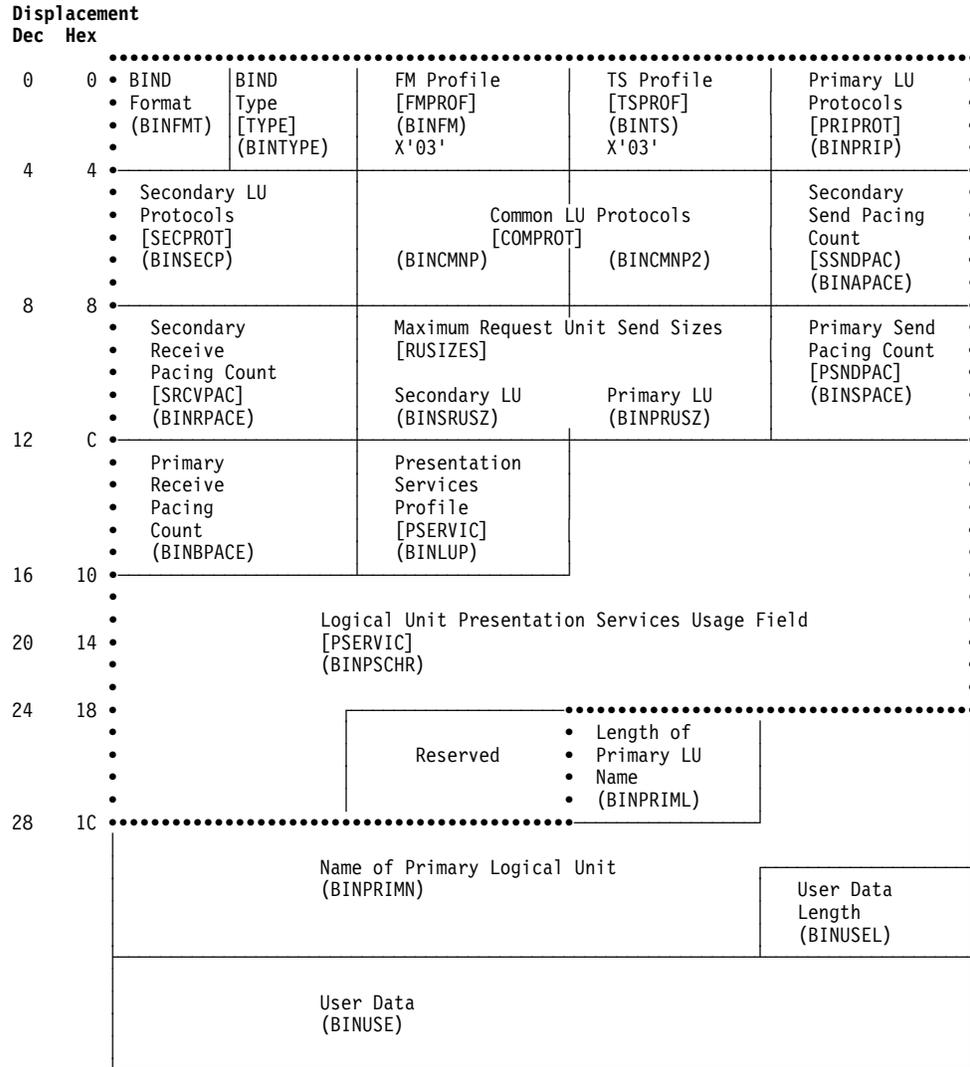
- Figure 9 on page 120 describes the BIND format.
- Figure 10 on page 121 describes the user extension of the BIND.
- Table 15 on page 121 and Table 16 on page 121 describe the format for the block handler (BH) flags and mode flags in the user extension of the BIND.
- Table 18 on page 123 describes the RU fields that NTO tests during the processing of the BIND RU.

The user extension of the BIND (Figure 10 on page 121) allows a user-written application program to activate and deactivate block handlers. VTAM standard definition statements do not allow the user data field in the BIND to be defined. These block handlers can be used to perform functions in NCP, such as text editing of data streams. User-written application programs can activate block handlers in NCP through the BH flags and mode flags fields. The BH flags information is used as part of a modify BH control request. The mode flags are part of a Set Destination Mode control request.

¹ FEATURE=BREAK is required for TWX.

BIND Format for NTO Devices

Figure 9 provides the layout of a BIND for NTO devices.



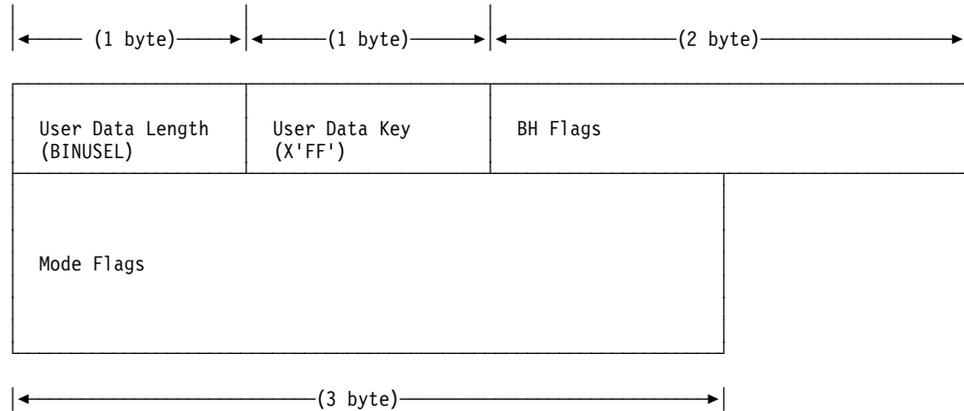
The dotted section is the fixed-length portion of the BIND format.

The names in brackets are keywords of the MODEENT definition statement used to build the corresponding fields in a logon mode table entry (refer to *VTAM Resource Definition Reference*).

The names in parentheses are the ISTDBIND DSECT labels for the BIND RU fields. The ISTDBIND DSECT is used to examine a set of session parameters. Byte 0 of the BIND RU is the BIND request code and is not included in the ISTDBIND DSECT; bytes 1 through 26 of the BIND RU comprise the fixed-length portion of the BIND format shown in this figure. Refer to *VTAM Programming* for further information.

Figure 9. Format of the BIND

Figure 10 provides the layout of the user extension to an NTO BIND.



Note: The user extension of the BIND is not supported by TSO/VTAM or the MODEENT definition statement.

Figure 10. User Extension of the BIND

Table 15 lists the format of the BH flags. Table 16 provides the format of the mode flags.

Table 15. Format of the BH Flags

Byte	Bit	Value	Meaning
0	0	0	Do not change current BH set.
1	1–2	1	Change BH set.
		3–7	00
	0–7	01	Deactivate.
		10	Activate.
		11	Reserved.
	0	0	Reserved.
		1–FF	

Note: If the BH flags are zero, or if the user data length is less than 2 and includes the user data key, NTO will not issue a Modify BH request; otherwise, NTO will issue a Modify BH request to activate or modify the BH set.

Table 16 (Page 1 of 2). Format of the Mode Flags

Byte	Bit	Value	Meaning
0	0	0	BSC transparency bit set off.
		1	BSC transparency bit set on.
1	0	0	Do text mode ERPs (default).
		1	Override text mode ERPs (writes).
2	0	0	Accept leading graphics (writes).
		1	Reject leading graphics (default).
3	0	0	Do not delete EIB (default).
		1	Delete EIB.
4	0	Reserved.	
5	0	0	Do idle insertion (default).
		1	Inhibit idle insertion.
6	0	0	No embedded line control (default).
		1	Embedded line control.
7	0	0	Not critical text (default).
		1	Critical text.

Table 16 (Page 2 of 2). Format of the Mode Flags

Byte	Bit	Value	Meaning
1	0	0	TWXID prompt (default).
		1	No TWXID prompt.
	1	0	Do text mode ERPs (required for BSC terminals with temporary text delay character).
		1	Override text mode ERPs (reads) (default).
	2	0	Accept leading graphics (read).
		1	Reject leading graphics (default).
	3	0	Allow text time-out/do not insert EIB (default).
		1	Inhibit text time-out/insert EIB.
	4	0	No subblocking.
		1	Subblocking (default).
5	1	Interrupt enabled (required, always forced to 1).	
6	1	Monitor mode active (required, always forced to 1).	
7	1	Leave monitor active (required, always forced to 1).	
2	0-4	0	Reserved.
		5	EOB not = EOT (default). EOB = EOT.
	6-7	10	Message.
		01	Block (default).
		11	Transmission.

NTO takes the actions shown in Table 17 based on user data length.

Table 17. User Data Length and NTO Response

User Data Length	Action
3 or less	Issue a Set Destination Mode request using defaults.
4	Issue a Set Destination Mode request using mode flags byte 0 plus defaults for bytes 1 and 2.
5	Issue a Set Destination Mode request using mode flags bytes 0 and 1 plus defaults for byte 2.
6	Issue a Set Destination Mode request using mode flags bytes 0, 1, and 2.

Validity Checking of the BIND RU

During the processing of a BIND request unit (RU), NTO tests certain RU fields. If an unacceptable value is found in any of the tested fields, NTO indicates an error condition and rejects the BIND RU. Table 18 on page 123 shows the acceptable values of these RU fields. Only those fields tested by NTO during the validity checking of the BIND RU are enumerated in this chart.

Table 18. BIND RU Fields Tested by NTO

Offset/ Field Name	Acceptable Value	Meaning
0(0) BINTYPE		BIND type.
	.... 0001	Cold activation.
1(1) BINFM		FM profile.
	0000 0011	X'03' is the only acceptable value.
2(2) BINTS		TS profile.
	0000 0011	X'03' is the only acceptable value.
3(3) BINPRIP		Primary LU protocols.
	..01	Exception response.
	..10	Definite response.
	..11	Either definite or exception response.
	.... ..0.	Compression must not be used.
	.... ...1	Primary LU may send End Bracket indicator.
4(4) BINSECP		Secondary LU protocols.
	1...	Multiple request chains.
	..01	Exception response.
	..10	Definite response.
	..11	Either definite or exception response.
	.... ..0.	Compression must not be used.
	.... ...1	Secondary may send EB (End Bracket).
5(5) BINCMNP		Common LU protocols.
	.0..	FM headers must not be used.
	..1.	Brackets will be used and the reset state is between brackets.
	...1	Conditional bracket termination (Termination Rule 1).
	.... 0...	Alternate code must not be used.
6(6) BINCMNP2		Common LU protocols.
	01..	Half-duplex contention mode.
	10..	Half-duplex flip-flop mode.
	..0.	Contention loser is responsible for recovery.
	...0	Secondary is first speaker in bracket mode and contention winner.

Appendix E. MTA Sign-On Procedure for Terminal Operators

This appendix explains how to sign on to a terminal under control of the MTA facility. It is divided into two sections:

- “General Sign-On Procedure” provides a basic process for signing on to all types of terminals.
- “Specific MTA Sign-On Procedures” gives detailed sign-on information.

Terminals under control of the multiple terminal access (MTA) facility of NCP require a sign-on procedure to allow the program to determine the type of terminal that is calling the controller. The program analyzes the sign-on message and control characters received from the terminal to determine the type of terminal and the transmission code it employs, then selects the appropriate control procedures for use with that terminal. The program uses the selected procedure for as long as the connection to that terminal exists.

The sign-on procedure differs for the various types of terminals. The procedure to be used for each terminal should be posted at the terminal or given to each terminal user.

General Sign-On Procedure

Use the following procedures to sign on at MTA terminals.

For All MTA Terminals Except TWX

1. Dial the telephone number of the MTA link used to communicate with the controller.
2. After the keyboard unlocks or the bid message is printed, (for basic 2740 and 2740 with checking) enter the two characters, /" (slash double-quotation mark). Allow the bid message to be completely printed before pressing the bid key and entering the /" characters. Failure to do so can cause unpredictable results. The bid message is transmitted in both correspondence code and in EBCD/BCD code so that it is printed intelligibly regardless of the code used.
3. If you define more than one line control selection table (LCST) entry in the MTATABL definition statement representing the terminal, enter a 2-digit index number representing the LCST entry used by the program when communicating with the terminal. The first entry named in the MTATABL definition statement associated with the terminal is represented by index number 00, the second by 11, and so on. The two digits must be identical. If the first entry is used, or only one entry is named in the MTATABL definition statement, you do not need to enter the 00 index number. NCP uses the first (or only) entry if no index number is entered.
4. End the sign-on procedure as follows:
 - For IBM 2740 with checking or IBM 2740 with transmit control and checking:* Press the return key, then enter the end-of-block (EOB) character.
 - For basic IBM 2740 or an IBM 2740 with transmit control:* Press the return key, then enter the end-of-transmission (EOT) character.
 - For IBM 2741:* Press the return key.

For TWX Terminals

1. Dial the telephone number of the MTA link used to communicate with the controller.
2. Press the LCST selection key within three seconds after the audible data tone begins. (If you wait longer than three seconds, a time-out occurs and the connection breaks.)

The LCST selection key is determined by your installation from values of the COMPARE and MASK keywords on the MTALCST definition statement. If you do not specify these keywords, the default values will properly identify the WRU character transmitted at 110 baud. Refer to *NCP, SSP, and EP Resource Definition Guide* and to *NCP, SSP, and EP Generation and Loading Guide* for more information.

Errors in the Sign-On Procedure

If the typing mechanism of the terminal does not move after you enter the sign-on message, assume that the sign-on was successful and begin keying message data.

However, if you make an error entering the sign-on message, or NCP cannot identify the type of terminal, the program sends a character sequence that “wiggles” the typing mechanism to signal you to reenter the sign-on message. (If the terminal is a basic IBM 2740, press the bid key before reentering the message.)

If you delay too long in completing the sign-on message, or you enter it erroneously enough times to reach the retry limit, NCP breaks the line connection. Redial the controller and begin again. MTARTO on the BUILD definition statement determines the time allowed to complete the sign-on message; the retry defines limit MTARTRY on BUILD.

Specific MTA Sign-On Procedures

At each terminal, post the appropriate procedure modified as necessary to suit local conditions

IBM 2741

1. Dial the computer, using the following telephone number(s): _____.
2. When the keyboard unlocks, enter *l*.
Optionally enter the MTA index number [11, 22,...].
3. Press the return key.

If the type element does not move within a few seconds, you signed on successfully and can begin entering message data. If the type element “wiggles,” the sign-on was unsuccessful. Repeat steps 2 and 3.

IBM 2740 without Transmit Control or Checking

1. Dial the computer, using the following telephone number(s): _____.
The bid message is now printed.
2. After the bid message is completed, press the bid key, then enter /".
Optionally enter the MTA index number [11, 22,...].
3. Press the return key.
4. Enter EOT.

If the type element does not move within several seconds, you signed on successfully and can begin entering message data. If the type element "wiggles," the sign-on was unsuccessful. Press the bid key and then repeat steps 2, 3, and 4.

IBM 2740 with Checking

1. Dial the computer, using the following telephone number(s): _____.
The bid message is now printed.
2. After the bid message is completed, press the bid key, then enter /".
Optionally enter MTA index number: [11, 22,...].
3. Press the return key.
4. Enter EOB. (If you enter EOT by mistake, repeat the entire procedure, beginning with step 1.)

If the type element does not move within several seconds, you signed on successfully and can begin entering message data. If the type element "wiggles," the sign-on was unsuccessful. Repeat steps 2, 3, and 4.

IBM 2740 with Transmit Control

1. Dial the computer, using the following telephone number(s): _____.
2. When the keyboard unlocks, enter /".
Optionally enter MTA index number: [11, 22,...].
3. Press the return key.
4. Enter EOT.

signed on successfully and can begin entering message data. If the type element "wiggles," the sign-on was unsuccessful. Press the bid key and then repeat steps 2, 3, and 4.

IBM 2740 with Transmit Control and Checking

1. Dial the computer, using the following telephone number(s): _____.
2. When the keyboard unlocks, enter /".
Optionally enter MTA index number: [11, 22...].
3. Press the return key.
4. Enter EOB. (If you enter EOT by mistake, repeat the entire procedure, beginning with step 1.)

If the type element does not move within several seconds, you signed on successfully and can begin entering message data. If the type element “wiggles,” the sign-on was unsuccessful. Repeat steps 2, 3, and 4.

For TWX Terminals

1. Dial the computer, using the following telephone number(s): _____.
2. Press the LCST selection key within three seconds after the audible data tone begins.

If the typing mechanism does not “move” within several seconds, you signed on successfully and can begin entering message data. If the mechanism does “wobble,” the sign-on was unsuccessful. Press the LCST selection key again or repeat both steps.

Glossary

This glossary includes terms and definitions from:

- The *American National Standard Dictionary for Information Systems*, ANSI X3.172-1990, copyright 1990 by the American National Standards Institute (ANSI). Copies may be purchased from the American National Standards Institute, 11 West 42nd Street, New York, New York 10036. Definitions are identified by the symbol (A).
- The *Information Technology Vocabulary*, developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and the International Electrotechnical Commission (ISO/IEC JTC1/SC1). Definitions of published parts of this vocabulary are identified by the symbol (I); definitions taken from draft international standards, committee drafts, and working papers being developed by ISO/IEC JTC1/SC1 are identified by the symbol (T), indicating that final agreement has not yet been reached among the participating National Bodies of SC1.

The following cross references are used in this glossary:

Contrast with: This refers to a term that has an opposed or substantively different meaning.

Synonym for: This indicates that the term has the same meaning as a preferred term, which is defined in its proper place in the glossary.

Synonymous with: This is a backward reference from a defined term to all other terms that have the same meaning.

See: This refers the reader to multiple-word terms that have the same last word.

See also: This refers the reader to related terms that have a related, but not synonymous, meaning.

A

abend. Abnormal end of task.

abnormal end of task (abend). Termination of a task before its completion because of an error condition that cannot be resolved by recovery facilities while the task is executing.

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

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

ACF/SSP. Advanced Communications Function for the System Support Programs. Synonym for *SSP*.

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

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

activate. To make a resource of a node ready to perform the functions for which it was designed. Contrast with *deactivate*.

active. The state a resource is in when it has been activated and is operational. Contrast with *inactive*.

adaptive session-level pacing. A form of session-level pacing in which session components exchange pacing windows that may vary in size during the course of a session. This allows transmission within a network to adapt dynamically to variations in availability and demand of buffers on a session-by-session basis. Session-level pacing occurs within independent stages along the session path according to local congestion at the intermediate nodes. Synonymous with *adaptive session pacing*. See *pacing*. See also *flow control*.

adaptive session pacing. Synonym for *adaptive session-level pacing*.

Advanced Communications Function (ACF). A group of IBM licensed programs (principally VTAM, TCAM, NCP, and SSP) that use the concepts of Systems Network Architecture (SNA), including distribution of function and resource sharing.

allocate. A logical unit (LU) 6.2 application program interface (API) verb used to assign a session to a conversation for the conversation's use. Contrast with *deallocate*.

alternate route. A secondary or backup route that is used if normal routing is not possible.

API. Application program interface.

APPL. Application program.

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

application program interface (API). (1) The formally defined programming language interface between an IBM system control program or licensed program and its user. (2) The interface through which an application program interacts with an access method. In VTAM, it is the language structure used in control blocks so that application programs can reference them and be identified to VTAM.

ASCII. (A) American National Standard Code for Information Interchange. The standard code, using a coded character set consisting of 7-bit coded characters (8-bit including parity check), used for information interchange among data processing systems, data communication systems, and associated equipment. The ASCII set consists of control characters and graphic characters.

B

begin bracket. In SNA, the value (binary 1) of the begin-bracket indicator in the request header (RH) of the first request in the first chain of a bracket; the value denotes the start of a bracket. Contrast with *end bracket*. See also *bracket*.

BHSET. Block handler routines.

binary synchronous communication (BSC).

(1) Communication using binary synchronous line discipline. (2) A uniform procedure, using a standardized set of control characters and control character sequences, for synchronous transmission of binary-coded data between stations.

BIND. In SNA, a request to activate a session between two logical units (LUs).

bracket. One or more chains of request units and their responses that are exchanged between two session partners and that represent a transaction between them. A bracket must be completed before another bracket can be started. Examples of brackets are database inquiries/replies, update transactions, and remote job entry output sequences to workstations.

branch exchange. A switching system that provides telephone communication between branch stations and external networks.

BSC. Binary synchronous communication.

buffer. A portion of storage for temporarily holding input or output data.

C

CA. (1) Channel attachment.

call. (1) (A) (I) The action of bringing a computer program, a routine, or a subroutine into effect, usually by specifying the entry conditions and jumping to an entry point. (2) To transfer control to a procedure, program, routine, or subroutine. (3) The actions necessary to make a connection between two stations. (4) To attempt to contact a user, regardless of whether the attempt is successful.

calling. (A) (I) The process of transmitting selection signals in order to establish a connection between data stations.

CALLOUT. The logical channel type on which the data terminal equipment (DTE) can send a call, but cannot receive one.

channel. (A) A path along which signals can be sent, for example, data channel, output channel. See also *link*.

channel-attached (CA). (1) Pertaining to the attachment of devices directly by input/output channels to a host processor. (2) Pertaining to devices attached to a controlling unit by cables, rather than by telecommunication lines. Contrast with *link-attached*. Synonymous with *local*.

CICS. Customer Information Control System.

command. (1) A request from a terminal for the performance of an operation or the execution of a particular program. (2) In SNA, any field set in the transmission header (TH), request header (RH), and sometimes portions of a request unit (RU), that initiates an action or that begins a protocol; for example: (a) Bind Session (session-control request unit), a command that activates an LU-LU session, (b) the change-direction indicator in the RH of the last RU of a chain, (c) the virtual route reset window indicator in a FID4 transmission header.

command processor. A user-written module designed to perform a specific function. Command processors, which can be written in assembler or a high-level language (HLL), are invoked as commands.

communication control unit. A communication device that controls the transmission of data over lines in a network. Communication control units include transmission control units (such as the 2702 Transmission Control Unit) and communication controllers (such as the 3720 or 3725).

communication controller. A type of communication control unit whose operations are controlled by one or

more programs stored and executed in the unit; for example, the IBM 3725 Communication Controller. It manages the details of line control and the routing of data through a network.

configuration. (1) (T) The arrangement of a computer system or network as defined by the nature, number, and the chief characteristics of its functional units. The term may refer to a hardware or a software configuration. (2) The devices and programs that make up a system, subsystem, or network.

connection. Synonym for *physical connection*.

contention. In a session, a situation in which both NAUs attempt to initiate the same action at the same time, such as when both attempt to send data in a half-duplex protocol (half-duplex contention), or both attempt to start a bracket (bracket contention). At session initiation, one NAU is defined to be the contention winner; its action will take precedence when contention occurs. The contention loser must get explicit or implicit permission from the contention winner to begin its action.

control block. (1) (I) A storage area used by a computer program to hold control information. (2) In the IBM Token-Ring Network, a specifically formatted block of information provided from the application program to the Adapter Support Interface to request an operation.

control point (CP). (1) A component of a node that manages resources of that node and optionally provides services to other nodes in the network. Examples are a system services control point (SSCP) in a type 5 node, a physical unit control point (PUCP) in a type 4 node, a network node control point (NNCP) in a type 2.1 network node, and an end node control point (ENCP) in a type 2.1 end node. An SSCP and an NNCP can provide services to other nodes. (2) A component of a type 2.1 node that manages the resources of that node. If the type 2.1 node is an APPN node, the CP is capable of engaging in CP-CP sessions with other APPN nodes. If the type 2.1 node is a network node, the CP also provides services to adjacent end nodes in the type 2.1 network.

controller. A unit that controls input/output operations for one or more devices.

CP. Control point

cross-domain. In SNA, pertaining to control of resources involving more than one domain. Contrast with *same-domain*.

Customer Information Control System (CICS). A licensed program that enables transactions entered at remote terminals to be processed concurrently by

user-written application programs. It also includes facilities for building, using, and maintaining databases.

CWALL. An NCP threshold of buffer availability, below which the NCP will accept only high-priority path information units (PIUs).

D

DACTLINK. Deactivate link.

data set. The major unit of data storage and retrieval, consisting of a collection of data in one of several prescribed arrangements and described by control information to which the system has access.

ddname. Data definition name.

deactivate. To take a resource of a node out of service, rendering it inoperable, or to place it in a state in which it cannot perform the functions for which it was designed. Contrast with *activate*.

deallocate. A logical unit (LU) 6.2 application program interface (API) verb that terminates a conversation, thereby freeing the session for a future conversation. Contrast with *allocate*.

definite response (DR). In SNA, a protocol requested in the form-of-response-requested field of the request header that directs the receiver of the request to return a response unconditionally, whether positive or negative, to that request chain. Contrast with *exception response (ER)*.

definition statement. (1) In VTAM, the statement that describes an element of the network. (2) In NCP, a type of instruction that defines a resource to the NCP. See Figure 11, Figure 12, and Figure 13 on page 132.

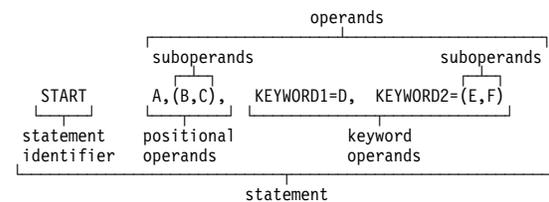


Figure 11. Example of a Language Statement

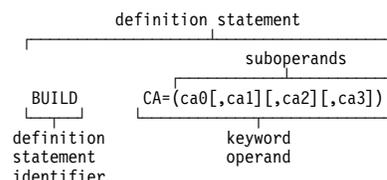


Figure 12. NCP Examples

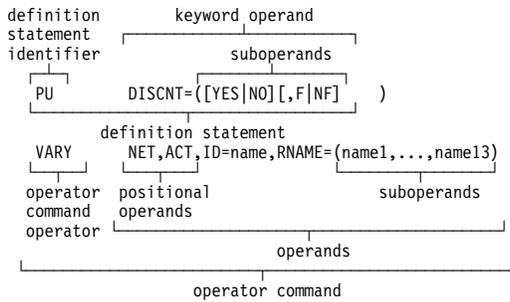


Figure 13. VTAM Examples

See also *keyword*, *keyword operand*, *operand*, *statement*, and *suboperand*.

dial-in. Refers to the direction in which a switched connection is requested by any node or terminal other than the receiving host or an NCP.

dial-out. Refers to the direction in which a switched connection is requested by a host or an NCP.

domain. An access method, its application programs, communication controllers, connecting lines, modems, and attached terminals.

DR. Definite response.

DSECT. Dummy control section.

duplex. (A) In data communication, pertaining to a simultaneous two-way independent transmission in both directions. Synonymous with *full duplex (FDX)*. Contrast with *half-duplex*.

dynamic. (1) In programming languages, pertaining to properties that can only be established during the execution of a program; for example, the length of a variable-length data object is dynamic. (2) Pertaining to an operation that occurs at the time it is needed rather than at a predetermined or fixed time.

E

EBCDIC. (A) Extended binary-coded decimal interchange code. A coded character set consisting of 8-bit coded characters.

EIB. External interrupt block.

element. (1) A field in the network address. (2) The particular resource within a subarea identified by the element address. See also *subarea*.

element address. A value in the element address field of the network address identifying a specific resource within a subarea. See *subarea address*.

emulation mode. The function of a network control program that enables it to perform activities equivalent

to those performed by a transmission control unit. Contrast with *network control mode*.

Emulation Program (EP). An IBM control program that allows a channel-attached 3705 or 3725 communication controller to emulate the functions of an IBM 2701 Data Adapter Unit, an IBM 2702 Transmission Control, or an IBM 2703 Transmission Control. See also *network control program*.

end bracket. In SNA, the value (binary 1) of the end bracket indicator in the request header (RH) of the first request of the last chain of a bracket; the value denotes the end of the bracket. Contrast with *begin bracket*. See also *bracket*.

end-of-transmission (EOT). The specific character, or sequence of characters, that indicates no more data.

end-of-transmission (EOT) handshaking. When a 3710 sends EOT characters over an idle line and waits for return characters. If no EOT response is returned, the 3710 breaks the session.

EOT. End-of-transmission.

EP. Emulation Program.

ER. Exception response.

ERP. Error recovery procedures

error recovery procedures (ERP). (1) Procedures designed to help isolate and, where possible, to recover from errors in equipment. The procedures are often used in conjunction with programs that record information on machine malfunctions. (2) A set of routines that attempt to recover from transmission errors.

exception response (ER). In SNA, a protocol requested in the form-of-response-requested field of a request header that directs the receiver to return a response only if the request is unacceptable as received or cannot be processed; that is, a negative response, but not a positive response, may be returned. Contrast with *definite response (DR)*.

EXEC. In a VM operating system, a user-written command file that contains CMS commands, other user-written commands, and execution control statements, such as branches.

exit routine. A routine that receives control when a specified event occurs. For IBM software products, an exit routine is classified as either an installation-wide exit routine or a user exit routine.

EXT. External trace file.

extended network addressing. The network addressing system that splits the address into an 8-bit subarea and a 15-bit element portion. The subarea portion of the address is used to address host processors or communication controllers. The element portion is used to permit processors or controllers to address resources.

extended subarea addressing. A network addressing system that is used in a network with more than 255 subareas.

F

flow control. The process of managing the rate at which data traffic passes between components of the network. The purpose of flow control is to optimize the rate of flow of message units, with minimum congestion in the network; that is, to neither overflow the buffers at the receiver or at intermediate routing nodes, nor leave the receiver waiting for more message units. See also *adaptive session-level pacing*.

frame. In SDLC, the vehicle for every command, every response, and all information that is transmitted using SDLC procedures.

full duplex (FDX). Synonym for *duplex*.

G

generation. The process of assembling and link editing definition statements so that resources can be identified to all the necessary programs in a network.

generation definition. The definition statement of a resource used in generating a program.

H

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

half-session. A session-layer component consisting of the combination of data flow control and transmission control components comprising one end of a session.

host. Synonymous with *host processor*.

host processor. (1) (T) A processor that controls all or part of a user application network. (2) In a network, the processing unit in which the data communication access method resides.

I

I/O. Input/output.

IMS. Information Management System. Synonymous with *IMS/VS*.

IMS/VS. Information Management System/Virtual Storage. Synonym for *IMS*.

information (I) format. A format used for information transfer.

Information Management System (IMS). A general purpose system whose full name is Information Management System/Virtual Storage (IMS/VS). It enhances the capabilities of OS/VS for batch processing and telecommunication and allows users to access a computer-maintained data base through remote terminals.

Information/Management. A feature of the Information/System licensed program that provides interactive systems management applications for problem, change, and configuration management.

Information/System. An interactive retrieval program with related utilities designed to provide systems programmers with keyword access to selected technical information contained in either of its companion products, Information/MVS or Information/VM-VSE.

INITIATE. A network services request sent from a logical unit (LU) to a system services control point (SSCP) requesting that an LU-LU session be established.

inoperative. The condition of a resource that has been active, but is not. The resource may have failed, received an INOP request, or is suspended while a reactivate command is being processed. Contrast with *active*.

INT. Internal trace table.

interface. (A) A shared boundary. An interface might be a hardware component to link two devices or it might be a portion of storage or registers accessed by two or more computer programs.

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

ISTATUS. In VTAM and NCP, a definition specification method for indicating the initial status of resources.

J

JCL. Job control language.

job control language (JCL). (A) A problem-oriented language designed to express statements in a job that are used to identify the job or describe its requirements to an operating system.

K

keyword. (1) (T) A lexical unit that, in certain contexts, characterizes some language construction. (2) (A) One of the predefined words of an artificial language. (3) One of the significant and informative words in a title or document that describes the content of that document. (4) A name or symbol that identifies a parameter. (5) A part of a command operand that consists of a specific character string (such as DSNAME=). See also *definition statement*, *keyword operand*, *operand*, and *parameter*.

keyword operand. An operand that consists of a keyword followed by one or more values (such as DSNAME=HELLO). See also *definition statement*.

L

line. Channel or circuit.

line group. One or more telecommunication lines of the same type that can be activated and deactivated as a unit.

line mode. A form of screen presentation in which the information is presented a line at a time in the message area of the terminal screen.

line speed. The number of binary digits that can be sent over a telecommunication line in one second, expressed in bits per second (bps).

link. The combination of the link connection (the transmission medium) and two link stations, one at each end of the link connection. A link connection can be shared among multiple links in a multipoint or token-ring configuration. See also *channel*.

link-attached. Pertaining to devices that are physically connected by a telecommunication line. Contrast with *channel-attached (CA)*. Synonymous with *remote*.

load module. (I) A program unit that is suitable for loading into main storage for execution; it is usually the output of a linkage editor.

local. Pertaining to a device that is attached to a controlling unit by cables, rather than by a telecommunication line. Synonymous with *channel-attached*.

local address. In SNA, an address used in a peripheral node in place of an SNA network address and transformed to or from an SNA network address by the boundary function in a subarea node.

logical unit (LU). A type of network accessible unit that enables end users to gain access to network resources and communicate with each other.

logical unit (LU) 6.2. A type of logical unit that supports general communication between programs in a distributed processing environment. LU 6.2 is characterized by (a) a peer relationship between session partners, (b) efficient utilization of a session for multiple transactions, (c) comprehensive end-to-end error processing, and (d) a generic application program interface (API) consisting of structured verbs that are mapped into a product implementation.

logmode table. Synonym for *logon mode table*.

logon mode. In VTAM, a subset of session parameters specified in a logon mode table for communication with a logical unit. See also *session parameters*.

logon mode table. In VTAM, a set of entries for one or more logon modes. Each logon mode is identified by a logon mode name. Synonymous with *logmode table*.

LU. Logical unit.

LU-LU session. A session between two logical units (LUs) in an SNA network. It provides communication between two end users, or between an end user and an LU services component. See *session*.

LU type. The classification of an LU in terms of the specific subset of SNA protocols and options it supports for a given session, namely:

- The mandatory and optional values allowed in the session activation request.
- The usage of data stream controls, function management headers (FMHs), request unit parameters, and sense data values.
- Presentation services protocols such as those associated with FMH usage.

LU types 0, 1, 2, 3, 4, 6.1, 6.2, and 7 are defined.

LUCB. Logical unit control block.

LUS. Logical unit services.

M

maintain system history program (MSHP). A program that facilitates the process of installing and servicing a VSE system.

management services (MS). One of the types of network services in control points (CPs) and physical units (PUs). Management services are the services provided to assist in the management of SNA networks, such as problem management, performance and accounting management, configuration management, and change management.

migration. Installing a new version or release of a program when an earlier version or release is already in place.

modem. A device that modulates and demodulates signals transmitted over data communication facilities. The term is a contraction for modulator-demodulator.

module. (A) A program unit that is discrete and identifiable with respect to compiling, combining with other units, and loading; for example, the input to or output from an assembler, compiler, linkage editor, or executive routine.

MS. Management services.

MSG. Console messages.

MSHP. Maintain system history program.

multiple-domain network. A network with more than one system services control point.

Multiple Virtual Storage (MVS). An IBM licensed program whose full name is the Operating System/Virtual Storage (OS/VS) with Multiple Virtual Storage/System Product for System/370. It is a software operating system controlling the execution of programs.

MVS. Multiple Virtual Storage.

N

NC. Network control.

NCP. (1) Network Control Program (IBM licensed program). Its full name is Advanced Communications Function for the Network Control Program. Synonymous with *ACF/NCP*. (2) Network control program (general term).

NCP major node. In VTAM, a set of minor nodes representing resources, such as lines and peripheral nodes, controlled by a network control program.

NCP/EP definition facility (NDF). A program that is part of System Support Programs (SSP) and is used to generate a partitioned emulation program (PEP) load module or a load module for a Network Control Program (NCP) or for an Emulation Program (EP).

NDF. Network definition facility.

NetView. A system 370-based IBM licensed program used to monitor a network, manage it, and diagnose its problems.

network. (1) (T) An interconnected group of nodes. (2) A group of nodes and the links interconnecting them. See *SNA network*.

network control (NC). In SNA, a request/response unit (RU) category used for requests and responses exchanged between physical units (PUs) for such purposes as activating and deactivating explicit and virtual routes and sending load modules to adjust peripheral nodes. See also *session control (SC)*.

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

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

Network Control Program (NCP). An IBM licensed program that provides communication controller support for single-domain, multiple-domain, and interconnected network capability. Its full name is Advanced Communications Function for the Network Control Program. See also *Emulation Program*.

network definition facility (NDF). The facility that defines the identities and characteristics of each node in the network and the arrangement of the nodes in that system.

network management vector transport (NMVT). A management services request/response unit (RU) that flows over an active session between physical unit management services and control point management services (SSCP-PU session).

network performance analyzer (NPA). A function of NCP that collects performance data about devices. The data is recorded by NPM.

Network Routing Facility (NRF). An IBM licensed program that resides in the NCP, which provides a path for messages between terminals, and routes messages over this path without going through the host processor.

Network Terminal Option (NTO). An IBM licensed program used in conjunction with NCP that allows certain non-SNA devices to participate in sessions with SNA application programs in the host processor. NTO converts non-SNA protocol to SNA protocol when data is sent to the host from a non-SNA device and reconverts SNA protocol to non-SNA protocol when data is sent back to the device.

NMVT. Network management vector transport.

node. (1) An endpoint of a link or junction common to two or more links in a network. Nodes can be processors, communication controllers, cluster controllers, or terminals. Nodes can vary in routing and other functional capabilities. (2) In VTAM, a point in a network defined by a symbolic name.

node type. A designation of a node according to the protocols it supports and the network accessible units that it can contain. Five types are defined: 1, 2.0, 2.1, 4, and 5. Within a subarea network, type 1, type 2.0, and type 2.1 nodes are peripheral nodes, while type 4 and type 5 nodes are subarea nodes.

nonswitched line. A telecommunication line on which connections do not have to be established by dialing. Contrast with *switched line*.

NOTIFY. A network services request that is sent by an SSCP to a logical unit (LU) to inform the LU of the status of a procedure requested by the LU.

NPA. Network performance analyzer.

NRF. Network Routing Facility.

NTO. Network Terminal Option.

O

operand. (1) (I) An entity on which an operation is performed. (2) (A) That which is operated upon. An operand is usually identified by an address part of an instruction. (3) Information entered with a command name to define the data on which a command processor operates and to control the execution of the command processor. (4) An expression to whose value an operator is applied. See also *definition statement*, *keyword*, and *parameter*.

OS/VS2. A virtual storage operating system that is an extension of OS/MVT.

P

padding. A technique by which a receiving component controls the rate of transmission of a sending component to prevent overrun or congestion. See *adaptive session pacing*, *send pacing*. See also *flow control*.

parameter. (1) (I) A variable that is given a constant value for a specified application and that may denote the application. (2) An item in a menu for which the user specifies a value or for which the system provides a value when the menu is interpreted. (3) Data passed to a program or procedure by a user or another program, namely as an operand in a language statement, as an item in a menu, or as a shared data structure. See also *keyword* and *operand*.

path. (1) The series of transport network components (path control and data link control) that are traversed by the information exchanged between two network accessible units. (2) In VTAM when defining a switched major node, a potential dial-out port that can be used to reach that node.

peripheral PU. Peripheral physical unit.

physical connection. In VTAM, a point-to-point connection or multipoint connection. Synonymous with *connection*.

physical unit (PU). The component that manages and monitors the resources (such as attached links and adjacent link stations) associated with a node, as requested by an SSCP via an SSCP-PU session. An SSCP activates a session with the physical unit in order to indirectly manage, through the PU, resources of the node such as attached links. This term applies to type 2.0, type 4, and type 5 nodes only. See also *peripheral PU*.

physical unit (PU) services. In SNA, the components within a physical unit (PU) that provide configuration services and maintenance services for SSCP-PU sessions.

PLU. Primary logical unit.

polling. (1) (A) Interrogation of devices for purposes such as to avoid contention, to determine operational status, or to determine readiness to send or receive data. (2) (T) The process whereby stations are invited, one at a time, to transmit.

POST. Power-on self test. A series of diagnostic tests that are run each time the computer's power is turned on.

primary logical unit (PLU). In SNA, the logical unit (LU) that sends the BIND to activate a session with its partner LU.

program temporary fix (PTF). A temporary solution or bypass of a problem diagnosed by IBM in a current unaltered release of the program.

protection key. An indicator that appears in the current program status word whenever an associated task has control of the system. This indicator must match the storage keys of all main storage locks that the task is to use.

protocol. (1) In SNA, the meanings of, and the sequencing rules for, requests and responses used for managing the network, transferring data, and synchronizing the states of network components.

PTF. Program temporary fix.

PU. Physical unit.

PU type. (1) The type of physical unit in a node. (2) Synonym for node type.

PUT. Program update tape.

R

record. (1) (I) In programming languages, an aggregate that consists of data objects, possibly with different attributes, that usually have identifiers attached to them. In some programming languages, records are called structures. (2) (T) A set of data treated as a unit. (3) A set of one or more related data items grouped for processing. (4) In VTAM, the unit of data transmission for record mode. A record represents whatever amount of data the transmitting node chooses to send.

remote. Concerning the peripheral parts of a network not centrally linked to the host processor and generally using telecommunication lines with public right-of-way. Synonymous with *link-attached*.

request unit (RU). A message unit that contains control information, end-user data, or both.

request/response unit (RU). A generic term for a request unit or a response unit. See also *request unit (RU)*.

reset. On a virtual circuit, reinitialization of data flow control. At reset, all data in transit are eliminated.

response. A reply represented in the control field of a response frame. It advises the primary or combined station of the action taken by the secondary or other

combined station to one or more commands. See also *command*.

route. An ordered sequence of nodes and transmission groups (TGs) that represent a path from an origin node to a destination node traversed by the traffic exchanged between them.

routing. The assignment of the path by which a message will reach its destination.

RU. Request/response unit.

S

same-domain. Refers to communication between entities in the same SNA domain. Contrast with *cross-domain*.

same-domain LU-LU session. In SNA, an LU-LU session between logical units (LUs) in the same domain.

scanner interface trace (SIT). A record of the activity within the communication scanner processor (CSP) for a specified data link between a 3725 Communication Controller and a resource.

SDLC. Synchronous data link control.

send pacing. In SNA, pacing of message units that a component is sending. See also *pacing*.

service point (SP). An entry point that supports applications that provide network management for resources not under the direct control of itself as an entry point. Each resource is either under the direct control of another entry point or not under the direct control of any entry point. A service point accessing these resources is not required to use SNA sessions (unlike a focal point). A service point is needed when entry point support is not yet available for some network management function.

session. A logical connection between two network accessible units (NAUs) that can be activated, tailored to provide various protocols, and deactivated, as requested. Each session is uniquely identified in a transmission header (TH) accompanying any transmissions exchanged during the session. See *half-session*, *LU-LU session*, *SSCP-LU session*, and *SSCP-PU session*.

session control (SC). In SNA, (1) One of the components of transmission control. Session control is used to purge data flowing in a session after an unrecoverable error occurs, to resynchronize the data flow after such an error, and to perform cryptographic verification. (2) A request unit (RU) category used for requests and responses exchanged between the

session control components of a session and for session activation and deactivation requests and responses. See also *network control (NC)*.

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

SIT. Scanner interface trace.

SMP. System Modification Program.

SMP/E. System Modification Program Extended.

SNA. Systems Network Architecture.

SNA network. The part of a user-application network that conforms to the formats and protocols of Systems Network Architecture. It enables reliable transfer of data among end users and provides protocols for controlling the resources of various network configurations. The SNA network consists of network accessible units (NAUs), boundary function, gateway function, and intermediate session routing function components; and the transport network. See *network*.

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

SNI. SNA network interconnection.

SP. Service point.

SRT. Symbol resolution table.

SSCP. System services control point.

SSCP ID. In SNA, a number that uniquely identifies a system services control point (SSCP). The SSCP ID is used in session activation requests sent to physical units (PUs) and other SSCPs.

SSCP-LU session. In SNA, a session between a system services control point (SSCP) and a logical unit (LU); the session enables the LU to request the SSCP to help initiate LU-LU sessions. See *session*.

SSCP-PU session. In SNA, a session between a system services control point (SSCP) and a physical unit (PU); SSCP-PU sessions allow SSCPs to send requests to and receive status information from individual nodes in order to control the network configuration. See *session*.

SSP. System Support Programs (IBM licensed program). Its full name is Advanced Communications Function for System Support Programs. Synonymous with *ACF/SSP*.

statement. A language syntactic unit consisting of an operator, or other statement identifier, followed by one or more operands. See *definition statement*.

station. (1) One of the input or output points of a network 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) One or more computers, terminals, or devices at a particular location.

status. The measure of the condition or availability of a resource.

status modifier. (1) In a System/370 status code, an indicator of the input/output (I/O) status. (2) In VTAM, a specific character appearing in specific positions of the status code; for example, B in the 10th position indicates a backup.

subarea. A portion of the SNA network consisting of a subarea node, any attached peripheral nodes, and their associated resources. Within a subarea node, all network accessible units, links, and adjacent link stations (in attached peripheral or subarea nodes) that are addressable within the subarea share a common subarea address and have distinct element addresses. See also *element*.

subarea address. A value in the subarea field of the network address that identifies a particular subarea. See also *element address*.

suboperand. One of multiple elements in a list comprising an operand. See also *definition statement*.

subsystem. A secondary or subordinate system, usually capable of operating independently of, or asynchronously with, a controlling system.

switched line. A communication line in which the connection between the communication controller and a remote link station is established by dialing. Contrast with *non switched line*.

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

synchronous data link control (SDLC). A discipline for managing synchronous, code-transparent, serial-by-bit information transfer over a link connection. Transmission exchanges may be duplex or half-duplex over switched or nonswitched links. The configuration of the link connection may be point-to-point, multipoint, or loop. SDLC conforms to subsets of the Advanced Data Communication Control Procedures (ADCCP) of the American National Standards Institute and High-Level Data Link Control (HDLC) of the International Standards Organization.

system definition. The process, completed before a system is put into use, by which desired functions and operations of the system are selected from various available options. Synonymous with *system generation*.

system generation. Synonym for *system definition*.

System Modification Program (SMP). An operating system component that facilitates the process of installing and servicing an MVS system. See also *System Modification Program Extended (SMP/E)*.

System Modification Program Extended (SMP/E). An IBM licensed program that facilitates the process of installing and servicing an MVS system. See also *System Modification Program (SMP)*.

system services control point (SSCP). A component within a subarea network for managing the configuration, coordinating network operator and problem determination requests, and providing directory services and other session services for end users of the network. Multiple SSCPs, cooperating as peers with one another, can divide the network into domains of control, with each SSCP having a hierarchical control relationship to the physical units and logical units within its own domain.

System Support Programs (SSP). An IBM licensed program, made up of a collection of utilities and small programs, that supports the operation of the NCP.

Systems Network Architecture (SNA). The description of the logical structure, formats, protocols, and operational sequences for transmitting information units through and controlling the configuration and operation of networks.

T

TAB. Terminal anchor block.

TCAM. (1) Telecommunications Access Method. Synonymous with *ACF/TCAM*. (2) The IBM licensed program whose full name is Advanced Communications Function for TCAM and that provides queued message handling. TCAM Versions 1 and 2 are access methods, but TCAM Version 3 is a message handling subsystem.

telecommunication line. Any physical medium such as a wire or microwave beam, that is used to transmit data.

teletypewriter exchange service (TWX). Teletypewriter service in which suitably arranged teletypewriter stations are provided with lines to a central office for access to other such stations throughout the U.S. and Canada. Both baudot and ASCII-coded machines are used. Business machines may also be used with certain restrictions.

TERMINATE. In SNA, a request unit that is sent by a logical unit (LU) to its system services control point (SSCP) to cause the SSCP to start a procedure to end one or more designated LU-LU sessions.

time-out. (1) (I) An event that occurs at the end of a predetermined period of time that began at the occurrence of another specified event. (2) A time interval allotted for certain operations to occur; for example, response to polling or addressing before system operation is interrupted and must be restarted.

time sharing option (TSO). An optional configuration of the operating system that provides conversational time sharing from remote stations.

time sharing option for VTAM (TSO/VTAM). An optional configuration of the operating system that provides conversational time sharing from remote stations in a network using VTAM.

TSO. Time sharing option.

TSO/VTAM. Time sharing option for VTAM.

TWX. Teletypewriter exchange service.

U

unformatted system services (USS). In SNA products, a system services control point (SSCP) facility that translates a character-coded request, such as a logon or logoff request into a field-formatted request for processing by formatted system services and translates field-formatted replies and responses into character-coded requests for processing by a logical unit.

UP. Unnumbered poll (SDLC).

USS. Unformatted system services.

V

vector. The MAC frame information field.

virtual machine. A functional simulation of a computer and its associated devices.

Virtual Machine (VM). A licensed program whose full name is the Virtual Machine/System Product (VM/SP). It is a software operating system that manages the resources of a real processor to provide virtual machines to end users. As a time-sharing system control program, it consists of the virtual machine control program (CP), the conversational monitor system (CMS), the group control system (GCS), and the interactive problem control system (IPCS).

virtual storage. (I) The notion of storage space that may be regarded as addressable main storage by the user of a computer system in which virtual addresses are mapped into real addresses. The size of virtual storage is limited by the addressing scheme of the computer system and by the amount of auxiliary storage available, not by the actual number of main storage locations.

Virtual Storage Extended (VSE). An IBM licensed program whose full name is the Virtual Storage Extended/Advanced Function. It is a software operating system controlling the execution of programs.

Virtual Telecommunications Access Method (VTAM). An IBM licensed program that controls communication and the flow of data in an SNA network. It provides single-domain, multiple-domain, and interconnected network capability.

VM. Virtual Machine. Its full name is Virtual Machine/System Product. Synonymous with *VM/SP*.

VM/SNA console support (VSCS). A VTAM component for the VM environment that provides Systems Network Architecture (SNA) support. It allows SNA terminals to be virtual machine consoles.

VM/VCNA. VM/VTAM Communications Network Application.

VM/VTAM Communications Network Application (VM/VCNA). An IBM licensed program that provides SNA support for VM. It allows SNA terminals to be used as virtual machine consoles. See also *VM/SNA console support*.

VS. Virtual storage.

VSCS. VM/SNA console support.

VSE. Virtual Storage Extended. Synonymous with *VSE/Advanced Functions*.

VTAM. Virtual Telecommunications Access Method (IBM licensed program). Its full name is Advanced Communications Function for the Virtual Telecommunications Access Method. Synonymous with *ACF/VTAM*.

VTAM definition. The process of defining the user application network to VTAM and modifying IBM-defined characteristics to suit the needs of the user.

Bibliography

This bibliography is intended as a guide for identifying publications related to NTO products.

For publications specifically about NTO and NRF, see "Where to Find More Information" on page xiv.

NCP, SSP, and EP Library

The following paragraphs briefly describe the library for NCP, SSP, and EP. Other publications related to NTuneMON, VTAM, NPSI, NetView, NTO, and NRF are listed without the accompanying descriptions.

NCP and EP Reference (LY43-0029)

This book describes various aspects of the internal processing of NCP and EP (PEP or EP Standalone). It provides information for customization and diagnosis.

NCP and EP Reference Summary and Data Areas (LY43-0030)

This two-volume book provides quick access to often-used diagnostic and debugging information about NCP and EP (PEP or EP Standalone).

NCP and SSP Customization Guide (LY43-0031)

This book helps users who are familiar with the internal logic of NCP and SSP to modify these products. It describes how to change NCP and SSP to support stations that IBM-supplied programs do not support.

NCP and SSP Customization Reference (LY43-0032)

This book supplements the *NCP and SSP Customization Guide*. It describes the resources and macroinstructions provided by IBM for customizing NCP and SSP.

NCP, SSP, and EP Diagnosis Guide (LY43-0033)

This book helps users isolate and define problems in NCP and EP (PEP or EP Standalone) using SSP. The primary purpose of the book is to help the user interact with the IBM Support Center to resolve a problem. In addition, it explains some of the diagnostic aids and service aids available with SSP.

NCP, SSP, and EP Trace Analysis Handbook (LY43-0037)

This book describes how to use the trace analysis program and how to read trace analysis program output.

NCP, SSP, and EP Generation and Loading Guide (SC31-6221)

This book provides detailed explanations of how to generate and load NCP and EP (PEP or EP Standalone) using SSP. It contains information for generating and loading under MVS, VM, and VSE.

NCP, SSP, and EP Messages and Codes (SC31-6222)

This book is a reference book of abend codes issued by NCP and EP (PEP or EP Standalone), and messages issued by the System Support Programs associated with NCP. This information is also available through the online message facility, an IBM OS/2 application available on diskette.

NCP, SSP, and EP Resource Definition Guide (SC31-6223)

This book helps users understand how to define NCP and EP (PEP or EP Standalone), using SSP. It describes functions and resources and lists the definition statements and keywords that define those functions and resources.

NCP, SSP, and EP Resource Definition Reference (SC31-6224)

This book helps users code definition statements and keywords to define NCP and EP (PEP or EP Standalone), using SSP. It also provides a quick reference of definition statement coding order and keyword syntax.

NCP V7R7, SSP V4R7, and EP R14 Library Directory (SC30-3971)

This book helps users locate information on a variety of NCP, SSP, and EP tasks. It also provides a high-level understanding of NCP, SSP, and EP and summarizes the changes to these products and to the library for NCP V7R7, SSP V4R7, and EP R14.

NCP V7R7 Migration Guide (SC30-3889)

This book helps users migrate an NCP generation definition from an earlier release to NCP V7R7. It also describes how to add new functions for NCP V7R7.

NCP Version 7 and X.25 NPSI Version 3 Planning and Installation (SC30-3470)

This book helps users plan and install support for X.25 lines in the 3745 or 3746 Model 900.

Bibliography

NCP Version 7 and X.25 NPSI Version 3 Diagnosis, Customization, and Tuning (LY30-5610)

This book helps users diagnose, customize, and tune X.25 lines in the 3745 or 3746 Model 900.

Other Networking Products' Libraries

The following publications provide cross-product information for NTuneMON, VTAM, NPSI, NetView, and NPM. For detailed information about these products, refer to the library for each.

Networking Library

Planning for NetView, NCP, and VTAM (SC31-8063)

Planning for Integrated Networks (SC31-8062)

ACF/NCP, ACF/SSP, EP, NTuneMON, and NPSI Softcopy Collection Kit (CD-ROM, LK2T-0414)

NTuneMON Library

NTuneMON V2R5 User's Guide (SC31-6266)

NTuneNCP Feature Reference (LY43-0039)

Related Publication: *NCP Tuning with NTune*, GG24-2520

VTAM Library

VTAM Migration Guide (GC31-6547)

VTAM Release Guide (GC31-6555)

Estimating Storage for VTAM (SK2T-6400)

VTAM Network Implementation Guide (SC31-6548)

VTAM Resource Definition Reference (SC31-6552)

VTAM Resource Definition Samples (SC31-6554, book and diskettes)

VTAM Customization (LY43-0068)

VTAM Operation (SC31-6549)

VTAM Operation Quick Reference (SX75-0207)

VTAM Messages and Codes (SC31-6546)

VTAM Licensed Program Specifications (GC31-6553)

VTAM Programming (SC31-6550)

VTAM Programming for LU 6.2 (SC31-6551)

VTAM Diagnosis (LY43-0069)

VTAM Data Areas for MVS/ESA (LY43-0071)

VTAM CMIP Services and Topology Agent Programming Guide (SC31-6544)

APPC Application Suite User's Guide (SC31-6532)

APPC Application Suite Administration (SC31-6533)

APPC Application Suite Programming (SC31-6534)

NPSI Library

X.25 NPSI Version 3 General Information (GC30-3469)

NCP Version 7 and X.25 NPSI Version 3 Planning and Installation (SC30-3470)

X.25 NPSI Version 3 Host Programming (SC30-3502)

NCP Version 7 and X.25 NPSI Version 3 Diagnosis, Customization, and Tuning (LY30-5610)

X.25 NPSI Version 3 Release 9 Data Areas (LY30-5627)

NetView Library

TME 10 NetView for OS/390 NGMF User's Guide (SC31-8234)

TME 10 NetView for OS/390 User's Guide (SC31-8241)

TME 10 NetView for OS/390 Administration and Security Reference (SC31-8222)

TME 10 NetView for OS/390 Application Programmer's Guide (SC31-8223)

TME 10 NetView for OS/390 Automation Guide (SC31-8225)

TME 10 NetView for OS/390 Bridge Implementation (SC31-8238)

TME 10 NetView for OS/390 Command Reference (SC31-8227)

TME 10 NetView for OS/390 Customization Guide (SC31-8228)

TME 10 NetView for OS/390 Customization: Using Assembler (SC31-8229)

TME 10 NetView for OS/390 Customization: Using PL/I and C (SC31-8230)

TME 10 NetView for OS/390 Customization: Using REXX and the NetView Command List Language (SC31-8231)

TME 10 NetView for OS/390 Planning Guide (GC31-8226)

TME 10 NetView for OS/390 Installation and Administration Guide (SC31-8236)

TME 10 NetView for OS/390 Messages (SC31-8237)

TME 10 NetView for OS/390 Diagnosis Guide (LY43-0108)

TME 10 NetView for OS/390 Resource Object Data Manager and GMFHS Programmer's Guide (SC31-8233)

TME 10 NetView for OS/390 Tuning Guide (SC31-8240)

TME 10 NetView for OS/390 User's Guide (SC31-8241)

TME 10 NetView for OS/390 NGMF User's Guide (SC31-8234)

TME 10 NetView for OS/390 SNA Topology Manager and APPN Accounting Manager Implementation Guide (SC31-8239)

TME 10 NetView for OS/390 Data Model Reference (SC31-8232)

TME 10 NetView for OS/390 APPN Topology and Accounting Agent Guide (SC31-8224)

NTO Library

Network Terminal Option: R11 Planning, Migration, and Resource Definition Guide (SC30-3347)

Network Terminal Option: R11 Diagnosis (LY30-3194)

NRF Library

NRF Planning (SC27-0593)

NRF Migration, Resource Definition and Customization (SC31-6203)

NRF Resource Definition and Customization (SC30-3407)

NRF Diagnosis (LY30-5597)

Related Publications

The following publications, though not directly related to this book, may be helpful in understanding your network.

Internet Standard Subnetting Procedure (TCP/IP RFC 950)

Network Design and Analysis General Information (GC30-3495)

Remote Loading/Activation Guide (SA33-0161)

3745 and 3746 Service Processor Installation and Maintenance (SY33-2115)

TPF Concepts and Structures Manual (GH20-7488)

IBM 3745 Communication Controller Publications

The following list shows selected publications for the IBM 3745 Communication Controller.

IBM 3745 Communication Controller Introduction (GA33-0138 for the 3745-130, 3745-150, and 3745-170)

IBM 3745 Communication Controller Introduction (GA33-0092 for the 3745-210, 3745-310, 3745-410, and 3745-610)

IBM 3745 Communication Controller All Models and &900.: Connection and Integration Guide (SA33-0129)

3745 Communications Controller Models 130, 150, 160, and 170: Connection and Integration Guide (SA33-0141)

IBM 3745 Communication Controller (All Models): Principles of Operation (SA33-0102)

IBM 3745 Advanced Operations Guide (SA33-0097)

3745 Communication Controller Models A, 3746 Nways Multiprotocol Controller Models 900 and 950: Planning Guide (GA33-0457)

IBM 3745 Problem Determination Guide (SA33-0096)

IBM 3746 Model 900 and Model 950 Publications

IBM 3745 Communication Controller Models A, IBM 3746 Expansion Unit Model 900, IBM 3746 Nways Multinetwork Controller Model 950 Overview (GA33-0180)

Bibliography

IBM 3746 Nways Multinetwork Controller Model 950 User's Guide (SA33-0356)

MVS/ESA Publications

MVS/ESA Device Validation Support (GC28-1617)

| *MVS/ESA Hardware Configuration Definition: User's Guide* (GC33-6457)

SNA Publications

The following publications contain information on SNA.

Systems Network Architecture Technical Overview (GC30-3073)

Systems Network Architecture Management Services Reference (SC30-3346)

Systems Network Architecture Formats (GA27-3136)

TCAM Publications

| *TCAM Version 2 Base Installation Guide* (SC30-3132)

TCAM Version 2 Networking Installation Guide (SC30-3153)

TCP/IP Publications

The following publications contain information on Transmission Control Protocol/Internet Protocol (TCP/IP).

General: The following list shows selected publications with general information on TCP/IP.

Internetworking with TCP/IP Volume I: Principles, Protocols, and Architecture, Douglas E. Comer, Prentice Hall, Englewood Cliffs, New Jersey, 1991 (SC31-6144)

Internetworking with TCP/IP Volume II: Implementation and Internals, Douglas E. Comer, Prentice Hall, Englewood Cliffs, New Jersey, 1991 (SC31-6145)

TCP/IP Introduction (GC31-6080)

IBM TCP/IP Tutorial and Technical Overview (GG24-3376)

MVS Publications: The following list shows selected publications on TCP/IP for MVS.

IBM TCP/IP Version 2 Release 2.1 for MVS: Planning and Customization (SC31-6085)

IBM TCP/IP Version 2 Release 2.1 for MVS: User's Guide (SC31-6088)

VM Publications: The following list shows selected publications on TCP/IP for VM.

| *IBM TCP/IP Version 2 Release 4 for VM: Planning and Customization* (SC31-6082)

| *IBM TCP/IP Version 2 Release 4 for VM: User's Guide* (SC31-6081)

IBM OS/2 Publications: The following list shows selected publications on TCP/IP for IBM OS/2.

IBM TCP/IP Version 2.0 for OS/2: Installation and Administration (SC31-6075)

IBM TCP/IP Version 2.0 for OS/2: User's Guide (SC31-6076)

DOS Publications: The following list shows selected publications on TCP/IP for DOS.

| *IBM TCP/IP Version 2.1.1 for DOS: Installation and Administration* (SC31-7047)

| *IBM TCP/IP Version 2.1.1 for DOS: User's Guide* (SC31-7045)

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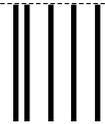
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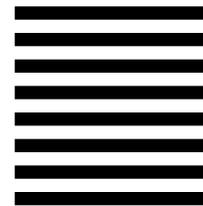
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