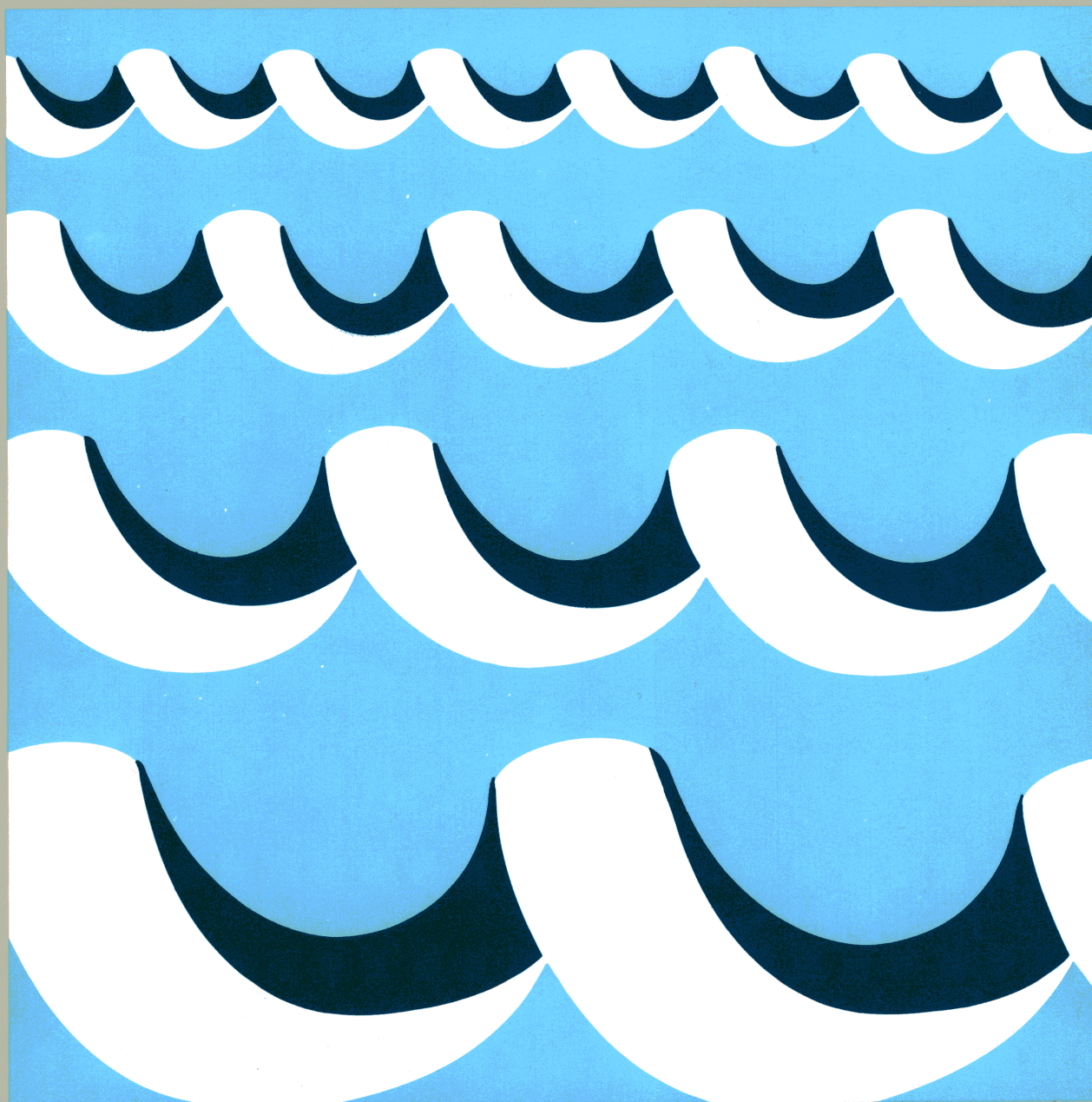


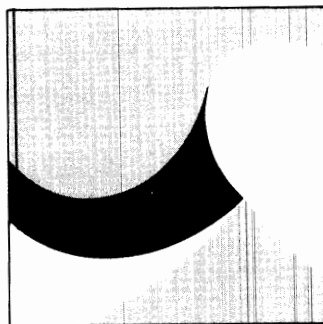


Network Control Program and
System Support Programs
Resource Definition Guide





**Network Control Program and
System Support Programs
Resource Definition Guide**



Advanced Communications Function for Network Control Program

Versions 3 and 4 Program Numbers: 5667-124, 5668-854

Advanced Communications Function for System Support Programs

Version 3 Program Numbers: 5665-338 (MVS), 5666-322 (VSE),
5664-289 (VM)

Advanced Communications Function for Network Control Program

V4 Subset Program Number: 5668-754

First Edition (May 1986)

This edition applies to:

- Advanced Communications Function for Network Control Program Version 3, Program Product 5667-124
- Advanced Communications Function for Network Control Program Version 4, Program Product 5668-854
- Advanced Communications Function for Network Control Program V4 Subset Program Product 5668-754
- Advanced Communications Function for System Support Programs Version 3, Program Products:
 - 5665-338
 - 5666-322
 - 5664-289.

This edition also applies to all subsequent releases and modifications until otherwise indicated in new editions or Technical Newsletters. Changes are made periodically to the information herein; before using this publication in connection with the operation of IBM systems, consult the latest *IBM System/370, 30XX and 4300 Processors Bibliography*, GC20-0001, for the editions that are applicable and current.

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NCP, SSP, and EP Library Overview

The diagrams on the following pages will help you find the NCP, SSP, or EP books that contain the information you need.

Migration and Generation

<i>For Information About:</i>	<i>Look In:</i>	<i>Order Number:</i>
How to generate an NCP/PEP load module How to load an NCP/PEP load module into your communication controller	NCP and SSP Generation and Loading Guide	SC30-3348
How to change, delete, or add definition statements and operands in your NCP generation definition if you are migrating from a previous release of NCP to a new release of NCP	NCP and SSP Migration	SC30-3252
Which NCP definition statements and operands to code for your network	NCP and SSP Resource Definition Guide	SC30-3349
How to code NCP definition statements and operands	NCP and SSP Resource Definition Reference	SC30-3254
Which EP definition statements and operands to code for your network How to code EP definition statements and operands How to generate an EP load module How to load an EP load module into your controller	EP Installation, Resource Definition, and Diagnosis	SC30-3338

Diagnosis and Customization

For Information About:	Look In:	Order Number:
<p>User-written code</p> <p>NCP internal macros</p> <p>Structured coding, timer routines, user exits, block handling routines, machine language coding tips</p> <p>Customizing your NCP for line control</p> <p>Standard attachment facility</p>	NCP Customization	LY30-5571
<p>NCP diagnostic procedures</p> <p>Determining if you have an NCP problem</p> <p>Determining what type of NCP problem you are having</p> <p>Which traces and dumps to gather for an error</p> <p>How to run the SSP utilities or the Configuration Report Program for NCP</p> <p>How to prepare an APAR</p> <p>Determining the correct level of IBM support</p>	NCP and SSP Diagnosis Guide	LY30-5591
<p>The normal functioning and structure of the SSP program and utilities</p>	SSP Diagnosis Reference	LY30-5564
<p>Determining if you have an EP problem</p> <p>Determining what type of EP problem you have</p>	EP Installation, Resource Definition, and Diagnosis	SC30-3338
<p>EP error responses and ABEND codes</p> <p>The normal functioning and structure of the EP program</p> <p>EP, BSC and start stop commands, line control, save areas, line testing, channel responses for EP</p> <p>EP modules: function and entry points</p>	EP Logic	LY30-3195
<p>SSP messages or NCP ABEND codes</p>	NCP and SSP Messages and Codes	SC30-3169
<p>NCP error responses</p> <p>The normal functioning and structure of the NCP program</p> <p>NCP and start-stop commands, line control, save areas, line testing, channel responses</p>	NCP Reference	LY30-5569
<p>Data area relationships</p> <p>NCP control blocks</p> <p>BTU commands and modifiers, NCP channel commands, NCP network commands</p> <p>EP command codes</p> <p>Controller instruction set</p> <p>RECMS, RECFMS, NMVT, and NPM formats</p> <p>SVC codes, line character codes</p> <p>Character mode PCF diagrams</p> <p>NCP exception responses</p>	NCP and EP Reference Summary and Data Areas	LY30-5570



About This Book

The following topics explain:

- Products Covered in This Book
- Who Should Read This Book
- How to use this book
- How this book is organized
- Where to get information about migration
- Where to find more information.

Products Covered in This Book

This book will help you produce an operating NCP for any one of the following versions:

- Advanced Communications Function for Network Control Program (NCP) Version 3 for the IBM 3705 Communications Controller
- Advanced Communications Function for Network Control Program (NCP) Version 3 for the IBM 3725 Communication Controller
- Advanced Communication Function for Network Control Program (NCP) Version 4
- Advanced Communication Function for Network Control Program (NCP) V4 Subset

Who Should Read This Book

This book is directed to system analysts, system programmers, system engineers, and field engineers responsible for defining an NCP for the IBM 3705, 3725, or 3720 Communication Controller. If you are not familiar with this task, this book will help you decide which definition statements and operands you need to code to define the characteristics and functions of your network. After you become familiar with this task, you can use this book in conjunction with the *NCP and SSP Resource Definition Reference*. The full title and order number for this reference are given later under “Corequisite Books” on page xv.

How to Use This Book

The primary emphasis of this book is on helping you define, to the NCP, the resources in your user-application network.

Your network has specific resources, and these resources have their own special characteristics. Also, your network will need to have particular functions included in it. You need to define to your NCP the characteristics and functions that relate to it. The approach of this book is to help you determine the definition statements and operands you need to code to define these characteristics and/or include these functions.

After you have determined the definition statements and operands you need to code, you must refer to the *NCP and SSP Resource Definition Reference* book for descriptions of how to code the definition statements and operands. (The full title and order number of this book are given under “Corequisite Books” on page xv.) The best way to use the *NCP and SSP Resource Definition Guide* is to have the *NCP and SSP Resource Definition Reference* book nearby when you are coding your NCP.

Some Things to Know Before Using This Book

Before using this book, you need to know the possible hardware and software combinations for SSP Version 3. The following table explains the hardware and software combinations for SSP Version 3:

NCP	Runs in This Controller	With This EP for PEP	Generated by These Operating Systems	Using This Version and Release of SSP
V3 for 3705	3705	EP/3705	MVS, VSE, VM/SP	V3R1 or V3R2
V3 for 3725	3725	EP/3725 R2	MVS, VM/SP	V3R1 or V3R2
V4R1	3725	EP/3725 R3	MVS, VSE	V3R1 or V3R2
V4R1	3720	Release 3	MVS, VSE	V3R2
V4R2	3725 or 3720	Release 4	MVS, VM/SP	V3R2
V4 Subset	3720	Release 3	VSE	V3R2
V4 Subset	3720	Release 4	VM/SP	V3R2
V4 Subset	3720	Release 4	MVS	V3R2

Note: Throughout this book, the use of the term “VM/SP” assumes that you are running under the VM/SP system in the CMS environment.

Before using this book, you also need to be aware that, if you are using the NCP V4 Subset, the gateway information (for SNA Network Interconnection) **does not apply** to your configuration.

Some Terms to Know While Using This Book

Throughout this book, some terms are used in specific ways that you need to be aware of:

- The term **your NCP** refers to the particular NCP you are defining.
- The term **macro** (used in previous releases of the NCP and SSP books) has been replaced by the term **definition statement** and the term **stage** has been replaced by the term **phase**.
- The term **network** has at least two meanings. A **public network** is a network established and operated by communication common carriers or telecommunication administrations for the specific purpose of providing circuit-switched, packet-switched, and leased-circuit services to the public. A **user-application network** is a configuration of data processing products, such as processors, controllers, and terminals, established and operated by users for data processing or information exchange, which may use services offered by communication common carriers or telecommunication Administrations. **Network**, as used in this book, refers to a user application network.

Throughout this book, the following abbreviations are used to refer to the associated Advanced Communications Function (ACF) program products. Where it is necessary to distinguish between an ACF and non-ACF version of one of these products, the book will make this distinction clear. Otherwise, always assume that an abbreviation without an “ACF/” before it is the ACF version.

Program Product	Abbreviation
Advanced Communications Function for Network Control Program	NCP
Advanced Communications Function for Network Control Program V4 Subset	NCP V4 Subset
Advanced Communications Function for System Support Programs	SSP
Advanced Communications Function for Telecommunications Access Method	TCAM
Advanced Communications Function for Virtual Telecommunications Access Method	VTAM

In this book, numbers over one thousand are represented in metric style. A space is used instead of a comma to separate groups of three digits. For example, the number ten thousand, five hundred and fifty-two is written 10 552.

What To Do If You Are Using the Emulation Program

The information in this book pertains primarily to an NCP operating in network control mode, or in both network control mode and emulation mode through the Partitioned Emulation Programming (PEP) extension. You can find information on producing an operating Emulation Program for the IBM 3725 Communication Controller or the IBM 3720 Communication Controller in the *Emulation Program for IBM Communication Controllers: Installation, Resource Definition, and Diagnosis* book, SC30-3338 (abbreviated title: *EP Installation, Resource Definition, and Diagnosis*). You can find information on producing an operating Emulation Program for the IBM 3705 Communications Controller (EP/3705) in the *Emulation Program for the IBM 3705: Generation and Utilities Guide and Reference* book, SC30-3242 (abbreviated title: *EP/3705 Generation and Utilities Guide and Reference*).

How This Book is Organized

This book has five chapters, four appendixes, and a glossary. Under a description of a definition statement or operand, any differences between versions and releases of NCP are noted. Otherwise, assume that the information applies to all versions.

Chapters and appendixes in this book are titled and organized as follows:

Chapter 1, “Steps in Producing an Operating NCP” : This chapter summarizes the installation, resource definition, generation, and loading tasks. It introduces you to the resources you must define to the NCP and the definition statements you use to define them.

Chapter 2, “Defining Characteristics and Functions Common to SDLC, BSC, and SS Devices” : This chapter helps you determine the definition statements and operands you need to code to define the characteristics and functions that are common to any Synchronous Data Link Control (SDLC), Binary Synchronous Communication (BSC), and Start-Stop (SS) devices attached to your NCP. Everyone must read this chapter.

Chapter 3, “Defining Characteristics and Functions for SDLC Devices” : This chapter helps you determine additional definition statements and operands you need to code to define characteristics and functions for any SDLC devices attached to your NCP. Read this chapter only if you have SDLC devices attached to your NCP.

Chapter 4, “Defining Characteristics and Functions for BSC Devices”: This chapter helps you determine additional definition statements and operands you need to code to define characteristics and functions for any BSC devices attached to your NCP. Read this chapter only if you have BSC devices attached to your NCP.

Chapter 5, “Defining Characteristics and Functions for SS Devices” : This chapter helps you determine additional definition statements and

operands you need to code to define characteristics and functions for any SS devices attached to your NCP. Read this chapter only if you have SS devices attached to your NCP.

Appendix A, “Coding Sheets” : This appendix provides blank coding sheets for keeping track of the values you specify in the definition statements and operands you use.

Appendix B, “Multiple Terminal Access Sign-On Procedures” : This appendix contains procedures for signing on to various types of Multiple Terminal Access (MTA) terminals.

Appendix C, “Dynamically Modifying Selected NCP Parameter Values” : This appendix contains instructions for changing NCP parameter values if you expect network growth. It also provides a list of the selected parameters that can be dynamically changed.

Appendix D, “Applying Maintenance to SSP Utilities Under MVS” : This appendix provides instructions on how to use the SSPGEN macro to install and maintain updates to SSP under the MVS operating system.

Where To Get Information About Migration

If you are migrating from a previous release of NCP to Version 4 of NCP, you will need to refer to the *NCP and SSP Migration* book. The *NCP and SSP Migration* book summarizes the changes you have to make to existing source programs to migrate to Version 4 of NCP. The full title and order number for this book are given later under “Corequisite Books” on page xv.

Where To Find More Information

Before using this book, you must have a thorough knowledge of Systems Network Architecture (SNA) and of the functions the NCP provides in an SNA network. You also should have a good understanding of the communication controller your NCP will reside in and the access method or access methods it will communicate with. The books listed can help you get this prerequisite knowledge and understanding. Two other requirements for using this book are an awareness of what your total network configuration looks like and a complete set of specifications for the resources in your network.

Prerequisite Knowledge and Books

The books listed below can help you with your prerequisite knowledge and understanding.

For All Users:

Abbreviated Title	Full Title	Order Number
<i>SNA Concepts and Products</i>	<i>Systems Network Architecture: Concepts and Products</i>	GC30-3072
<i>SNA Technical Overview</i>	<i>Systems Network Architecture: Technical Overview</i>	GC30-3073

For Users of NCP V4:

Abbreviated Title	Full Title	Order Number
	<i>Network Program Products General Information</i>	GC30-3350
	<i>Network Program Products Planning</i>	SC30-3351
	<i>Introduction to the IBM 3725 Communication Controller (Model 1 only)</i>	GA33-0010
	<i>Introduction to the IBM 3725 Communication Controller (Model 2 only)</i>	GA33-0021
	<i>IBM 3725 Communication Controller: Operator's Guide</i>	GA33-0014
	<i>IBM 3725 Communication Controller: Problem Determination and Extended Services</i>	GA33-0044
	<i>Introduction to the IBM 3720 Communication Controller</i>	GA33-0060
	<i>IBM 3720 Communication Controller: Operator's Guide</i>	GA33-0065
	<i>IBM 3720 Communication Controller: Problem Determination and Extended Services</i>	GA33-0066

For Users of NCP V3 for the IBM 3725:

Abbreviated Title	Full Title	Order Number
	<i>Introduction to the IBM 3725 Communication Controller</i>	GA33-0010

Abbreviated Title	Full Title	Order Number
	<i>IBM 3725 Communication Controller: Principles of Operation</i>	GA33-0013

For Users of NCP V3 for the IBM 3705:

Abbreviated Title	Full Title	Order Numbers
	<i>Introduction to the IBM 3704 and 3705 Communications Controllers</i>	GA27-3051
	<i>IBM 3704 and 3705 Communications Controllers: Principles of Operation</i>	GC30-3004
	<i>Introduction to the IBM 3705-80 Communications Controller</i>	GA27-3304
	<i>IBM 3705-80 Communications Controller: Principles of Operation</i>	GC30-3074

For Users of VTAM V3R1.1:

Abbreviated Title	Full Title	Order Number
	<i>Network Program Products General Information</i>	GC30-3350
	<i>Network Program Products Planning</i>	SC30-3351

For Users of VTAM V3R1:

Abbreviated Title	Full Title	Order Number
	<i>Network Program Products General Information</i>	GC23-0108
	<i>Network Program Products Planning</i>	SC23-0110

For Users of VTAM V2R2:

Abbreviated Title	Full Title	Order Number
	<i>Network Program Products General Information</i>	GC27-0657
	<i>Network Program Products Planning</i>	SC27-0658

For Users of VTAM V2R1:

Abbreviated Title	Full Title	Order Number
<i>VTAM General Information</i>	<i>Advanced Communications Function for VTAM: General Information</i>	GC27-0608

For Users of VTAM V1R3:

Abbreviated Title	Full Title	Order Number
<i>VTAM General Information</i>	<i>Advanced Communications Function for VTAM General Information: Introduction</i>	GC27-0462
<i>VTAM General Information</i>	<i>Advanced Communications Function for VTAM General Information: Concepts</i>	GT27-0463

For Users of TCAM V2R4:

Abbreviated Title	Full Title	Order Number
<i>TCAM General Information</i>	<i>Advanced Communications Function for TCAM General Information: Introduction</i>	GC30-3057
<i>TCAM General Information</i>	<i>Advanced Communications Function for TCAM General Information: Functional Description</i>	GC30-3131

Corequisite Books

While using this book, you will need to refer to the following books:

Abbreviated Title	Full Title	Order Number
<i>NCP and SSP Resource Definition Reference</i>	<i>Advanced Communications Function for Network Control Program Versions 3 and 4, Advanced Communications Function for System Support Programs Version 3: Resource Definition Reference</i>	SC30-3254
<i>NCP and SSP Generation and Loading</i>	<i>Advanced Communications Function for Network Control Program Versions 3 and 4, Advanced Communications Function for System Support Programs Version 3: Generation and Loading Guide</i>	SC30-3348

You also may need to refer to the books listed below.

For All Users:

Abbreviated Title	Full Title	Order Number
<i>NCP and SSP Migration</i>	<i>Advanced Communications Function for Network Control Program Versions 3 and 4, Advanced Communications Function for System Support Program Version 3: Migration</i>	SC30-3252
<i>NCP and SSP Messages and Codes</i>	<i>Advanced Communications Function for Network Control Program, Advanced Communications Function for System Support Programs: Messages and Codes</i>	SC30-3169
<i>NCP and SSP Diagnosis Guide</i>	<i>Advanced Communications Function for Network Control Program Versions 3 and 4, Advanced Communications Function for System Support Programs Version 3: Diagnosis Guide</i>	LY30-5591
<i>SNA Reference Summary</i>	<i>Systems Network Architecture: Reference Summary</i>	GA27-3136
<i>NPA Program Description/Operations</i>	<i>Network Performance Analyzer: Program Description/Operations</i>	SB21-2479

For Users of NCP V4R2 and NCP V4 Subset (for VM/SP and MVS):

Abbreviated Title	Full Title	Order Number
<i>NCP and EP Reference Summary and Data Areas</i>	<i>Advanced Communications Function for Network Control Program Version 4, Emulation Program for the IBM 3725: Reference Summary and Data Areas</i>	LY30-5570
<i>NCP Customization</i>	<i>Advanced Communications Function for Network Control Program Version 4: Customization</i>	LY30-5571

For Users of NCP V4R1 and NCP V4 Subset (for VSE):

Abbreviated Title	Full Title	Order Number
<i>NCP Reference Summary and Data Areas</i>	<i>Advanced Communications Function for Network Control Program Version 4; Emulation Program for the IBM 3725: Reference Summary and Data Areas for the IBM 3725</i>	LT70-5570
<i>NCP Customization</i>	<i>Advanced Communications Function for Network Control Program Version 4: Customization for the IBM 3725</i>	LY30-5571

For Users of NCP V3 for the IBM 3725:

Abbreviated Title	Full Title	Order Number
<i>NCP Reference Summary and Data Areas</i>	<i>Advanced Communications Function for Network Control Program Version 3; Emulation Program for the IBM 3725: Reference Summary and Data Areas for the IBM 3725</i>	LY30-5558
<i>NCP Customization</i>	<i>Advanced Communications Function for Network Control Program Version 3: Customization for the IBM 3725</i>	LY30-5559

For Users of NCP V3 for the IBM 3705:

Abbreviated Title	Full Title	Order Number
<i>Network Program Products Samples</i>	<i>Network Program Products: Samples (when available)</i>	SC27-0659
<i>NCP Reference Summary and Data Areas</i>	<i>Advanced Communications Function for Network Control Program for the IBM 3705; Emulation Program for the IBM 3705: Reference Summary and Data Areas</i>	LY30-5555
<i>NCP Customization</i>	<i>Advanced Communications Function for Network Control Program for the IBM 3705: Customization</i>	LY30-5556
	<i>IBM 3704 and 3705 Communications Controllers Assembler Language</i>	GC30-3003

For Users of VTAM V3:

Abbreviated Title	Full Title	Order Number
<i>VTAM Installation</i>	<i>Advanced Communications Function for VTAM: Installation and Resource Definition</i>	SC23-0111
<i>VTAM Operation</i>	<i>Advanced Communications Function for VTAM: Operation</i>	SC23-0113

For Users of VTAM V2R2:

Abbreviated Title	Full Title	Order Number
<i>VTAM Installation</i>	<i>Advanced Communications Function for VTAM: Installation and Resource Definition</i>	SC27-0610
<i>VTAM Operation</i>	<i>Advanced Communications Function for VTAM: Operation</i>	SC27-0612

For Users of VTAM V2R1:

Abbreviated Title	Full Title	Order Number
<i>VTAM Installation</i>	<i>Advanced Communications Function for VTAM: Planning and Installation Reference</i>	ST27-0610
<i>VTAM Operation</i>	<i>Advanced Communications Function for VTAM: Operation</i>	ST27-0612

For Users of VTAM V1R3:

Abbreviated Title	Full Title	Order Number
<i>VTAM Installation</i>	<i>Advanced Communications Function for VTAM: Planning and Installation Reference</i>	SC27-0584
<i>VTAM Operation</i>	<i>Advanced Communications Function for VTAM: Operation</i>	SC27-0466

For Users of TCAM V2R4:

Abbreviated Title	Full Title	Order Number
<i>TCAM Networking Installation Guide</i>	<i>Advanced Communications Function for TCAM: Networking Installation Guide</i>	SC30-3153
<i>TCAM Base Installation Guide</i>	<i>Advanced Communications Function for TCAM: Base Installation Guide</i>	SC30-3132
<i>TCAM Installation Reference</i>	<i>Advanced Communications Function for TCAM: Installation Reference</i>	SC30-3133

For Users of SSP V3 and the Configuration Control Program (CCP) Facility

Abbreviated Title	Full Title	Order Number
<i>SSP User's Guide for CCP</i>	<i>Advanced Communications Function for System Support Programs Version 3: User's Guide (for Configuration Control Program Facility)</i>	SC30-3261

Abbreviated Title	Full Title	Order Number
<i>SSP Installation and Diagnosis for CCP.</i>	<i>Advanced Communications Function for System Support Programs Version 3: Installation and Diagnosis (for Configuration Control Program Facility)</i>	SC30-3262

For Users of NetView

Abbreviated Title	Full Title	Order Number
	<i>NetView Installation and Administration Guide</i>	SC30-3360

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Chapter 1. Steps in Producing an Operating NCP

Note: Before you use this book, be sure to read the "About This Book" at the front of the book. "About This Book" explains (1) the purpose of the book, (2) how it is organized, (3) what knowledge you should have before using it, and (4) what other books you should read first or should have with you for reference.

You must complete four basic steps to produce an operating Advanced Communications Function for Network Control Program (NCP). These steps are:

1. Installing the NCP and SSP products from the Program Information Department tape
2. Defining the NCP configuration
3. Generating the load module
4. Loading the load module.

You *install* the program product by completing a series of steps that add the IBM-supplied NCP and SSP libraries to your operating system.

You *define* the NCP by coding a generation source program that consists of definition statements describing the characteristics and functions of the resources in the network that relate to the NCP. This source program forms the input to the generation procedure.

You *generate* the NCP by running the generation procedure provided by the Advanced Communications Function for System Support Programs (SSP). SSP Version 3 contains the NCP/EP Definition Facility (NDF) that generates an NCP object module which is link-edited by the system linkage editor. This process does not require user intervention. The primary output of the generation procedure is an NCP load module that is loaded into the communication controller where you want your NCP to reside.

You *load* the NCP into the communication controller by using either a utility program provided by SSP, or an access method loader facility.

Installing the Program

The first step in producing an operating NCP or SSP is to install the program. This book does not tell you how to complete this task. For directions on how to install your NCP or SSP, see the *Program Directory* that is shipped with your NCP and SSP tapes from IBM Software Distribution.

Defining the Program

The second and most involved step in producing an operating NCP is to define the program. Actually, it is not the NCP itself that you must define, but rather the relationship of the resources in the network to the NCP. The relationship of the resources in the network to the NCP refers to the physical and operational characteristics of the resources that affect the way they work with the NCP. Examples of these characteristics are the resources' addresses, types, speeds, and screen sizes; as well as their transmission protocols, methods of handling data, and special provisions for backup and recovery. The resources attached to the NCP can have many possible physical and operational characteristics. Therefore, it is essential that you have a good understanding of your network configuration and of your processing goals before you set out to define these resources to the NCP.

Resources That Must Be Defined to the NCP

The resources in a network whose relationship to the NCP you must define are:

- Host processor access methods
- Communication controllers
- Data links
- Link-attached devices
- Other NCPs
- Other networks (if you are including the SNA network interconnection function to join two or more independent networks).

The NCP works with all the resources in a network, and although it helps to control the flow of data among all these resources, its primary concern is with the devices that are link-attached to the communication controller where it resides. These include devices such as (1) keyboard-printer terminals; (2) clustered stations with, for example, displays and printers; (3) distributed processing systems; (4) remote job entry stations; and (5) other communication controllers. Each link-attached device uses one of three major line protocols to communicate with the NCP: Synchronous Data Link Control (SDLC), Binary Synchronous Communication (BSC), and Start-Stop (SS) communication.

For this book, a device that is attached to an SDLC data link is said to be an SDLC device, a device attached to a BSC link is said to be a BSC device,

and a device attached to an SS link is said to be an SS device. Note, however, that a device is not an SDLC, BSC, or SS device because of its design or purpose. For example, an IBM 3274 Control Unit can be attached to the NCP by either an SDLC data link or a BSC link. When it is attached to an SDLC data link, in this book it is called an SDLC device; when attached to a BSC link, it is called a BSC device. Some devices, however, such as an IBM 1050 Data Communication System device, can use only the SS line protocol to communicate with the NCP, and therefore are considered pure SS devices.

SDLC devices are Systems Network Architecture (SNA) devices. BSC and SS devices are non-SNA devices, although they can still operate in an SNA network.

This book helps you code your NCP according to the types of link-attached devices you have attached to your NCP. Chapters 2 through 5 are titled, respectively, as follows:

- Defining Characteristics and Functions Common to SDLC, BSC, and SS Devices
- Defining Characteristics and Functions for SDLC Devices
- Defining Characteristics and Functions for BSC Devices
- Defining Characteristics and Functions for SS Devices.

These chapters tell you not only how to define the characteristics and functions for a specific type of device, but also how to define the NCP's relationship to (1) the access method it is communicating with, (2) the communication controller it is running in, (3) the data links connecting it to the device, (4) other NCPs it can be connected to, and (5) other networks it can join.

How Resources Are Defined to the NCP

As mentioned earlier, you define the NCP by coding a generation source program that consists of definition statements. These definition statements contain many operands. The values you specify on these operands describe the relationship of the relevant resources in the network to the NCP.

There are six types of definition statements:

- System
- Configuration definition
- Network configuration
- Block-handler
- Generation delimiter
- Generation process control.

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System Definition Statements

The system definition statements provide information about the communication controller where your NCP will reside, functional options you have chosen for your NCP, and generation procedure characteristics. For example, they specify:

- The amount of storage installed in the communication controller
- The size of the buffers your NCP contains
- The number and positions of channel adapters installed in the communication controller
- Optional diagnostic aids, such as an address trace, that you want included for your NCP
- Optional dynamic control functions, such as dynamic reconfiguration, that you want included for your NCP.

The definition statements in the system group are:

Definition Statement	Description
-----------------------------	--------------------

PCCU	The PCCU definition statement is used only if your NCP can be started by the Advanced Communications Function for Virtual Telecommunications Access Method (VTAM or VTAM). It is used only by the VTAM initialization procedure and is not used by the NCP generation procedure. See the appropriate <i>VTAM Installation</i> book for a complete description of the PCCU definition statement.
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BUILD	The BUILD definition statement begins your NCP definition statement stream. It also allows you to specify a wide variety of characteristics and functions for your NCP and its relationship to the resources that are attached to it. Some of these characteristics and functions are (1) hardware features of the communication controller, (2) diagnostic aids, (3) program generation specifications, and (4) data control information. If you are including the SNA network interconnection function to connect two or more independent networks, the BUILD definition statement is used also to specify characteristics of one of the interconnected networks. The particular interconnected network identified by the BUILD definition statement is called the <i>native network</i> . All other interconnected networks are called <i>non-native networks</i> and are defined by the NETWORK definition statement, which is discussed later in this chapter under "Network Configuration Definition
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Statements” on page 1-8. The native network is the network containing the access methods that can own any resources attached to a gateway NCP. For more information on gateway NCPs and on native and non-native networks, see “Defining Interconnected Networks” on page 2-48.

- SYSCNTRL** The SYSCNTRL definition statement allows you to specify the dynamic control facilities you want included for your NCP. Some of these facilities are switched network backup, display data link status, change service-seeking pause, and reset device queues.
- NCPNAU** The NCPNAU definition statement is used only if you are adding user-written code or are using other IBM program products, such as the Network Terminal Option, to add special device support and functions to your NCP. The NCPNAU definition statement allows you to define the names of user-defined control blocks and function vector tables associated with a network addressable unit (NAU). It also allows you to assign a specific name to this NAU and to tell the NCP whether the NAU is to function as a system services control point (SSCP) or a logical unit (LU).
- GWNAU** The GWNAU definition statement is used only if you are including the SNA network interconnection function to connect two or more independent networks. It allows you to reserve addresses in the gateway NCP that will be used by LUs and SSCPs that will participate in cross-network sessions. It also allows you to specify characteristics to be assigned to these addresses, such as the identity of the LU or SSCP that will use each address and the number of sessions in which the LU or SSCP assigned to each address can participate.

Configuration Definition Statements

The configuration definition statements provide the information necessary to build the tables needed by the NCP to control the flow of data between the communication controller and its link-attached devices, and between the controller and any channel-attached host processors. For example, they specify:

- The average block size and buffer unit size used by the host processor access method
- Lists of valid identification sequences for BSC devices or Teletypewriter Exchange (TWX) terminals that dial in over the switched network
- The explicit routes and adjacent subareas used to send data to destination subareas in the network.

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The definition statements in the configuration definition group are:

Definition Statement	Description
HOST	The HOST definition statement allows you to specify characteristics of each host processor access method that is channel-attached to your NCP. These characteristics include (1) the number of NCP buffers to be allocated for receiving data from the access method, (2) the size of the access method buffer unit used to receive data from the NCP, (3) the number of buffer units the access method will allocate for receiving data from the NCP, and (4) the number of bytes in the header prefixes used by the access method.
CSB	The CSB definition statement is used only if you are defining your NCP for the IBM 3705 Communications Controller. This definition statement allows you to specify characteristics of the communication scanners installed in the 3705 controller. These characteristics include (1) internal oscillator rates, (2) location, (3) type, and (4) line addresses for receiving test data in emulation mode.
IDLIST	The IDLIST definition statement is used only if you have BSC devices or TWX terminals that are attached to a switched data link connected to your NCP. It allows you to specify a list of identification (ID) sequences for these devices, and also allows you to specify the maximum size of the ID list and the action the NCP will perform when it receives an ID sequence that does not match any sequence in the list.
LUPOOL	The LUPOOL definition statement is used only if you have logical units associated with type 1 and type 2 physical units attached to switched SDLC links. It allows you to specify a pool of logical unit control blocks (LUBs) to be used when a connection is established between the NCP and a type 1 or type 2 physical unit attached to a switched SDLC data link.
LUDRPOOL	The LUDRPOOL definition statement is used only if you are including the dynamic reconfiguration function or have any switched SDLC data links connected to your NCP. It allows you to specify two pools of empty logical unit control blocks (LUBs) to be used when an LU is added to an SDLC device by dynamic reconfiguration, or when a connection is established between the NCP and an SDLC device attached to a switched data link.

PUDRPOOL	The PUDRPOOL definition statement is used only if you are including the dynamic reconfiguration function in your NCP. It allows you to specify a pool of empty physical unit control blocks to be used when an SDLC device is added by dynamic reconfiguration to a data link connected to your NCP.
PATH	The PATH definition statement allows you to specify one or more destination subareas to which your NCP can route data. It also allows you to specify the explicit routes, adjacent subareas, and transmission groups used to send data to the destination subareas, and to specify data flow thresholds for the transmission groups used. In addition, it allows you to assign virtual routes to the explicit routes used, and to specify pacing window sizes for these virtual routes.
SDLCST	The SDLCST definition statement is used only if your NCP is connected to an adjacent NCP by one or more SDLC subarea links. It allows you to specify a set of parameters in a selection table to be used by a subarea link, and allows you to specify whether this set of parameters should be used when your NCP is operating in a primary or secondary state.
DIALSET	The DIALSET definition statement is used only if you have BSC or SS devices that are attached to a switched data link connected to your NCP. It allows you to specify the switched, point-to-point data links that make up a dial set (a <i>dial set</i> is a group of data links from which the NCP selects a link to dial a device).
MTALCST	The MTALCST definition statement is used only if you are using switched, multiple-terminal-access (MTA) data links for certain SS devices attached to your NCP. It allows you to define entries in a line-control selection table that is generated in the NCP for the devices that use the MTA data links. These entries describe terminal operating characteristics, such as (1) line speed, (2) transmission code, (3) line control, (4) length of print line, (5) carriage return rate, (6) text error retry limit, (7) buffer cutoff limit, and (8) a mask and compare character for TWX terminals.
MTALIST	The MTALIST definition statement is used only if you are using switched, MTA data links for certain SS devices attached to your NCP. It allows you to specify the types of terminals that can use the MTA data link.
MTAPOLL	The MTAPOLL definition statement is used only if you are using switched, MTA data links for IBM 1050 Data Communication System devices attached to your NCP. It allows you to specify the polling characters used by IBM 1050 Data Communication System terminals that

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can call the communication controller over any dial-in MTA data link.

MTATABL The MTATABL definition statement is used only if you are using switched, MTA data links for certain SS devices attached to your NCP. It allows you to specify the line control and transmission code used by the devices defined in the MTALCST definition statement. It also allows you to specify the name of each MTALCST definition statement that defines a set of operating parameters for these devices.

Network Configuration Definition Statements

The network configuration definition statements specify characteristics and functions for the following resources attached to the NCP:

- Systems Network Architecture (SNA) physical units (PUs) and logical units (LUs)

Note: SNA physical units are also called SDLC devices.

- Data links and data link groups
- Cluster controllers
- Terminals
- Components of terminals.

Some of these characteristics and functions are:

- The speed at which the data links connected to the NCP operate
- The type of clocking used by the data links connected to the NCP
- The transmission code used by the BSC and SS data links connected to the NCP
- The addresses of the data links, PUs, LUs, terminals, and components of terminals attached to the NCP
- The maximum amount of data that the PUs attached to the NCP can receive from the NCP in one data transfer.

The definition statements in the network configuration group are:

Definition Statement	Description
-----------------------------	--------------------

GROUP	The GROUP definition statement begins a series of definition statements that define data links and devices attached to your NCP that have certain characteristics in common. It allows you to specify such characteristics and functions as (1) whether the data links are switched or nonswitched; (2) whether the data links are used for SDLC, BSC, or SS communication;
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(3) optional or variable characteristics that all data links in the group must have in common; and (4) certain operation options to be applied to all data links in the group.

LINE

The **LINE** definition statement allows you to specify characteristics and functions for each data link connected to your NCP. These characteristics and functions include (1) the speed of the data link, (2) its address, (3) whether the modem or communication scanner will provide clocking, (4) whether the data link and modem constitute a duplex or half-duplex facility, and (5) the number of attempts the NCP will make to recover from errors occurring during transmission of data over the link.

SERVICE

The **SERVICE** definition statement allows you to generate a service order table for a nonswitched data link connected to your NCP. It allows you to specify the order that the devices attached to the data link are to be serviced and the maximum number of entries in the table. If you omit the **SERVICE** definition statement, SSP automatically generates the service order table for a line operating in network control mode.

CLUSTER

The **CLUSTER** definition statement is used only if you have clustered BSC stations (IBM 3270 Information Display Systems or IBM 2972 General Banking Terminal Systems) attached to your NCP. It allows you to specify such characteristics and functions as (1) the type of station; (2) the general polling characters used by the cluster controller to which the devices in the station are attached, if required; (3) the name of the station, if general polling characters are specified; (4) the block handler set, if any, associated with the station, and the points of execution of block handlers within the set; and (5) certain operation options to be used when the NCP is communicating with the clustered station.

TERMINAL

The **TERMINAL** definition statement is used only if you have BSC or SS devices attached to your NCP. It allows you to specify such characteristics and functions as (1) the name of the device; (2) its type; (3) the features that it is equipped with; (4) the polling and addressing characters by which the NCP will contact the device; (5) the telephone number by which the NCP can reach the device; (6) the length of the controller ID sequence the NCP will send to the device when contact is established; (7) the block handler set, if any, associated with the device, and the points of execution of block handlers within the set; and (8) certain

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operation options NCP is to use when communicating with the device.

- COMP** The COMP definition statement is used only if you have BSC or SS devices attached to your NCP. It allows you to specify characteristics and functions for each input and output component of the devices. These characteristics and functions include (1) the name of the component; (2) the polling and addressing characters by which the NCP will contact the component; (3) the block handler set, if any, associated with the component, and the times of execution of block handlers within the set; and (4) certain operation options the NCP is to use when communicating with the component.
- PU** The PU definition statement is used only if you have SDLC devices attached to your NCP, or if your NCP is connected to an adjacent NCP by one or more SDLC subarea links. It allows you to specify such characteristics and functions as (1) the name of the device, (2) its address and type, (3) the maximum amount of data it can receive from the NCP in one path information unit (PIU) or PIU segment, (4) the maximum number of consecutive PIUs or PIU segments the NCP will send to the device before servicing other devices on the link, (5) whether immediate polling retry is required for the device, (6) the number of error recovery attempts the NCP will make if transmission errors occur, (7) the maximum number of PIUs or PIU segments the NCP will send to the device before requesting a response, and (8) the maximum number of LUs associated with the device.
- LU** The LU definition statement is used only if you have SDLC devices attached to your NCP. It allows you to specify such characteristics and functions as (1) the name of an LU associated with an SDLC device; (2) the LU's logical address; (3) whether the NCP requires the LU to acknowledge, at intervals, receipt of data and readiness to accept more data; and (4) whether data transfer to the LU from the host processor access method is in batch mode.
- NETWORK** The NETWORK definition statement is used only if you are including the SNA network interconnection function to connect two or more independent networks. It allows you to specify characteristics of the non-native networks that will be connected to the gateway NCP. These characteristics include (1) the name of the non-native network, (2) the subarea address by which the non-native network will know the gateway NCP, (3) the maximum number of subareas in the non-native network that can simultaneously have

active virtual routes connecting them with the gateway NCP, and (4) whether access methods in the non-native network can start the gateway NCP.

Block-Handler Definition Statements

The block-handler definition statements are used only if you have BSC or SS devices attached to your NCP. They provide information that describes the optional processing that the NCP can perform on a block of data before sending the block to another resource in the network. For example, they specify:

- Block-handling routines that perform specific processing functions, such as inserting the date and time into blocks of data, and correcting text incorrectly entered from a device
- Block handlers and sets of block handlers that consist of one or more block-handling routines.

The definition statements in the block-handler group are:

Definition Statement	Description
STARTBH	The STARTBH definition statement allows you to specify the name of a block handler, and the point at which the block handler will be operated.
EDIT	The EDIT definition statement allows you to specify a character that can be used as a text canceling (backspace) character.
DATETIME	The DATETIME definition statement allows you to specify whether the NCP is to insert the date, time of day, or both, in a block of data that the NCP is processing.
UBHR	The UBHR definition statement is only for users who are including a user-written block-handling routine in a block handler. It allows you to specify the name of the user-written routine, its entry point, and the conditions under which it is to be run.
REMOVCTL	The REMOVCTL definition statement allows you to specify whether the NCP is to remove the ending control characters from incoming data blocks for TWX terminals, World Trade teletypewriter (WTTY) terminals, Western Union Plan 115A Outstations, and 83B3 Selective Calling Stations.
ENDBH	The ENDBH definition statement allows you to specify the end of a block handler.

BHSET The BHSET definition statement allows you to specify the name of a set of block handlers, whether the block-handler set may be executed when it is associated with a device by command from the host processor, and the point at which the block-handler set will be executed.

Generation Delimiter Definition Statement

The generation delimiter definition statement ends the definition statements in the NCP generation input job stream. It also provides information about the entry points and library member names of user-written code you may be including in your NCP. For the 3705, the generation delimiter definition statement also provides information about the scan limits and address substitution masks for the communication scanner processors installed in the 3705 controller.

The generation delimiter group has only one definition statement. It is:

Definition Statement	Description
GENEND	The GENEND definition statement ends your NCP definition statement stream, and allows you to specify certain characteristics about any user-written code you may be including in your NCP. For the 3705, the GENEND definition statement also allows you to specify certain characteristics about the scanners in the communication controller.

Generation Process Control Definition Statement

The generation process control definition statement allows you to selectively control the generation procedure for diagnostic purposes. This definition statement turns on and turns off traces, such as parameter traces, data traces and procedure traces. It also selectively dumps instances of the major data structures that the generation process uses, and runs the generation procedure in FASTRUN mode to check for input errors without creating object modules.

The generation process control group has only one definition statement. It is:

Definition Statement	Description
OPTIONS	The OPTIONS definition statement is used only if you want to control processing in the generation procedure. For diagnostic purposes, the OPTIONS definition statement allows you to turn on and turn off traces, such as parameter traces, data traces and procedure traces, and allows you to selectively dump instances of the major data structures that the generation process uses. Additionally, the OPTIONS definition statement

allows you to run the generation procedure in FASTRUN mode to check for input errors without creating object modules. The OPTIONS definition statement also allows certain IBM special products and user-written code to have access to NDF internal routines through the NDF standard attachment facility (see "Defining User-Written Generation Load Modules" on page 2-5). The OPTIONS definition statement also is used to inform NDF to generate a new generation definition containing statements and operands generated or passed to it via the standard attachment facility. For more information on using the OPTIONS definition statement for diagnostic purposes, see "Defining Diagnostic Operations for the Generation Procedure" on page 2-7.

Coding the Definition Statements to Define Resources to the NCP

The definition statements you need to code to define your NCP depend on the specific characteristics of your network. In general, the factors that determine which definition statements you need to code are:

- Whether you have any SDLC devices attached to your NCP
- Whether you have any BSC devices attached to your NCP
- Whether you have any SS devices attached to your NCP
- Whether you have any devices attached to your NCP that you want to be able to operate in emulation mode through the Partitioned Emulation Programming (PEP) extension of the NCP
- Whether you have any TWX devices attached to your NCP
- Whether you have any clustered IBM 3270 BSC stations attached to your NCP
- Whether you are including the dynamic reconfiguration function for any SDLC devices attached to your NCP
- Whether you are including block handlers for any BSC or SS devices attached to your NCP
- Whether you are defining your NCP for the 3705, the 3725, or the 3720.
- Whether you are operating under the MVS, VM/SP, or VSE operating system
- Whether you are defining an NCP that is to serve as a gateway NCP between two or more interconnected networks
- Whether you have any channel-attached host processors that can communicate with your NCP

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- Whether your NCP can be started by VTAM
- Whether your NCP is link-attached to another NCP
- Whether you are adding any user-written code or are using IBM program products such as NTO to add special device support and functions to your NCP
- Whether you are defining NCP/Token-Ring interconnection (NTRI) resources to your NCP
- Whether you have any switched data links connected to your NCP
- Whether you have any switched, MTA data links connected to your NCP.

The specific characteristics of your network determine not only which definition statements you need to code, but also which operands in each of the definition statements you will need to specify values for. You *must* be very familiar with your network before you can know which of these definition statements and operands to code.

Chapters 2 through 5 in this book, along with the *NCP and SSP Resource Definition Reference* book, help you complete the second step in producing an operating NCP; that is, to define the program. As mentioned earlier, Chapters 2 through 5 are organized to help you code your NCP according to the types of devices you are defining: SDLC, BSC, or SS. Special considerations for the specific characteristics of your network are discussed, where appropriate, in each of these chapters. Other areas that are covered in these chapters are:

- Which definition statements and operands to code for defining:
 - Program generation characteristics
 - Diagnostic operations for the generation procedure
 - Dynamic control facilities
 - The communication controller
 - The relationship between NCP and the access method
 - Routes between subareas
 - Connections between NCPs
 - Interconnected networks
 - The relationship between NCP and link-attached devices
 - Diagnostic aids
 - Backup and recovery
 - Performance characteristics.
- Special considerations for coding the definition statements and operands needed for defining each of the areas mentioned above.

Chapter 2 tells you which definition statements and operands you will need to code, regardless of the types of devices you have attached to your NCP. Read this chapter before reading any of the later ones. Chapters 3, 4, and 5 show you the definition statements and operands you will need to code according to the functions you want your NCP to perform and the specific

devices you are defining. You need to read only the chapters that pertain to the types of devices you have attached to your NCP.

After you have determined the definition statements and operands you need to code, refer to the *NCP and SSP Resource Definition Reference* book for a description of how to code them. The *NCP and SSP Resource Definition Reference* book contains descriptions of all the possible definition statements and operands you can code to define the NCP. Think of it as a dictionary. You need to refer to it to look up the definition of a definition statement or operand you have already determined you need to code. Remember, Chapters 2, 3, 4, and 5 of this book tell you *which* definition statements you need to code; the *NCP and SSP Resource Definition Reference* book tells you *how* to code them.

As you go through these chapters, keep track of the values you are specifying for each of the definition statements and operands you code. Use the coding sheets in Appendix A, "Coding Sheets" to help you do this. After you have determined and recorded the values for the definition statements and operands you need, go to the *NCP and SSP Generation and Loading Guide* for instructions on how to generate and load your NCP.

Definition Statement Sequence Required for NCP Generation

Before you begin coding the definition statements, be aware of the order that they must appear in your generation input job stream. The sequence of definition statements, and the requirements for their usage, is shown below:

Definition Statement	Usage	Position
PCCU	VTAM users only. One for each VTAM that can start the NCP. (Required only for VTAM initialization.)	Must precede BUILD definition statement.
OPTIONS	For diagnosis, FASTRUN operation, and use of the NDF standard attachment facility. No limit on number allowed for diagnostic purposes. The FASTRUN option cannot be disabled after it is started. Using the OPTIONS definition statement to specify use of the NDF standard attachment facility or to create a new generation definition can be specified only one time.	When used to specify the use of the NDF standard attachment facility, or to create a new generation definition, OPTIONS must be first in the definition statement instruction stream. Otherwise, it can appear anywhere in the definition statement instruction stream.
BUILD	Required.	First in NCP definition statement stream unless you code OPTIONS first.
SYSCNTRL	Required.	Must follow BUILD definition statement.

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Definition Statement	Usage	Position
NCPNAU	Customized functions only. One for each network addressable unit representing an SSCP or LU.	Must follow SYSCNTRL definition statement.
GWNAU	Gateway NCPs only. One for each LU and SSCP in a non-native network that requires a permanent address in the native network, or a guaranteed number of sessions with LUs or SSCPs in the native network; and one to define the number of addresses to be set aside in a pool for temporary use by LUs and SSCPs in non-native networks that will participate in cross-network sessions with LUs and SSCPs in the native network.	When defining specifications for LUs and SSCPs in non-native networks that require addresses in the native network, must follow the NCPNAU or SYSCNTRL definition statement.
HOST	NCPs in channel-attached controllers only. One for each access method that is channel-attached to the NCP.	Must precede first GROUP definition statement.
CSB	Only for users of NCP Version 3 for the IBM 3705 Communications Controller. One for each scanner in the controller.	Must precede first GROUP definition statement.
IDLIST	BSC or TWX devices attached to switched data links only. One for each list of ID sequences to be checked by the NCP.	Must precede first GROUP definition statement.
LUPOOL	For SDLC devices attached to switched data links. One for each access method that will communicate with type 1 and type 2 physical units over switched SDLC data links using the Assign Network Address (ANA) command.	Must precede first GROUP definition statement.
LUDRPOOL	Dynamic reconfiguration or switched SDLC data links only.	Must precede first GROUP definition statement.
PUDRPOOL	Dynamic reconfiguration only.	Must precede first GROUP definition statement.
PATH	Required. One for each destination subarea the NCP routes data to. If defining a gateway NCP, one for each destination subarea in the native network that the NCP routes data to.	Must precede first GROUP definition statement.
SDLCST	SDLC subarea links connecting two controllers only. One for when the NCP is in a primary state, and one for when it is in a secondary state.	Must precede first GROUP definition statement.

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Definition Statement	Usage	Position
DIALSET	BSC or SS devices attached to switched data links only. One for each dial set to be defined.	Must precede first GROUP definition statement.
MTALCST	MTA data links only. One for each line-control selection table entry to be defined.	All MTALCST definition statements must appear together for an MTALCST group. Must precede first GROUP definition statement.
MTALIST	MTA data links only. One for each list of line control types for MTA data links.	Must follow group of MTALCST definition statements for switched data link or links. Must precede first GROUP definition statement.
MTAPOLL	MTA data links only. One for all IBM 1050 terminals that can dial the controller over any MTA link.	Must precede first GROUP definition statement.
MTATABL	MTA data links only. One for each unique combination of line control types and transmission codes for MTA links.	Must precede first GROUP definition statement.
GROUP	Required. One for each data link group, even if the group is made up of only one data link.	Must appear at beginning of each data link group definition.
LINE	Required. One for each data link attached to the NCP.	Must follow GROUP definition statement or other LINE definition statement.
SERVICE	Nonswitched data links only. One for each data link, except for subarea links connecting two NCPs. If omitted, service order table created for a line operating in network control mode.	Must follow LINE definition statement.
CLUSTER	Clustered BSC stations only. One for each cluster controller.	Must follow SERVICE definition statement or other device definition statement (TERMINAL or COMP). Note that any CLUSTER, TERMINAL, or COMP definition statements defining BSC or SS devices must appear before any PU or LU definition statements defining SDLC devices.
TERMINAL	BSC or SS devices only. One for each device, including those attached to cluster controllers. Represents first or only input or output component of a device.	Must follow SERVICE definition statement or other device definition statement (CLUSTER, TERMINAL, or COMP).
COMP	BSC or SS devices only. One for each additional input or output component of a device.	Must follow TERMINAL definition statement or other COMP definition statement.

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Definition Statement	Usage	Position
PU	SDLC devices only. One for each device and link station.	Must follow LINE, SERVICE, LU, or other PU definition statements if the other PU definition statement defines a device that is attached to a switched data link. If defining a link station, must follow LINE definition statement. If defining a device attached to a multipoint data link or a point-to-point data link that is used for dynamic reconfiguration, must follow SERVICE definition statement, or if you did not code the SERVICE definition statement, must follow the LINE definition statement.
LU	SDLC devices only. One for each LU associated with a device on a nonswitched data link.	Must follow PU definition statement or other LU definition statement associated with same device.
NETWORK	Gateway NCPs only. One for each non-native network that is connected to the gateway NCP.	Must follow device definition statements (CLUSTER, TERMINAL, COMP, PU, and LU) for native resources attached to the gateway NCP.
GWNAU	Gateway NCPs only. One for each LU and SSCP in any network (native or non-native) that requires (1) a permanent address in the non-native network defined by the preceding NETWORK definition statement, or (2) a guaranteed number of sessions with LUs or SSCPs in that non-native network. Also, one to define the number of addresses to be set aside in a pool for temporary use by LUs and SSCPs in any network that will participate in cross-network sessions with LUs and SSCPs in the non-native network defined by the preceding NETWORK definition statement.	When defining specifications for LUs and SSCPs in any network (native or non-native) that require addresses in a non-native network, must follow the NETWORK definition statement that defines the non-native network where those addresses are required.
PATH	Gateway NCPs only (when following GWNAU definition statement). One for each destination subarea in a non-native network that the NCP routes data to.	When defining routes to destination subareas in a non-native network, must follow GWNAU definition statements associated with the non-native network defined by the preceding NETWORK definition statement.
STARTBH	BSC or SS devices only. One allowed for each block handler.	Must appear at beginning of block handler.
EDIT	BSC or SS devices only. One allowed for each block handler.	Must appear before DATETIME definition statement, if DATETIME definition statement is coded.

Definition Statement	Usage	Position
DATETIME	BSC or SS devices only. One allowed for each block handler.	Must follow EDIT definition statement, if EDIT is coded.
UBHR	BSC or SS devices only. No limit on number allowed.	May appear in any sequence between the STARTBH and ENDBH definition statements.
REMOVCTL	SS devices only. One allowed for each block handler.	May appear in any sequence between the STARTBH and ENDBH definition statements.
ENDBH	BSC or SS devices only. One allowed for each block handler.	Must appear at end of block handler.
BHSET	BSC or SS devices only. One for each block handler set needed.	Must follow all block-handler definition statements of a block-handler set.
GENEND	Required.	Last in NCP definition statement stream unless you code OPTIONS last.

Using NCP Model Statements to Define the NCP

The NCP Model Statements are examples of how you code the key NCP definition statements and are included on the SSP product tape. These statements are provided to you in machine-readable form and are intended to ease the task of defining an initial network configuration.

The documentation included on the tape explains how to find and use appropriate model statements. It also explains which operands on each definition statement you must verify to ensure a correct definition. The Job Control Language or EXEC's needed to print the model statements is included on the SSP tape. Print the documentation included on the tape and use it as a guide during the definition process.

Note: The model definitions are used for NCP only and do not cover complex configurations in your network. If you wish to create configurations containing components such as NTO, NSI, and NRF, or functions such as SNI, consult the appropriate IBM documentation. These model definitions cover only the major building blocks of an NCP and the most commonly used PU's, LU's, cluster controllers, and terminals.

You need to have the necessary tools for displaying and modifying the model statements. Whether you use TSO (SPF) or any other method does not affect the principles or procedures used by the model statements.

Following are lists of the definition statements you can code, the name for the model statement, and the usage of the definition statement. The first list covers these items for the 3725 and the 3720, and the second list covers these items for the 3705. The 'name' denotes any of the following:

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- A file in the CMS environment
- A PDS model member in the MVS operating system
- A type 'A' member of the VSE library
- Or other storage media containing the model statements.

Note: (For VM/SP users) Use the MVS model statements included on your SSP tape. These model statements also apply to the VM/SP operating system.

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Definition Statement	Name	Usage
	NDF3725	Starter member
	NCP3725	Composite generation member
PCCU	PCCU	
BUILD	BUILD	
SYSCNTRL	SYSCNTRL	
HOST	HOST	Channel-attached controller
PUDRPOOL	PUDRPOOL	
LUDRPOOL	LUDRPOOL	
PATH	PATH	Communication to other subareas
SDLCST	SSDINN	SDLC lines; primary & secondary
GROUP	GBS	BSC remote 3270 group; leased line
LINE	LBS3271	BSC line
SERVICE	SERVICE	Remote 3270 BSC cluster
CLUSTER	CBS3271	3270 cluster & 3277/3286 terminal
GROUP	GSD	SDLC group
LINE	LSDFDX	SDLC line; full duplex
PU	PSD3271	3271 PU & 3277 LU
PU	PSD3274	3274 PU & 3274 LU
PU	PSD3275	3275 PU & LU
PU	PSD3276	3276 PU & 3278 LU
PU	PSD3600	3600 PU & LU
PU	PSD3650	3650 PU & LU
PU	PSD3767	3767 PU & LU
PU	PSD4700	4700 PU & LU
PU	PSD6580	6580 PU & LU
PU	PSD6670	6670 PU & LU
PU	PSD8100	8100 PU & LU
PU	PSD8815	8815 PU & LU
LINE	LSDHDX	SDLC line; half duplex
GROUP	GSDSW	SDLC group; switched
LINE	LSDSW	SDLC line; switched
PU	PSDSW	switched PU
GROUP	GVRNPA	Virtual group; NPA
GROUP	GSDINN	SDLC group; intermediate node
LINE	LSDICA	Intermediate node
GENEND	GENEND	

Figure 1-1. Network Model Statements for the 3725 and 3720

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Definition Statement	Name	Usage
	NDF3705	Starter member
	NCP3705	Composite generation member
PCCU	PCCU	
BUILD	BUILD	
SYSCNTRL	SYSCNTRL	
HOST	HOST	Channel-attached controller
CSB	CSB	
PUDRPOOL	PUDRPOOL	
LUDRPOOL	LUDRPOOL	
PATH	PATH	Communication to other subareas
SDLCST	SSDINN	SDLC lines; primary & secondary
GROUP	GBS	BSC group
LINE	LBS3271	BSC line
SERVICE	SERVICE	Remote 3270
CLUSTER	CBS3271	3270 cluster & 3277/3286 terminal
GROUP	GSD	SDLC group
LINE	LSDFDX	SDLC line; full duplex
PU	PSD3271	3271 mod 12 PU & 3277 LU
PU	PSD3274	3274 PU & LU for 3274 cluster
PU	PSD3275	3275 PU & LU
PU	PSD3276	3276 PU & 3278 LU
PU	PSD3600	3600 PU & LU
PU	PSD3650	3650 PU & LU
PU	PSD3767	3767 PU & LU
PU	PSD4700	4700 PU & LU
PU	PSD6580	6580 PU & LU
PU	PSD6670	6670 PU & LU
PU	PSD8100	8100 PU & LU
PU	PSD8815	8815 PU & LU
LINE	LSDHDX	SDLC line; half duplex
GROUP	GSDSW	SDLC group; switched lines
LINE	LSDSW	SDLC line; switched
PU	PSDSW	switched PU
GROUP	GVRNPA	SDLC group, line, & PU; virtual lines
GROUP	GSDINN	SDLC group, line, and PU; primary and secondary
LINE	LSDICA	Local-local link

Figure 1-2 (Part 1 of 2). Network Model Statements for the 3705

Definition Statement	Name	Usage
GENEND	GENEND	

Figure 1-2 (Part 2 of 2). Network Model Statements for the 3705

Generating the Program

The third step in producing an operating NCP is to generate the program. You do this by running a job in a host processor. This job can be run in any host processor; it does not have to be run in the host processor that will load the NCP.

SSP Version 3 includes the NCP/EP Definition Facility (NDF), a program used in generating an NCP and/or EP load module. For more information on generating the NCP, see the *NCP and SSP Generation and Loading Guide*.

Loading the Program

The fourth step in producing an operating NCP is to load the program into the communication controller where it is to reside. You can load your NCP into a channel-attached controller in two ways. You can use the loader utility provided by SSP, or you can use a loader facility provided by an access method. If you are loading your NCP into a link-attached controller, you must use the access method loader facility. See the *NCP and SSP Generation and Loading Guide* for information on how to use the SSP loader utility to load a channel-attached controller. For information on how to use the access method loader facility to load both a channel-attached and link-attached controller, see the appropriate *VTAM Operation* book and the appropriate *TCAM Base Installation Guide*.

Chapter 2. Defining Characteristics and Functions Common to SDLC, BSC, and SS Devices

This chapter helps you determine the definition statements and operands you need to code to define characteristics and functions of your NCP, such as:

- Program generation characteristics
- Diagnostic operations for the generation procedure
- Dynamic control facilities
- Communication controller characteristics
- The relationship between the NCP and the access method
- Routes between subareas
- Connections between NCPs
- Interconnected networks
- The relationship between the NCP and link-attached devices
- Diagnostic aids
- Backup and recovery
- Performance characteristics
- Customized functions.

All of the definition statements and operands discussed in this chapter pertain to your NCP regardless of the types of devices that are attached to your NCP. Chapters 3, 4, and 5 contain discussions of additional definition statements and operands that you may need to code depending on the types of devices that are attached to your NCP: SDLC, BSC, or SS.

This chapter, along with Chapters 3, 4, and 5, concentrates on telling you which definition statements and operands you need to code to obtain a desired function or define a specific characteristic. It does not tell you how to determine the values you need to specify for the individual operands. In most cases, these values should have been determined by a systems designer or analyst and given to you as a set of specifications. **You may have difficulty using this manual to code your NCP unless you have these specifications.**

Each of the topics in this chapter starts out with a boxed-in list of the definition statements and operands you will need to code to define certain characteristics or functions about the resources in your network that relate to your NCP. Explanations of what you use these definition statements and operands for are contained in each of these topics.

You can use most operands when defining either the 3725, 3720, or 3705. However, if an operand is followed by (3725 and 3720), use it only when

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defining a 3725 or 3720. If an operand is followed by (3705), use it only when defining a 3705. As you go through this chapter, keep in mind that you do not have to code every definition statement and operand that is discussed. Some of the definition statements and operands are required regardless of your configuration. These required definition statements and operands are identified as such. If you are coding your NCP for a 3725, you must specify a BUILD, SYSCNTRL, HOST (for a local NCP) or PATH (for a remote NCP), GROUP, LINE, and GENEND definition statement. If you are coding your NCP for a 3705, you also must specify a CSB definition statement.

Other definition statements and operands are required for specific configurations. These also are identified as required along with information about the qualifications concerning their requirement.

The rest of the definition statements and operands you need to code depend on the physical and operational conditions of your network; for example:

- Whether you have any SDLC devices attached to your NCP
- Whether you have any BSC or SS devices attached to your NCP
- Whether you have any switched data links connected to your NCP
- Whether you want certain functions, such as the channel adapter trace or dynamic reconfiguration, to be performed by your NCP
- Whether you are operating under the MVS, VM/SP, or VSE operating system.

These and other conditions will be made clear throughout this chapter and Chapters 3, 4, and 5.

In many cases, if you do not code a particular operand, a default value will be automatically assigned to the operand by the generation procedure. You will probably choose to accept this default value for many of the operands in your definition statement instruction stream. It is a good idea to code relevant and significant operands for which you have accepted default values, even though these values will still be used if you do not code them. Coded default values will help you if you ever need your generation output listings for analyzing problems or making a change to your NCP. However, if it is more important to you to save time while defining your NCP, you may decide not to code default values. In this case, the generation procedure will produce messages indicating the default values that the NCP will use for the operands you do not code.

After you have determined the definition statements and operands you need to code, refer to the *NCP and SSP Resource Definition Reference* manual for an explanation of how to code them and a list of the possible values you can specify.

Defining Program Generation Characteristics

You must define to the NCP several physical and operational characteristics about your configuration before you can generate the NCP. These characteristics and the definition statements and operands you need to code to define them are discussed below.

Defining the Program

BUILD TYPGEN, NEWNAME

Use the TYPGEN operand of the BUILD definition statement to specify whether your NCP will operate in a channel-attached controller, a link-attached controller, or a controller that is both channel-attached and link-attached (see Figure 2-1).

Also use the TYPGEN operand of the BUILD definition statement to specify an NCP V4 Subset generation.

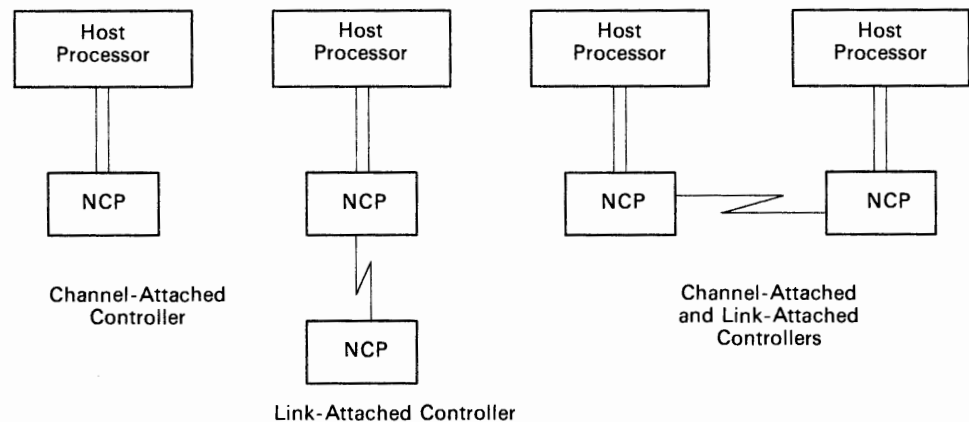


Figure 2-1. Examples of NCP in Channel-Attached and Link-Attached Controllers

If you are defining your NCP for a channel-attached controller, use the TYPGEN operand to specify whether your NCP will include only network control functions or both network control functions and emulation functions. Network control functions are those for which the 3725, 3720, and 3705 are principally designed. Emulation functions are those equivalent to the functions performed by the IBM 2701 Data Adapter Unit and the IBM 2702 and 2703 Transmission Control units. They are performed only for BSC and SS devices, and allow these devices to communicate with non-SNA application programs. The NCP performs emulation functions through the Partitioned Emulation Programming (PEP) extension. If you are defining your NCP for the 3705, 3725, or 3720,

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to use the PEP extension you must install the appropriate Emulation Program (EP) in the same controller with your NCP.

If you are defining an NCP V4 Subset, use the TYPGEN operand to specify which type of NCP V4 Subset you want:

- Channel-attached
- Link-attached
- PEP extension.

Use the NEWNAME operand of the BUILD definition statement to specify a name for your NCP load module, which will be produced at the end of the generation procedure.

Defining the Operating System

BUILD	TYP SYS
-------	---------

Use the TYP SYS operand of the BUILD definition statement to specify whether you will be loading your NCP under the MVS, VM/SP, or VSE operating system.

For NCP V4 Subsets: The TYP SYS operand must match the operating system that you are using to generate your NCP.

Defining the NCP Version Number

BUILD	VERSION
-------	---------

Use the VERSION operand of the BUILD definition statement to specify which version of the NCP you will generate. Do not code VERSION if you are generating only emulation program resources.

Defining Data Sets

BUILD	LOADLIB QUALIFY
-------	--------------------

Use the above operands of the BUILD definition statement if you are defining data sets that can be owned by VTAM. See the appropriate *VTAM Installation* manual for a description of these operands.

Defining Printing of Table Assembly Statements

BUILD	PRTGEN
-------	--------

Use the PRTGEN operand of the BUILD definition statement to specify whether you want the macro generated statements for the NCP table assemblies to be printed.

Defining the Member Name for Link-Edit Control Statements

BUILD	LENAME	(VSE only)
-------	--------	------------

Use the LENAME operand of the BUILD definition statement only if you are generating your NCP under the VSE operating system. Use this operand to specify a unique name for the member containing the link-edit control statements. This unique name is required only when NDF jobs concurrently catalog link edit cards to the same sublibrary. The member is created by the first step in the NCP generation process and cataloged by the LIBRARIAN to be used in the link-edit step.

Defining User-Written Generation Load Modules

If you are using SSP Version 3 Release 2, you can generate user-written code along with NCP code in one generation using the NDF standard attachment facility. The NDF standard attachment facility allows user-written generation load modules, which you supply, to pass information to NDF. For more information on using the NDF standard attachment facility, see the *NCP Customization* manual.

Note: Use the operands in the following list only if you are defining an NCP Version 4 Release 2.

OPTIONS	NEWDEFN, USERGEN
GROUP	LNKOWNER, VIROWNER
NCPNAU	VIROWNER

Use the NEWDEFN operand of the OPTIONS definition statement to specify whether you want NDF to build a new generation definition. This new generation definition contains the input generation definition, and will

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contain any statements and/or operands passed to NDF by user-written generation applications.

Use the `USERGEN` operand of the `OPTIONS` definition statement to specify the names of the user-written generation load modules which utilize the NDF standard attachment facility or to specify IBM special products. Each user-written generation application must have a separate user-written generation load module to process its statements and operands and generate table source statements. You can specify a maximum of 25 user-written generation load modules in a single generation.

If you choose to code the `USERGEN` or `NEWDEFN` operands of the `OPTIONS` definition statement, `OPTIONS` must be the first statement of the generation input stream.

Use the `LNKOWNER` operand of the `GROUP` definition statement to specify the name of the user-written generation load module that is responsible for the link-level processing for the resources defined in the `GROUP` definition statement. The name must match one of the user-written generation load module names specified in the `USERGEN` operand of the `OPTIONS` definition statement.

Use the `VIROWNER` operand of the `GROUP` definition statement to specify the name of the user-written generation load module that is responsible for the virtual processing for the resources defined in the `GROUP` definition statement. The name must match one of the user-written generation load module names specified in the `USERGEN` operand of the `OPTIONS` definition statement.

Use the `VIROWNER` operand of the `NCPNAU` definition statement to specify the name of the user-written generation load module that owns this `NCPNAU` definition statement. The name must match one of the user-written generation load module names specified in the `USERGEN` operand of the `OPTIONS` definition statement.

Operands Ignored by SSP Version 3

If you have previously defined your NCP Version 3 for the IBM 3725 Communication Controller or your NCP Version 3 for the IBM 3705 Communications Controller, you might have included operands on the `BUILD` definition statement which are now ignored by SSP Version 3. If you included these operands, you will receive an informational message. SSP Version 3 now contains the NCP/EP Definition Facility (NDF), a program which is used to generate NCP/EP load modules. This program does not need the operands listed below to generate an NCP. However, if you coded these operands, you can still generate your NCP without modifying your generation input. These operands on the `BUILD` definition statement are:

BUILD	ASMXREF, CONDASM, JOB CARD, LESIZE, MACLIB, OBJLIB, OBJQUAL, OUTPUT, PARTIAL, ROUND, TIME, UNIT, USERLIB, UT1, UT2, UT3
-------	--

For descriptions of these operands, see the *NCP and SSP Resource Definition Reference* manual, order number SC30-3227-0.

Defining Diagnostic Operations for the Generation Procedure

You can instruct the generation procedure to print a variety of diagnostic information in its generation deck report by coding the OPTIONS definition statement and certain associated operands. The OPTIONS definition statement lets you generate diagnostic information for only those definition statements which appear to be causing a problem. The OPTIONS definition statement and its associated operands used for diagnosis are discussed below. For more information on using the OPTIONS definition statement for diagnosis, see the *NCP and SSP Diagnosis Guide*.

Defining Procedure Tracing

OPTIONS	TRPROC, NOTRPROC
---------	---------------------

Use the TRPROC operand of the OPTIONS definition statement if an IBM support representative instructs you to run a procedure trace for diagnostic purposes. This operand activates a trace of the entry and exit for specified subcomponents. Use the TRPROC operand to trace entry and exit for all modules in certain subcomponents, or to trace entry and exit for Statement/Keyword routines.

Use the NOTRPROC operand of the OPTIONS definition statement to deactivate the above traces.

Defining Parameter Tracing

OPTIONS	TRPARM, NOTRPARM
---------	---------------------

Use the TRPARM operand of the OPTIONS definition statement if an IBM support representative instructs you to run a parameter trace for diagnostic purposes. This operand activates input and output parameter tracing for specified subcomponents. Use the TRPARM operand to trace the input and output parameters of all modules in a certain subcomponent, or to trace the input and output parameters for the Statement/Keyword routines.

Use the NOTRPARM operand of the OPTIONS definition statement to deactivate the above traces.

Defining Data Tracing

OPTIONS	TRDATA, NOTRDATA
---------	---------------------

Use the TRDATA operand of the OPTIONS definition statement if an IBM support representative instructs you to run a data trace for diagnostic purposes. This operand activates the data trace for specified subcomponents or for a data area. Use the TRDATA operand to trace data for all modules in a certain subcomponent. Use this operand also to specify that you want the generation procedure to:

- Print each component of a statement, length, and type of data as soon as it is known
- Print the internal representation for each statement as soon as it is known
- Print an identifying message for each routine in the Keyword Vector Table (KVT) that gets called
- Trace the generation of linkage editor control cards.

Use the NOTRDATA operand of the OPTIONS definition statement to deactivate the above traces and other operations performed by the TRDATA operand.

Defining Data Printing

OPTIONS	TRSNAP
---------	--------

Use the TRSNAP operand of the OPTIONS definition statement if you encounter incorrect control blocks or other data-related problems. This operand instructs the generation procedure to print the major data structures that you specify. For example, use the TRSNAP operand to specify the printing of KVT's, the Symbol Table, the Storage Manager structures, and the Storage Manager data sets.

Defining Verification of the Generation Deck

OPTIONS	FASTRUN
---------	---------

Use the FASTRUN operand of the OPTIONS definition statement to specify that you want the generation procedure to run in FASTRUN mode. FASTRUN checks for input errors in the generation deck without creating control blocks. To use the FASTRUN operand, ensure that you use job control language or EXECs that call only the NDF program and **not** the linkage editor. For information on job control language or EXECs for SSP Version 3 see the *NCP and SSP Generation and Loading Guide*.

Defining Dynamic Control Facilities

SYSCNTRL	OPTIONS
----------	---------

Use the OPTIONS operand of the SYSCNTRL definition statement to specify which of the dynamic control facilities you want included for your NCP. The dynamic control facilities allow the NCP to handle requests from the access method to change certain NCP parameters or to determine the status of resources such as data links or terminals. See the appropriate *VTAM Installation* manual and the appropriate *TCAM Base Installation Guide* for information on the dynamic control facilities that are available with each access method.

Defining the Communication Controller

You must define to the NCP several physical and operational characteristics about the communication controller in which your NCP is going to reside. These characteristics and the definition statements and operands you need to code to define them are discussed below.

BUILD	MODEL, MEMSIZE, CA, REMLOAD	(3705)
CSB	SPEED, TYPE, MOD	(3705) (3705) (3705)

Use the **MODEL** operand of the **BUILD** definition statement to specify the type of communication controller in which your NCP will reside. If you are defining your NCP for the 3725 or 3720, use the **MODEL** operand to specify that you will be loading your NCP into the 3725 or 3720. If you are defining an NCP for the 3705, use the **MODEL** operand of the **BUILD** definition statement to specify whether you will be loading your NCP into an IBM 3705-II or 3705-80 Communications Controller.

Use the **MEMSIZE** operand of the **BUILD** definition statement to specify the amount of storage your NCP will occupy in the communication controller in which it will reside. For the 3725, the loaded NCP will use the value you specify in this operand or the installed storage size of the controller itself, whichever is less. For the 3720, the loaded NCP always uses the installed storage size of the controller.

Use the **CA** operand of the **BUILD** definition statement to specify characteristics about the channel adapters installed in the communication controller in which your NCP will reside.

If you are defining your NCP for the 3725 or 3720, only one type of channel adapter can be installed—the type 5 channel adapter—and it can be installed in six positions for the 3725 or two positions for the 3720. For the 3725, four of these positions can accommodate channel adapters with a two-processor switch. For the 3720, both of the positions can accommodate channel adapters with a two-processor switch. Use the **CA** operand to specify how many channel adapters are installed, whether they have a two-processor switch, and in which positions they are installed. If you are defining an NCP V4 Subset, you can specify up to two channel adapters.

If you are defining your NCP for the 3705, four possible types of channel adapters can be installed in four possible positions. Use the **CA** operand to specify which types of channel adapters are installed in which positions.

Use the **REMLOAD** operand of the **BUILD** definition statement only if you are defining your NCP for the 3705. Use this operand to specify whether

the remote program loader feature is installed in your communication controller.

Use the CSB definition statement only if you are defining your NCP for the 3705.

Use the SPEED operand of the CSB definition statement to specify the internal oscillator (business machine clock) rates for the oscillators in a communication scanner installed in the controller in which your NCP will reside.

Use the TYPE operand of the CSB definition statement to specify whether the scanner you are defining is a type 2 or type 3 scanner.

Use the MOD operand of the CSB definition statement to specify the location of the scanner you are defining in the communication controller. The scanner can be in the base module or in the first, second, or third expansion module.

Defining the Relationship between the NCP and the Access Method

You must define to the NCP several physical and operational characteristics about the relationship between the NCP and the access method or access methods with which it will communicate. These characteristics and the definition statements and operands you need to code to define them are discussed below.

Defining the Channel

BUILD	NCPA, DELAY, TIMEOUT
-------	----------------------------

Use the NCPA operand of the BUILD definition statement to specify whether the channel adapters you identify in the CA operand of the BUILD definition statement are to be active or inactive. Your NCP load module must be loaded into the communication controller over one of the channel adapters you specify as being active. All channel adapters you specify as being inactive are disabled for all communication with the NCP. Any channel adapter not connected to an operational host processor must be disabled.

Use the DELAY operand of the BUILD definition statement to specify the amount of time you want your NCP to delay before presenting an attention signal to the channels you identify in the CA operand. This delay allows data to be queued for multiple PIU transfers to the access method at a savings of host cycles.

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Use the TIMEOUT operand of the BUILD definition statement to specify the amount of time you want your NCP to wait for a response to an attention signal it has sent to the access method before it initiates channel discontact.

Defining Access Method and NCP Subareas

BUILD	MAXSUBA, SUBAREA
HOST	SUBAREA

Use the MAXSUBA operand of the BUILD definition statement to specify the upper limit of the range of subarea addresses used within the network you are defining. The value you specify in this operand must match the values specified in the MAXSUBA specifications for all other NCPs and access methods in the same network.

If you are defining an NCP Version 4, you are not required to code the the MAXSUBA operand. NCP Version 4 contains the extended network addressing function. This function allows you to associate a greater number of resources with any subarea address in the network. The value of MAXSUBA does **not** affect the maximum number of resources that can be associated with a subarea address in the network. No matter what value you specify for the MAXSUBA operand, the maximum number of resources that can be associated with a subarea in the network is 32 768. Extended network addressing accomplishes this by allowing 15 bits to be designated in the element portion of the network address, and 8 bits to be designated for the subarea address.

Note: Until all the nodes in your network are extended network addressing capable, MAXSUBA is required.

If you are defining an NCP Version 3, the total number of resources that can be associated with any subarea address depends on the value of MAXSUBA, as follows:

Value of MAXSUBA	Maximum Number of Resources Possible
3	16 384
7	8 192
15	4 096
31	2 048
63	1 024
127	512
255	256

Use the SUBAREA operand of the BUILD definition statement to specify the subarea address of your NCP.

Use the SUBAREA operand of the HOST definition statement to specify the subarea address of the access method or access methods that your NCP can communicate with over a channel. One HOST definition statement is coded for each access method that the NCP can communicate with over a channel. This means that if you are defining your NCP for a controller that is link-attached only, you do not have to code any HOST definition statements. If you are coding your NCP for a controller that is both channel-attached and link-attached, you need to code HOST definition statements for only those access methods that the NCP can communicate with over a channel, not for the access methods that it can communicate with over subarea links to other NCPs.

Note: Each subarea in a network, whether the network is a single-domain network or a multiple-domain network, must have a unique subarea address assigned to it in the SUBAREA operand of either the BUILD definition statement or the HOST definition statement. The only exceptions are:

- *A configuration in which a subarea defined to one domain never communicates with a second domain that includes a subarea having the same address*
- *A configuration in which more than one access method has the same address but only one is communicating with the network at a time.*

Defining Access Method and NCP Buffers

BUILD	BFRS
HOST	INBFRS, MAXBFRU, UNITSZ, BFRPAD
LINE	TRANSFR

Use the BFRS operand of the BUILD definition statement to specify the size of the buffers in your NCP buffer pool. Buffers from this pool are used to contain PIU messages from access methods in channel-attached host processors, other NCPs, and link-attached devices. The value you specify in the BFRS operand is rounded upward to a multiple of four to provide fullword alignment. A buffer initialization process occurs immediately after the NCP is loaded into the communication controller. During this process, the NCP formats all remaining controller storage space into buffers. This space is divided by the rounded buffer size, plus a 12-byte buffer management prefix, to yield the number of buffers in the pool. The 12-byte buffer management prefix is used to chain buffers together and to hold the data count and data offset of the data within the buffer.

You need to consider several factors when estimating a value for the BFRS operand. One factor is the size of messages and control fields used in the network. Short messages use only a portion of a single buffer. Therefore, if short messages are used in your network and you specify a small buffer size, less unused buffer space will exist. This unused space can be used elsewhere for other PIU traffic. Long messages, on the other hand, require multiple buffers, which means that several buffers will be chained to contain a single long message.

An additional factor in the estimation of a value for the BFRS operand is the maximum size of data sent to an SDLC device as a segment. This size is specified on the MAXDATA operand of the PU definition statement, which is discussed in Chapter 3.

Another thing you need to consider when estimating a value for the BFRS operand is required command and response PIUs. Response PIUs can represent a significant amount of traffic, especially when the NCP is operating in a definite response mode, where 50 percent of all traffic could be responses, or where pacing responses are used.

Diagnostic programs that communicate with the NCP through the access method may also place restrictions on the value you specify for the BFRS operand. See the appropriate manuals for such diagnostic programs to determine what, if any, restrictions apply.

If you are including emulation functions for any BSC or SS devices attached to your NCP, use the BFRS operand to specify also the number of buffers to be allocated for the free buffer pool. The free buffer pool is used by the NCP when it is operating in emulation mode to communicate with the maintenance and operator subsystem (MOSS) in the 3725 or 3720.

Use the INBFRS operand of the HOST definition statement to specify the number of buffers the NCP will allocate for receiving data from the access method you are defining. The value you specify here is the number of buffers that are *initially* allocated. If a data transfer requires additional buffers, they are allocated in multiples of the same quantity you specify in this operand.

You need to consider two factors when estimating a value for the INBFRS operand. If the amount of data transfers that occur during a given time (traffic rate) consistently exceeds the preallocated buffer space, the NCP supervisory routine is frequently interrupted to provide more buffers for the excess data. The time the NCP spends processing these interrupts reduces the time it devotes to servicing data links. On the other hand, preallocating an excessive quantity of buffers for receiving data from the access method may deplete the buffer pool to the point that insufficient buffers are available for receiving data from link-attached devices. Buffer depletion is especially likely when the buffer pool is relatively small and infrequent transfers over the channel cause the preallocated buffers to be unused and therefore unavailable for relatively long periods of time. In choosing a value for the INBFRS operand, you must determine a reasonable balance between degraded NCP efficiency and unnecessary over-allocation of buffers.

Use the MAXBFRU and UNITSZ operands of the HOST definition statement to specify a limit to the amount of data the access method can receive from the NCP during a single data transfer over the network control subchannel. This limit must be specified so that the NCP does not attempt to send more data than the access method can accept. Use the MAXBFRU operand of the HOST definition statement to specify the number of buffer units the access method you are defining will allocate for receiving data from the NCP. Use the UNITSZ operand of the HOST definition statement to specify the size of these buffer units. The size of the buffer used to receive a data transfer is the product of these two values. The value you specify in the UNITSZ operand must be equal to or less than the size of the access method's buffer (IOBUF for VTAM; UNITSZ for TCAM).

Use the BFRPAD operand of the HOST definition statement to specify the number of pad characters that the access method you are defining requires for such things as insertion of message header and message text prefixes before the data.

Use the TRANSFR operand of the LINE definition statement to specify the number of NCP buffers corresponding to the maximum amount of data your NCP is to receive from a data link during a single data transfer operation. Code this operand for both channel-attached and link-attached NCPs. You can use this operand to limit the amount of data accepted from a data link during one data transfer to no more than the access method in the destination host processor (and intermediate access methods, if any) can accept in a single channel operation, or to no more than the data transfer limit imposed by a subsequent NCP in the path. You can also use this operand to limit the number of buffers the NCP can assign at one time to a device on the link, thus preventing that device from monopolizing the available NCP buffers. NCP procedures differ for SDLC, BSC, and SS data links when the buffer limit for the link is reached. For an SDLC link, if the end of the PIU has not been received by the time the buffer limit is reached, the NCP discards all of the data received and sends an SDLC next receive (NR) count error to the sending device. The data is retransmitted until an error threshold is reached and the PU is taken out of service with a permanent error. The discarded data is not sent to the access method. For a BSC or SS link, the NCP sends the filled buffers to the access method as a sub-block and continues to receive data from the device until it receives an end-of-block or end-of-transmission character, or until the sub-block limit you have specified in the CUTOFF operand of the LINE definition statement is reached.

Note: VTAM Users Only: The value you specify in this operand, times the value you specify in the BFRS operand of the BUILD definition statement, minus 18, ($TRANSFR \times BFRS - 18$) must match the value specified in the MAXDATA operand of the PCCU definition statement.

If you omit the TRANSFR operand from the LINE definition statement, you can use the TRANSFR operand of the BUILD definition statement to specify the data transfer limit for data links connected to your NCP. See "Defining Data Transfer Specifications" on page 2-79 for information about the TRANSFR operand of the BUILD definition statement.

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Note: The value you specify for the TRANSFR operand must be the same for all lines in the transmission group. Problems with link activation will result if the values for the TRANSFR operands are not the same for all lines in the transmission group.

Defining the Maximum Number of Concurrent Sessions

BUILD	MAXSSCP, NUMHSAS, VRPOOL
-------	--------------------------------

Use the MAXSSCP operand of the BUILD definition statement to specify the maximum number of system services control points (SSCPs) your NCP can be in session with concurrently. These sessions can be conducted over channels, subarea links, or a combination of the two. An NCP can be in session with from one to eight SSCP's concurrently.

Use the NUMHSAS operand of the BUILD definition statement to specify the number of host subareas in your network that can communicate with your NCP over a channel plus any that can communicate with it over subarea links to other NCPs. Be careful not to choose an excessive value for this operand because it can waste NCP storage. Ensure that the value you specify in this operand equals the number of host subareas that have virtual routes ending in this NCP.

Note: If you are defining a gateway NCP, or an NCP that is working with the Network Routing Facility program product and can activate virtual routes, ensure that the value you specify in this operand equals the number of host subareas and NCP subareas that can activate virtual routes that have endpoints in this NCP.

Use the VRPOOL operand of the BUILD definition statement to specify the number of virtual route and transmission priority number (TPN) control blocks available for concurrent activation of your NCP. If a virtual route fails, you may require additional VRPOOL entries for a fast restart because clean-up of a failed VR has a lower priority than VR restart. Be careful not to choose an excessive value for this operand because it can waste NCP storage. Ensure that the value you specify in this operand equals the number of virtual routes ending in this NCP.

Note: If you are defining a gateway NCP, these virtual routes include virtual routes from non-native networks. See "Defining Interconnected Networks" on page 2-48 for more information about gateway NCPs and interconnected networks.

Defining the NCP to VTAM

PCCU	AUTODMP, AUTOIPL, AUTOSYN, BACKUP, CDUMPDS, (3725 and 3720) CHANCON, CONFGDS, (MVS & VSE) CONFGPW, (MVS & VSE) CUADDR, DUMPDS, DUMPSTA, GWCTL, INITEST, LOADSTA, MAXDATA, MDUMPDS, (3725 and 3720) NCPLUB, (VSE only) NETID, OWNER, RNAME, SUBAREA, VFYLM
------	--

Use the PCCU definition statement and its operands if your NCP can be activated by VTAM. Use these operands to specify characteristics about your NCP and the communication controller in which it resides. See the appropriate *VTAM Installation* manual for a complete description of this definition statement and its operands.

Defining Routes between Subareas

Data travels from subarea to subarea in the network along specified paths called routes. Routes can be defined at two levels: a physical level and a logical level.

At the physical level, a route is called an explicit route and consists of a sequence of subareas and transmission groups over which two subareas communicate. A transmission group consists of one or more data links that are used to transfer data between subareas. A maximum of eight transmission groups can exist between two NCPs. The channel that connects the NCP to the access method is also considered a transmission group. In the case of transmission groups between NCPs, messages are automatically distributed among the data links comprising the group, allowing for more data to be passed simultaneously between the NCPs and for rerouting of data if one of the links fails. You define transmission groups in the TGN operand of the PU definition statement, which is discussed in "Defining Transmission Groups" on page 2-37.

At the logical level, a route is called a virtual route and is a logical connection between two subareas. Each virtual route in the network is assigned to an explicit route and takes on the physical characteristics of that explicit route. You define virtual routes in the access method, and in some cases, in the NCP. You define explicit routes in the access method and in the NCP. See the appropriate *VTAM Installation* manual and the appropriate *TCAM Networking Installation Guide* for more information especially about defining virtual routes, but also about defining explicit routes. Before attempting to define routes in your network, read the information on routing contained in the *SNA Technical Overview* manual also.

Note: A tool called the Route Table Generator (RTG) is available to help you generate the PATH definition statements for the routes in your network. The Route Table Generator is an IBM field-developed program. Consult your local IBM representative for more information about it.

Defining Explicit Routes

Note: If you are defining explicit routes to an NCP V4 Subset, see page 2-29 for some additional considerations.

As said earlier, an explicit route consists of a sequence of subareas and transmission groups over which two subareas communicate. For example, in Figure 2-2 on page 2-19, NCP subarea 5 communicates with VTAM subarea 1 over explicit route 1 (ER1). Data along this route travels from NCP subarea 5 to NCP subarea 4 over transmission group 4 (TG4), from NCP subarea 4 to NCP subarea 3 over TG2, and finally from NCP subarea 3 to the destination subarea, VTAM subarea 1, over TG1.

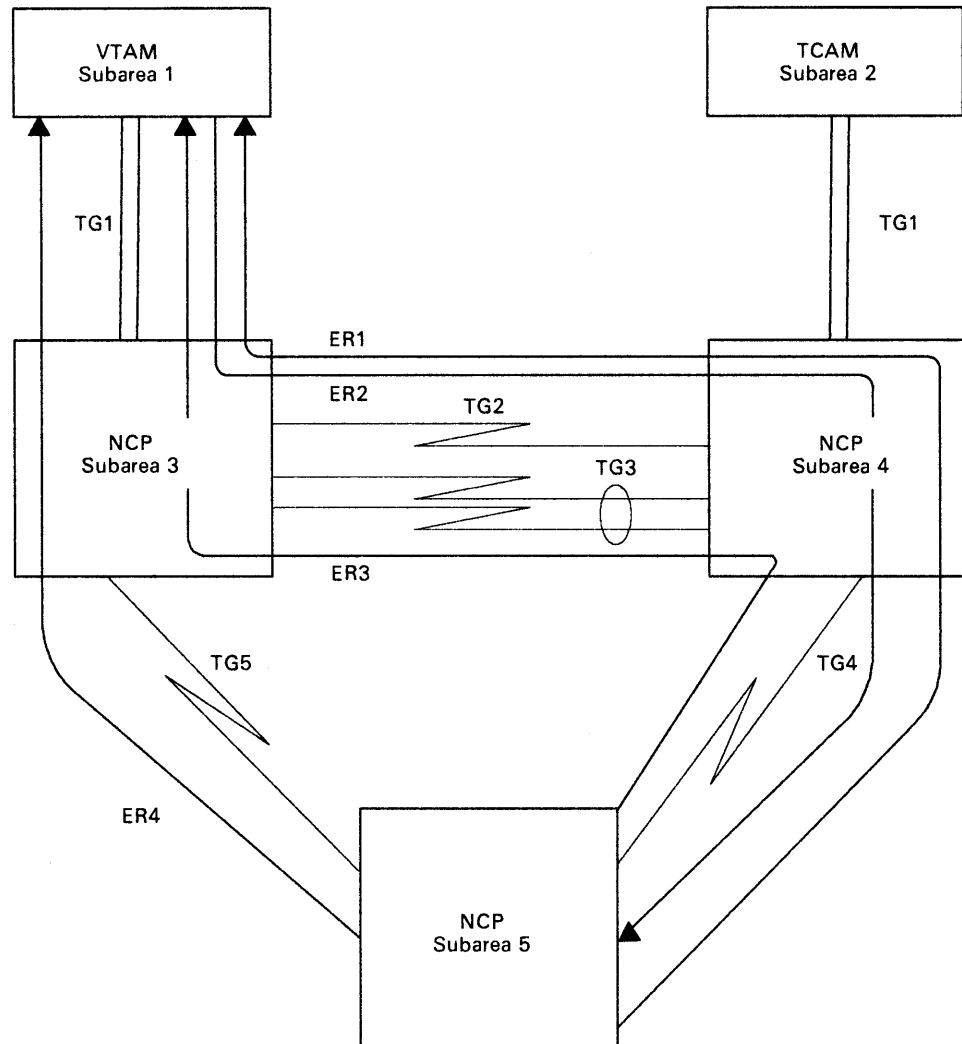


Figure 2-2. Example of Explicit Routes

There can be up to eight explicit routes between one subarea in the network and a destination subarea. For example, in Figure 2-2 on page 2-19, NCP subarea 5 can also communicate with VTAM subarea 1 (the final destination) over explicit route 3 (ER3) and explicit route 4 (ER4). Explicit route 3 is almost identical to explicit route 1, except that data travels from NCP subarea 4 to NCP subarea 3 over TG3 instead of TG2. Data along explicit route 4 travels from NCP subarea 5 to NCP subarea 3 over TG5, and from NCP subarea 3 to VTAM subarea 1 over TG1. Data is assigned to travel along a particular route when the session between a resource in one subarea (an origin subarea) and a resource in a destination subarea is established. Therefore, data that travels along one route when a session is activated may not necessarily travel along the same route the next time a session between the same subareas is established.

Data travels over an explicit route in one direction. It travels over a virtual route in both directions. Because virtual routes are assigned to

explicit routes, for every explicit route that is defined to carry data in one direction, another explicit route must be defined to carry data in the other direction. Both explicit routes must use the same set of subareas and transmission groups in both directions. However, they do not have to have the same explicit route number. For example, in Figure 2-2 on page 2-19, data travels from VTAM subarea 1 to NCP subarea 5 over explicit route 2. Data along this route travels from VTAM subarea 1 to NCP subarea 3 over TG1, from NCP subarea 3 to NCP subarea 4 over TG2, and from NCP subarea 4 to destination subarea NCP subarea 5 over TG4, using the same set of subareas and transmission groups as explicit route 1 from NCP subarea 5 to destination subarea VTAM subarea 1. Explicit route 3, however, is defined as having the same explicit route number in both directions. Data traveling along explicit route 3 from VTAM subarea 1 to NCP subarea 5 uses the same subareas and transmission groups as data traveling along explicit route 3 from NCP subarea 5 to VTAM subarea 1. Likewise, explicit route 4 from VTAM subarea 1 to NCP subarea 5 is defined as having the same explicit route number as explicit route 4 from NCP subarea 5 to VTAM subarea 1. It, too, uses the same set of subareas and transmission groups in both directions.

The definition statements and operands you need to code to define the explicit routes in your network from an NCP point-of-view are discussed below.

PATH	DESTSA, ER0, ER1, ER2, ER3, ER4, ER5, ER6, ER7
------	--

Use the DESTSA operand of the PATH definition statement to specify the subarea address of one of the destination subareas to which your NCP will send data. As explained in the next several paragraphs, you must code one PATH definition statement for each destination subarea. Remember, a destination subarea is an endpoint of an explicit route that either passes through or originates in your NCP. The destination subarea might be either an access method or another NCP.

For example, as shown in Figure 2-2 on page 2-19, NCP subarea 4 has three explicit routes that pass through it. These are explicit route 1, explicit route 2, and explicit route 3. The destination subarea for NCP subarea 4 following explicit route 1 is VTAM subarea 1, and the destination subarea following explicit route 2 is NCP subarea 5. Data travels on explicit route 3 in two directions. So, the destination subarea for NCP subarea 4 following explicit route 3 for data travelling in one direction is VTAM subarea 1 and for data travelling in the other direction is NCP subarea 5. The same relationship holds true for NCP subarea 3 following explicit route 4.

Because an explicit route originates in NCP subarea 5 and no routes pass through it, the only destination subarea for NCP subarea 5 following explicit route 1 is VTAM subarea 1.

Use one of the ER0 through ER7 operands of the PATH definition statement to define each individual explicit route that either originates in or passes through your NCP on its way to the destination subarea specified in the DESTSA operand of the PATH definition statement. It is important to remember that the ER0 through ER7 operands in one PATH definition statement define up to eight routes between your NCP and the destination subarea defined in the DESTSA operand of that PATH definition statement. For each route, use one of the ER0 through ER7 operands to specify the adjacent subarea to which your NCP will send data on its way to the destination subarea, and to specify the transmission group over which your NCP will send data to the adjacent subarea. Use these operands to specify also the low, medium, high, and total flow-control thresholds for the transmission group. These thresholds are used to detect congestion on the transmission group. You specify them for each of the transmission priorities at which data can be flowing across the transmission group. When a threshold is exceeded, flow-control congestion indicators are included in the PIUs sent to destination subareas, notifying these destination subareas of the congestion situation. Appropriate flow-control actions then take place.

From an overall network point-of-view, the ER0 through ER7 operands define entire routes. However, these entire routes are made up of segments that must be carefully defined in each subarea that a route originates in or passes through. For example, in Figure 2-3 on page 2-23, the explicit routes shown between NCP subarea 5 and VTAM subarea 1 are defined by five NCP PATH definition statements and one VTAM PATH statement. These are shown below. For purposes of this example and all other examples in this chapter, the definition statements are not shown in standard assembler language format. For example, continuation characters have been omitted, and definition statements and operands do not start in columns 10 and 16 respectively. When you code your NCP source program, however, you must be sure that it conforms to standard assembler language format.

In NCP Subarea 5:

```
PATH    DESTSA=1,  
        ER1=(4,4)
```

In VTAM Subarea 1:

```
PATH    DESTSA=5,  
        ER2=(3,1)
```

In NCP Subarea 4:

```
PATH    DESTSA=1,  
        ER1=(3,2)
```

In NCP Subarea 3:

```
PATH    DESTSA=5,  
        ER2=(4,2)
```

In NCP Subarea 3:

```
PATH    DESTSA=1,  
        ER1=(1,1)
```

In NCP Subarea 4:

```
PATH    DESTSA=5,  
        ER2=(5,4)
```

Notice that the PATH definition statements in the left column define an explicit route from NCP subarea 5 to VTAM subarea 1, and that the PATH statement and PATH definition statements in the right column define an

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explicit route from VTAM subarea 1 to NCP subarea 5. This is how a virtual route is able to handle data traveling in either direction using the same set of subareas and transmission groups in both directions. In NCP subarea 5, data is defined as traveling along explicit route 1 from NCP subarea 5 to an adjacent subarea, NCP subarea 4, along TG4 4 [ER1 = (4,4)]. In NCP subarea 4, the data is routed along explicit route 1 from NCP subarea 4 to an adjacent subarea, NCP subarea 3, over TG2 [ER1 = (3,2)]; and in NCP subarea 3, from NCP subarea 3 to adjacent subarea (which also is the destination subarea), VTAM subarea 1, over TG1 [ER1 = (1,1)]. You can trace explicit route 2 from VTAM subarea 1 to NCP subarea 5 in the same way by looking at the path definitions in the right column.

Notice also that explicit route 1 is defined as being explicit route 1 in every PATH definition statement that is coded in the left column, and that explicit route 2 is defined as being explicit route 2 in every PATH definition statement that is coded in the right column. This is how an explicit route is defined as being an entire route: by calling it the same explicit route number in *every* PATH definition statement that defines its destination subarea.

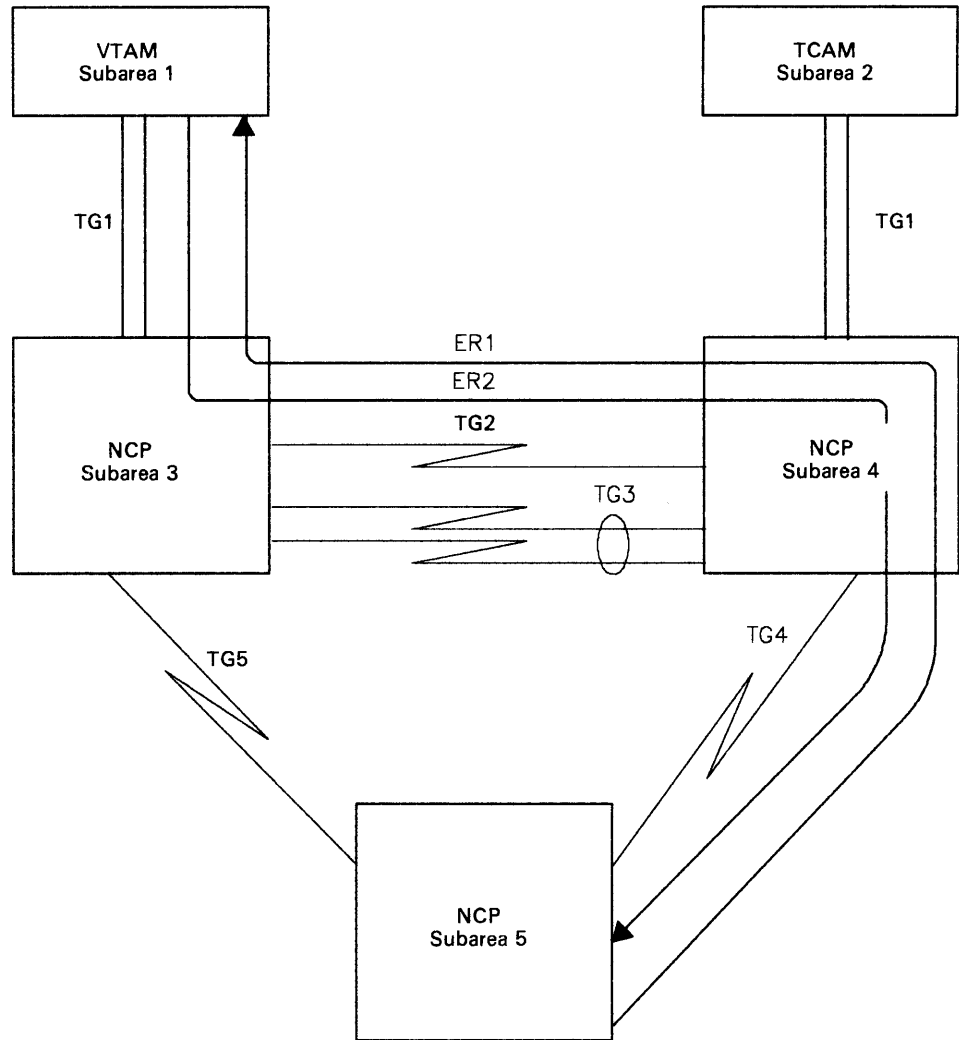


Figure 2-3. Explicit Routes between NCP Subarea 5 and VTAM Subarea 1

Definitions of segments of one explicit route can often serve as definitions of segments of other explicit routes, provided that those other explicit routes are going to the same destination subarea. For example, in Figure 2-4 on page 2-25, an explicit route is shown going from TCAM subarea 2 to VTAM subarea 1. It is defined by the following PATH definition statements:

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In TCAM Subarea 2:

```
PATH    DESTSA=1,  
        ER1=(4,1)
```

In NCP Subarea 4:

```
PATH    DESTSA=1,  
        ER1=(3,2)
```

In NCP Subarea 3:

```
PATH    DESTSA=1,  
        ER1=(1,1)
```

This explicit route shares the same definitions in NCP subarea 4 and NCP subarea 3 as explicit route 1 shown in Figure 2-4 on page 2-25. If these two explicit routes were defined in the same network, when defining the NCPS in subareas 3 and 4, you would not need to code separate PATH definition statements for explicit route 1 going from NCP subarea 5 to VTAM subarea 1, and for explicit route 1 going from TCAM subarea 2 to VTAM subarea 1.

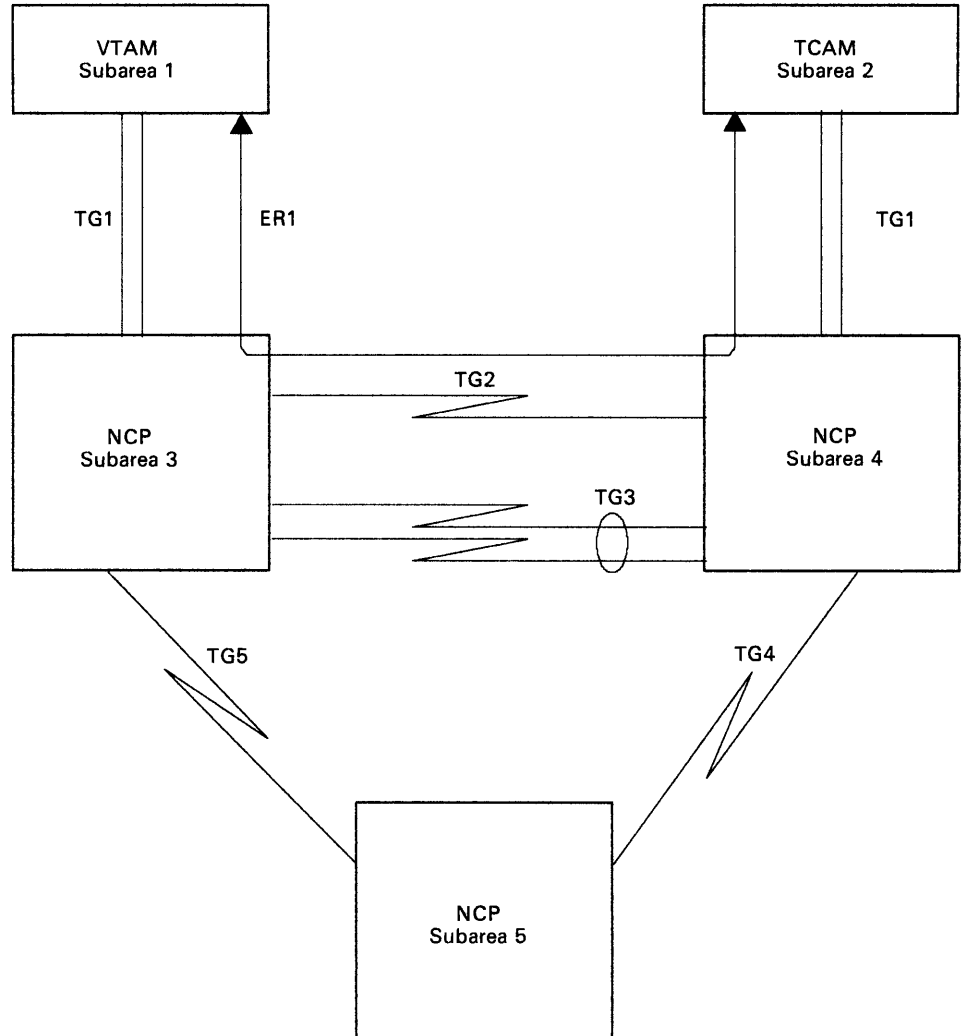


Figure 2-4. Explicit Route between TCAM Subarea 2 and VTAM Subarea 1

In Figure 2-5 on page 2-26, a different explicit route is shown going from TCAM subarea 2 to VTAM subarea 1. If this explicit route existed in the same network as the explicit route shown in Figure 2-4 on page 2-25, it would be defined by the following PATH definition statements:

In TCAM Subarea 2:

```
PATH DESTSA=1,
      ER2=(4,1)
```

In NCP Subarea 3:

```
PATH DESTSA=1,
      ER2=(1,1)
```

In NCP Subarea 4:

```
PATH DESTSA=1,
      ER2=(5,4)
```

In NCP Subarea 5:

```
PATH DESTSA=1,
      ER2=(3,5)
```

Notice that this explicit route is defined by ER2 operands in each of the subareas that it originates in or passes through. This is because it is an

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alternate explicit route having the same destination subarea as explicit route 1 shown in Figure 2-4 on page 2-25.

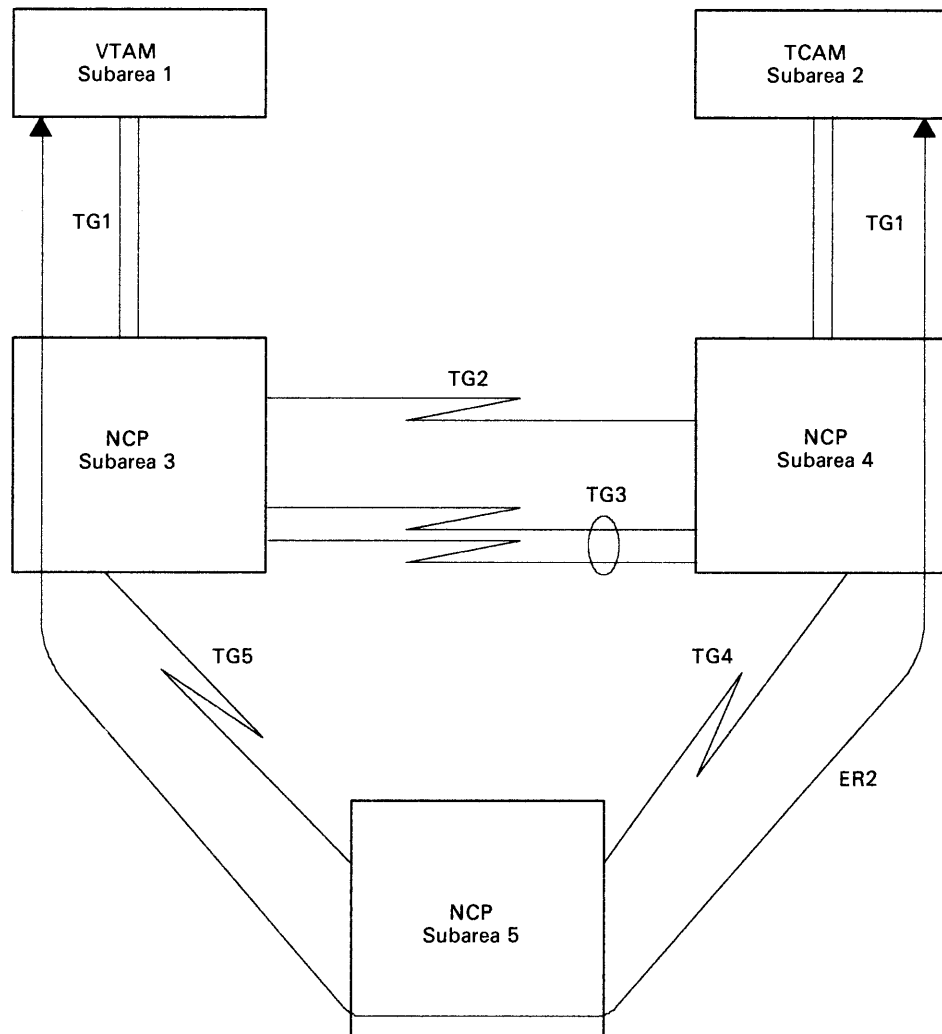


Figure 2-5. Alternate Explicit Route between TCAM Subarea 2 and VTAM Subarea 1

Figure 2-6 on page 2-28 shows the four explicit routes shown in Figure 2-3, Figure 2-4, and Figure 2-5 together in one network. The following PATH definition statements show how the PATH definition statements that define these routes individually are combined to define them in one network. (Notice that explicit route 1 and explicit route 2 from TCAM subarea 2 to VTAM subarea 1 have the same explicit route numbers in both directions.)

In VTAM Subarea 1:

```
PATH  DESTSA=2,  
      ER1=(3,1),  
      ER2=(3,1),  
PATH  DESTSA=5,  
      ER2=(3,1)
```

In NCP Subarea 4:

```
PATH  DESTSA=1,  
      ER1=(3,2),  
      ER2=(5,4),  
PATH  DESTSA=2,  
      ER1=(2,1),  
      ER2=(2,1),  
PATH  DESTSA=5,  
      ER2=(5,4)
```

In TCAM Subarea 2:

```
PATH  DESTSA=1,  
      ER1=(4,1),  
      ER2=(4,1)
```

In NCP Subarea 5:

```
PATH  DESTSA=1,  
      ER1=(4,4),  
      ER2=(3,5),  
PATH  DESTSA=2,  
      ER2=(4,4)
```

In NCP Subarea 3:

```
PATH  DESTSA=1,  
      ER1=(1,1),  
      ER2=(1,1),  
PATH  DESTSA=2,  
      ER1=(4,2),  
      ER2=(5,5),  
PATH  DESTSA=5,  
      ER2=(4,2)
```


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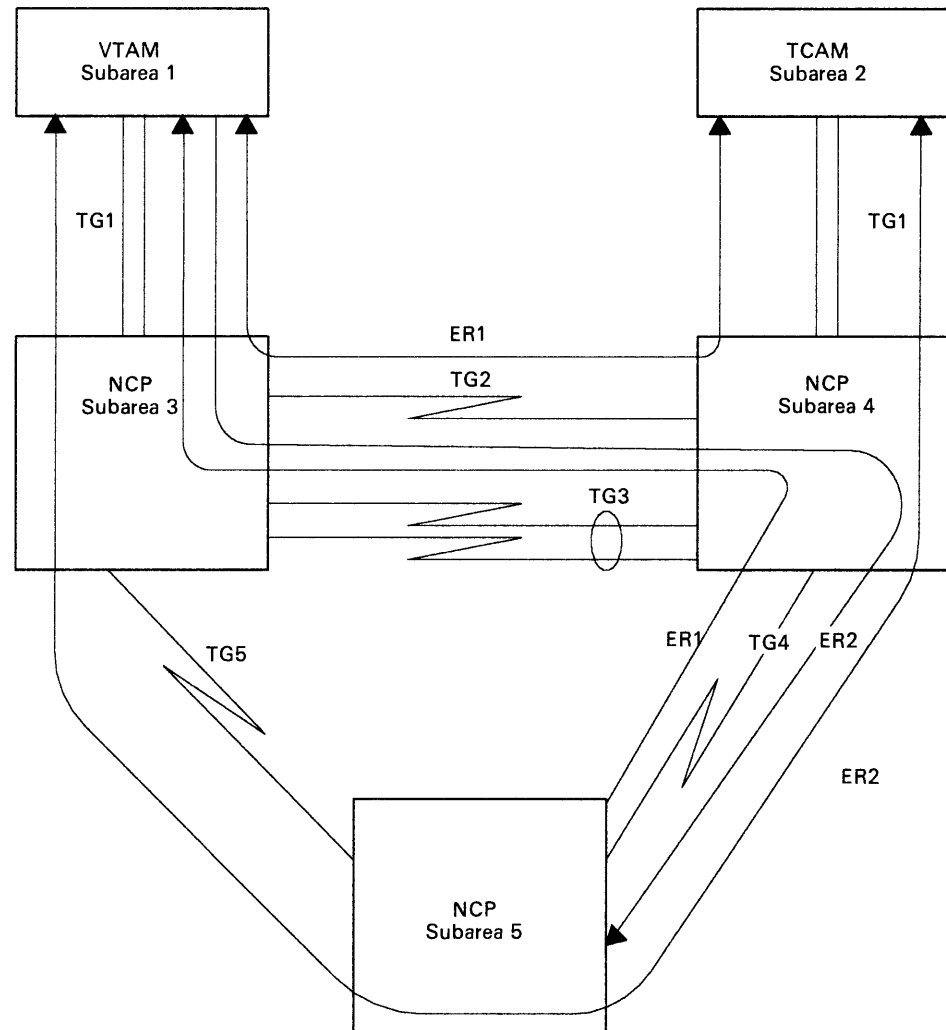


Figure 2-6. Four Explicit Routes Together in One Network

Some considerations to keep in mind when you are defining explicit routes are:

- You can define up to eight explicit routes between an origin subarea and a destination subarea.
- You can assign any number from 0 to 7 to an explicit route.
- For a particular explicit route, you must use the same explicit route number in every PATH definition statement that defines its destination subarea.
- For every explicit route defined to carry data in one direction, you must define another explicit route to carry data in the other direction.
- Between the origin subarea and a destination subarea, you can use the same explicit route number to define the forward data flow and the

reverse data flow, or you can use different explicit route numbers to define the forward and reverse data flows.

- You cannot use the same explicit route number to define the same direction of data flow for multiple routes between the same origin subarea and the same destination subarea.
- You can code for a given destination subarea only one PATH definition statement in each NCP definition; all explicit routes or segments of explicit routes to that given destination subarea must be coded on the same PATH definition statement.
- Many explicit routes can use the same transmission group as part of their routes; if a transmission group becomes inoperative, all explicit routes using that transmission group also become inoperative.
- When defining an explicit route for backup, use different subareas and transmission groups wherever possible for the primary route and the backup route to ensure the backup route will be available if the primary route becomes inoperative because of failure of a physical component of the route.
- Explicit routes comprising a cross-network path are defined independently in each network that the cross-network path travels through. Therefore, data flowing between subareas in separate networks is not likely to travel on the same-numbered explicit routes in each network. In other words, when defining explicit routes that are part of a cross-network path, you do not have to specify the same explicit route number from network to network. See “Defining Interconnected Networks” on page 2-48 and “Defining Cross-Network Paths” on page 2-64 for more information on interconnected networks and cross-network paths.

Defining Virtual Routes

As you read earlier, a virtual route is a logical connection between an origin subarea and a destination subarea. It is assigned to an explicit route, or pair of explicit routes, over which data for a particular session is transmitted. A virtual route takes on the physical characteristics of the explicit route it is assigned to. Also, a virtual route has certain data flow-control characteristics, such as transmission priorities and pacing specifications, assigned to it. Transmission priorities are assigned to virtual routes in class-of-service tables that are defined in the access method. Pacing specifications for virtual routes are defined to the access method and to the NCP. A virtual route, and thereby the explicit route or pair of explicit routes it is assigned to, is selected for a particular session based on the way you define your class-of-service tables. See the appropriate *VTAM Installation* manual and the appropriate *TCAM*

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Networking Installation Guide for information on defining class-of-service tables.

You need to code the following definition statements and operands to define the virtual routes in your network from an NCP point-of-view. Code these definition statements and operands if you are defining an NCP that you want to activate routes. An NCP can activate routes only if it is one of the following:

- A gateway NCP (for more information about gateway NCPs and interconnected networks, see “Defining Interconnected Networks” on page 2-48)
- Working with the IBM Network Routing Facility (NRF) program product
- Working with the IBM Non-SNA Interconnection program product.

BUILD	VRACT
PATH	VR0, VRPWS00, VRPWS01, VRPWS02, VR1, VRPWS10, VRPWS11, VRPWS12, VR2, VRPWS20, VRPWS21, VRPWS22, VR3, VRPWS30, VRPWS31, VRPWS32, VR4, VRPWS40, VRPWS41, VRPWS42, VR5, VRPWS50, VRPWS51, VRPWS52, VR6, VRPWS60, VRPWS61, VRPWS62, VR7, VRPWS70, VRPWS71, VRPWS72

For NCP V3 and V4R1 Users Only:

If you are defining a gateway NCP, use the VRACT operand of the BUILD definition statement to specify that the gateway NCP can activate virtual routes to destination subareas in the networks that it joins. If you are defining an NCP that is working with NRF, use this operand to specify whether your NCP can activate virtual routes to other NCPs in the network. If you are defining an NCP that is working with the Non-SNA Interconnection program product, use this operand to specify whether your NCP can activate virtual routes to destination subareas in the network.

For NCP V4R2 Users Only: Virtual route activation is a standard part of NCP V4R2; therefore, you do not need to code the VRACT operand. If you do code VRACT, you get a message informing you that NDF ignores the specification.

Use the VR0 through VR7 operands of the PATH definition statement to assign a virtual route to an explicit route defined in this same PATH definition statement. Ensure that the value you specify for each VR0 through VR7 operand is the same as the number of the explicit route you are assigning the virtual route to.

Note: If you are defining an NCP that cannot activate virtual routes, you can code the VR0 through VR7 operands for documentation purposes only. In this case, the generation procedure will ignore the operands.

When assigning virtual routes to explicit routes in the NCP, keep the following considerations in mind:

- You can assign any number from 0 to 7 as a virtual route number.
- Many virtual routes can be assigned to the same explicit route. If an explicit route becomes inoperative, the virtual routes using it are no longer available for session traffic.
- You cannot assign the same virtual route to more than one explicit route between an origin subarea and a destination subarea.
- If you are defining a virtual route between your NCP and a subarea that can also activate the same virtual route, you must assign the same virtual route number to:
 - The explicit route in the origin subarea that defines the route's forward data flow
 - The explicit route in the destination subarea that defines the route's reverse data flow.

Use the VRPWS00 through VRPWS72 operands of the PATH definition statement to specify the minimum and maximum virtual route pacing window sizes in support of high-speed and/or long-delay transmission facilities (for example, satellites) for the virtual routes you are defining. You can specify values for the different transmission priorities the route might have.

Defining Connections between NCPs

You must define several physical and operational characteristics about the relationship of the NCP to an NCP in an adjacent communication controller. These characteristics and the definition statements and operands you need to code to define them are discussed below.

Defining Subarea Links

SDLCST	MODE, GROUP, TADDR	
GROUP	MODE	
LINE	MODULO, SDLCST, CONFIG, MONLINK	(3725 and 3720)

A subarea link is an SDLC data link that connects two NCPs. Each data link between NCPs is considered a subarea link, even if it belongs to a multiple-link transmission group. (Subarea links are sometimes called intermediate network node [INN] links or intermediate routing node [IRN] links.) The NCP at each end of a subarea link can be in a primary state (doing the polling) or in a secondary state (being polled). An NCP in contact with another NCP is in a primary state if it has the higher subarea address, or in a secondary state if the other NCP has the higher subarea address. The determination of which NCP will be in a primary state and which will be in a secondary state is made at SDLC CONTACT (XID) time, when the NCPs exchange subarea addresses and additional information to ensure compatibility between themselves. In some cases, an NCP can be connected to more than one NCP and can be in a primary state in its relationship to one and in a secondary state in its relationship to another.

Use the MODE operand of the SDLCST definition statement to specify whether the set of parameters being defined by this SDLCST definition statement is to be used when your NCP is in a primary state or in a secondary state. The SDLCST definition statement defines one entry (set of parameters) in a selection table to be used by any subarea link connecting the two NCPs. You must code two of these definition statements: one defining the parameters to be used by a link when the NCP is in a primary state, and one defining the parameters to be used by a link when the NCP is in a secondary state.

Note: Following the discussion of the MODE operand of the GROUP definition statement on 2-33 are examples and sample coding that will help clarify coding for primary and secondary NCPs.

Use the **GROUP** operand of the **SDLCST** definition statement to specify the name of the **GROUP** definition statement that contains a set of additional parameters to be used by the subarea link connecting the two NCPs.

Use the **TADDR** operand of the **SDLCST** definition statement if you are coding this definition statement to define the parameters to be used when the NCP is in a secondary state. Use this operand to specify the physical address of the communication controller in which your NCP will reside. This address is included in the load/dump program. Instead of the physical address of the communication controller, you can specify the subarea address of your NCP. If the NCP in the adjacent controller is a Version 1 Release 2.1 NCP, the value specified in the **TADDR** operand of the **SDLCST** definition statement must be the same value that is specified in the **ADDR** operand of the **PU** definition statement in the NCP Version 1 Release 2.1 definition.

Use the **MODE** operand of the **GROUP** definition statement to specify whether the characteristics being defined by this **GROUP** definition statement are to be used when your NCP is in a primary state or a secondary state. You must code three **GROUP** definition statements for defining connections between NCPs: one defining specifications to be used when the NCP is in a primary state, one defining specifications to be used when the NCP is in a secondary state, and one defining parameters to be used by the subarea links connecting the two NCPs only until contact has been made between the NCPs.

Ensure that you code **LINE** and **PU** definition statements under the **GROUP** definition statement that defines specifications to be used before contact is made between the NCPs. These **LINE** and **PU** definition statements define the links that connect the two NCPs and the link stations that represent the adjacent NCP. They also contain specifications to be used before contact is made between the two NCPs. However, the two **GROUP** definition statements defining specifications to be used when the NCP is in a primary state or secondary state are called stand-alone definition statements, and have no **LINE** or **PU** definition statements coded under them. Code the **MODE** operand only on the two stand-alone **GROUP** definition statements. The values you specify in the **MODE** operands of the stand-alone **GROUP** definition statements must match the values specified in the **MODE** operands of the associated **SDLCST** definition statement.

The following example and sample coding (with explanations) attempt to clarify the coding of primary and secondary NCPs connected by subarea link(s).

Figure 2-7 on page 2-34 represents two NCP subareas connected by subarea links. Each NCP subarea in the figure must have two **SDLCST** definition statements and their coded operands to define characteristics about the subarea links connecting them. One **SDLCST** definition statement (**SA4PRI**) defines characteristics to be used by the subarea links when NCP subarea 4 is in a primary state. The other **SDLCST** definition statement (**SA4SEC**) defines characteristics to be used by the subarea links when NCP subarea 4 is in a secondary state. (Similar **SDLCST** definition statements must be coded for NCP subarea 5 also.)

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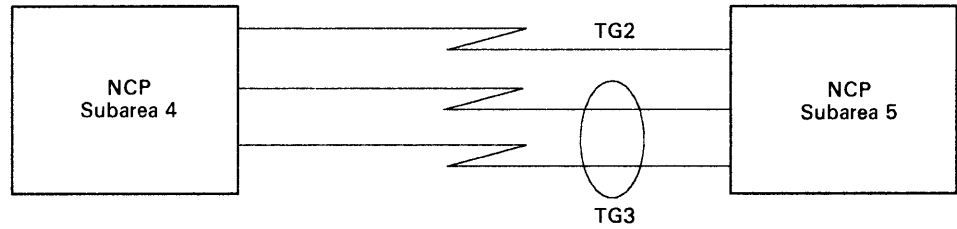


Figure 2-7. Example of Two NCP Subareas Connected by Subarea Links

In this particular configuration, NCP subarea 4 is always in a secondary state because it has a lower subarea address than the one NCP it is connected to. The GROUP operands in each SDLCST definition statement point to corresponding GROUP definition statements that define additional characteristics to be used by the subarea links connecting the two NCPs.

A sample of what the coding for NCP subarea 4 could be is:

```

SA4PRI          SDLCST          MODE=PRIMARY,
                                GROUP=GP1PRI,
                                RETRIES=(7,1,4),
                                MAXOUT=7,
                                PASSLIM=254,
                                TRANSFR=31,
                                SERVLIM=254
SA4SEC          SDLCST          MODE=SECONDARY,
                                GROUP=GP1SEC,
                                RETRIES=(7),
                                MAXOUT=7,
                                PASSLIM=254,
                                TRANSFER=31
GP1SEC          GROUP          LNCTL=SDLC,
                                TYPE=NCP,
                                DIAL=NO,
                                MODE=SEC,
                                ACTIVTO=60,
                                REPLYTO=NONE
GP1PRI          GROUP          LNCTL=SDLC,
                                TYPE=NCP,
                                DIAL=NO,
                                MODE=PRI,
                                REPLYTO=1,

```

```

GP1          GROUP          TEXT0=3
                                LNCTL=SDLC,
                                TYPE=NCP,
                                DIAL=NO,
                                REPLYTO=3
TG2LN1       LINE          ADDRESS=(064,FULL),
                                SPEED=230400,
                                DUPLEX=FULL,
                                CLOCKING=EXT,
                                ATTACH=MODEM,
                                HISPEED=YES,
                                NRZI=YES,
                                NEWSYNC=NO,
                                SDLCST=(SA4PRI,SA4SEC),
                                MONLINK=YES,
                                IPL=YES,
                                TRANSFR=31,
                                PAUSE=.2,
                                RETRIES=(4,2,4),
                                ETRATIO=10
TG2LN125     PU            PUTYPE=4,
                                AVGPB=256,
                                ANS=CONTINUE,
                                SRT=(32768,32768),
                                DATMODE=FULL,
                                TGN=2
TG3LN1       LINE          ADDRESS=(096,FULL),
                                .
                                .
                                .

```

In this example, you can see that in addition to the SDLCST definition statements, NCP subarea 4 must have GROUP definition statements and their coded operands to define characteristics about the subarea links that connect the two subareas in the figure.

Two GROUP definition statements (GP1SEC and GP1PRI), which are pointed to by the GROUP operands of the SDLCST definition statements in the previous example, also must be coded for the subarea links connecting the two NCPs. These GROUP definition statements define characteristics in addition to those defined by the SDLCST definition statements. They also correspond to the SDLCST definition statements in terms of defining characteristics to be used when the NCP is in a primary or secondary state.

A third GROUP definition statement (GP1) must be coded to define characteristics to be used by the subarea links before contact is made between the NCPs.

Use the MODULO operand of the LINE definition statement only if you are defining your NCP for the 3725 or 3720. Use this operand to specify whether the subarea link you are defining is to operate as a modulo 8 link or as a modulo 128 link. If the subarea link is to operate as a modulo 8 link, the NCP will send up to 7 information frames (I-frames) to the controller attached to the link before a response is required that indicates whether the controller received the I-frames. If you specify that the subarea link is to operate as a modulo 128 link, the NCP will send up to 127 I-frames to the attached controller before a response is required.

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If you specify that the link is to operate as a modulo 128 link, the modulus of the link is dependent on the value specified on the MAXOUT operand of the PU definition statement of the connecting NCP. See the description of the MAXOUT operand of the SDLCST definition statement for more information.

Use the SDLCST operand of the LINE definition statement to specify the names of the SDLCST definition statements that define the parameters to be used by the subarea link you are defining when the NCP is in a primary state or a secondary state. You must code this operand only on a LINE definition statement that defines a subarea link between two NCPs. This LINE definition statement also contains specifications to be used before contact is made between the two NCPs.

Use the CONFIG operand of the LINE definition statement if you are defining your NCP for a link-attached communication controller. Use this operand to specify whether the subarea link between two communication controllers is switched or nonswitched.

Use the MONLINK operand of the LINE definition statement to specify whether you want the monitor link function included for your NCP. The monitor link function allows the NCP to activate link stations representing adjacent NCPs and subarea links to other communication controllers when it is not in session with an SSCP. It also allows the NCP to perform error recovery that would otherwise be done by the owning SSCP.

Note: The MODULO, SDLCST, CONFIG, and MONLINK operands of the LINE definition statement are in addition to those that you need to code to define other characteristics about the subarea link. The other definition statements and operands you need to code are discussed in "Defining Data Links" on page 2-68 and "Defining Data Links" on page 3-1.

Defining Link Stations

PU	PUTYPE
----	--------

Each NCP connected to another NCP by an SDLC subarea link is represented by one or more link stations. A link station is a logical combination of hardware and software within the communication controller that serves to represent the NCP, and to allow the NCP to attach to and provide control for a subarea link. One exists at both ends of *each* subarea link connecting two NCPs, even if the link belongs to a multiple-link transmission group. See Figure 2-8 on page 2-37.

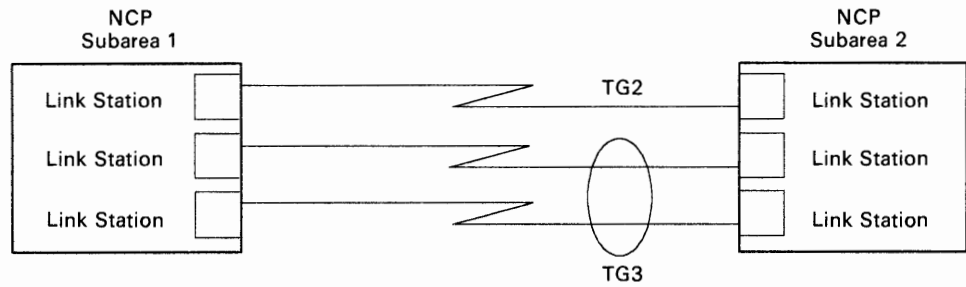
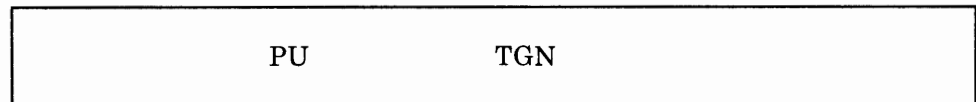


Figure 2-8. Link Stations at Ends of Subarea Links

When defining link stations, you define the link stations in the communication controller in which your NCP will reside. However, the link stations in the communication controller in which your NCP will reside really represent the NCP in an adjacent controller. For example, in Figure 2-8 on page 2-37, if you were defining NCP subarea 1, you would define the link stations that exist in the communication controller in which NCP subarea 1 resides; however, these link stations represent NCP subarea 2. Likewise, if you were defining NCP subarea 2, the link stations in NCP subarea 2 really represent NCP subarea 1.

Use the PUTYPE operand of the PU definition statement to specify the existence of a link station in your communication controller that represents an adjacent NCP. A link station is a PU type-4. For link stations, you need to code a PU definition statement following each LINE definition statement that defines a subarea link. Therefore, you can code only one PU definition statement with PUTYPE=4 for these generations. The PUTYPE operand is also used to define SDLC devices that are link-attached to the NCP. See “Defining Devices” on page 3-11 for a description of how it is used for this purpose.

Defining Transmission Groups



Use the TGN operand of the PU definition statement if you are defining a link station. Use this operand to specify the number of a transmission group. This transmission group is the transmission group to which the subarea link connected to the link station you are defining belongs. Up to eight transmission groups can exist between NCPs. There is no limit to the number of data links that can be in a transmission group.

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Ensure that you specify the same value for the TRANSFR operand of LINE definition statement for all links within the same transmission group. Failure to do this will result in link activation problems.

Defining Error Recovery

SDLCST	RETRIES
--------	---------

Use the RETRIES operand of the SDLCST definition statement to specify the number of attempts you want the NCP to make to recover from errors occurring during transmission over the subarea link to an adjacent NCP. An error condition occurs when the NCP does not receive a positive indication that a frame it has sent has been successfully received by the adjacent NCP. The NCP continues to retransmit the frame until the frame is successfully received, or until the number of retries you specify in this operand have been attempted. If an error occurs while the NCP is receiving data from the adjacent NCP over a duplex data link, it will send the adjacent NCP a command that causes it to retransmit all frames starting with the frame in error. It repeats this command until (1) it has successfully received the frame, (2) it has retried the receive operation the number of times you specify in this operand, or (3) the adjacent NCP sends an abnormal response (for example, a request for initialization). If an error occurs while the NCP is receiving data from the adjacent NCP over a half-duplex link, the error frame will be rejected by the next send (NS) count of a poll or poll response.

Defining Performance

SDLCST	MAXOUT, PASSLIM
GROUP	ACTIVTO
LINE	PAUSE

If you are defining your NCP for the 3725 or 3720, use the MAXOUT operand of the SDLCST definition statement to specify the maximum number of frames you want the NCP to receive from the adjacent NCP before a response is required.

If you are defining your NCP for the 3705, use the MAXOUT operand of the SDLCST definition statement to specify the maximum number of PIUs or PIU segments you want your NCP to send to an adjacent NCP before requesting a response.

Note: The following description and examples of this operand address its use for the 3725 or 3720.

The primary NCP uses the value you specify for the MAXOUT operand of the PU definition statement. During the contact procedure while the controllers are configurable devices, the NCPs on the subarea link exchange the MAXOUT values specified on their respective PU definition statements and determine whether they are to operate in modulo 8 or modulo 128 mode. After the NCPs determine which NCP is the secondary, the secondary NCP uses the value of the MAXOUT operand of the PU definition statement of the adjacent NCP as the number of frames to be sent before an acknowledgement is required. The exchange is concluded by the secondary NCP. The secondary NCP sends to the primary NCP the value of the MAXOUT operand of the SDLCST definition statement with MODE=SECONDARY specified. The primary NCP uses this value as the number of frames to send before an acknowledgement is required.

Examples of the exchange of MAXOUT values

Example 1: In this example, NCP1 and NCP2 are adjacent NCPs connected by a subarea link. Note that MODULO=128 is specified on the LINE definition statements for both NCP1 and NCP2.

During the contact procedure between NCP1 and NCP2, NCP2 sends to NCP1 its subarea number (SUBAREA=2) along with the value specified in the MAXOUT operand of the PU definition statement (MAXOUT=50). NCP1 then sends its subarea number (SUBAREA=4) along with the value specified in the MAXOUT operand of the PU definition statement (MAXOUT=10). Because NCP1's subarea number is greater than NCP2's subarea number, NCP1 becomes the primary NCP. NCP2 uses 10 as the number of frames to send before an acknowledgement is required. NCP2 then sends the value specified in the MAXOUT operand of its SDLCST definition statement with MODE=SEC specified (MAXOUT=70), and the exchange is concluded. NCP1 uses 70 as the number of frames to send before an acknowledgement is required.

NCP1		NCP2	
BUILD	SUBAREA=4	BUILD	SUBAREA=2
:	:	:	:
SDLCST	MAXOUT=20	SDLCST	MAXOUT=70
	MODE=SEC		MODE=SEC
SDLCST	MAXOUT=10	SDLCST	MAXOUT=50
	MODE=PRI		MODE=PRI
LINE	MODULO=128	LINE	MODULO=128
PU	MAXOUT=10	PU	MAXOUT=50
:	:	:	:
:	:	:	:

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Example 2: In this example, NCP1 and NCP2 are adjacent NCPs connected by a subarea link. Note that `MODULO=128` is specified on the `LINE` definition statement for NCP1, and `MODULO=8` is specified for NCP2.

During the contact procedure between NCP1 and NCP2, NCP2 sends to NCP1 its subarea number (`SUBAREA=2`) along with the value specified in the `MAXOUT` operand of the `PU` definition statement (`MAXOUT=2`). NCP1 then sends its subarea number (`SUBAREA=4`) along with the value specified in the `MAXOUT` operand of the `PU` definition statement (`MAXOUT=10`). Because NCP1's subarea number is greater than NCP2's subarea number, NCP1 becomes the primary NCP. NCP2 is only capable of operating in modulo 8, so NCP2 cannot use 10 as the `MAXOUT` value. Instead, NCP2 uses a `MAXOUT` value of 7 (the default value) as the number of frames to send to NCP1 before an acknowledgement is required. NCP2 then sends the value specified in the `MAXOUT` operand of its `SDLCST` definition statement with `MODE=SEC` specified (`MAXOUT=5`), and the exchange is concluded. NCP1 uses 5 as the number of frames to send before an acknowledgement is required.

NCP1		NCP2	
<code>BUILD</code>	<code>SUBAREA=4</code>	<code>BUILD</code>	<code>SUBAREA=2</code>
<code>:</code>	<code>:</code>	<code>:</code>	<code>:</code>
<code>:</code>	<code>:</code>	<code>:</code>	<code>:</code>
<code>SDLCST</code>	<code>MAXOUT=20</code>	<code>SDLCST</code>	<code>MAXOUT=5</code>
	<code>MODE=SEC</code>		<code>MODE=SEC</code>
<code>SDLCST</code>	<code>MAXOUT=10</code>	<code>SDLCST</code>	<code>MAXOUT=2</code>
	<code>MODE=PRI</code>		<code>MODE=PRI</code>
<code>LINE</code>	<code>MODULO=128</code>	<code>LINE</code>	<code>MODULO=8</code>
<code>PU</code>	<code>MAXOUT=10</code>	<code>PU</code>	<code>MAXOUT=2</code>
<code>:</code>	<code>:</code>	<code>:</code>	<code>:</code>
<code>:</code>	<code>:</code>	<code>:</code>	<code>:</code>

Use the `PASSLIM` operand of the `SDLCST` definition statement to specify the maximum number of consecutive PIUs or PIU segments you want your NCP to send at one time to the adjacent NCP.

Use the `ACTIVTO` operand of the `GROUP` definition statement if you are coding this definition statement to define parameters to be used when the NCP is in a secondary state. Use this operand to specify an amount of time that you want the NCP to wait for communication from the primary NCP before it goes into automatic network shutdown (ANS) mode. (See the description of the `ANS` operand of the `PU` definition statement in Chapter 3 for information on automatic network shutdown mode.)

Note: If you are coding a `GROUP` definition statement that defines parameters to be used when the NCP is in a primary state, you must also code the `REPLYTO` and `TEXTTO` operands. If you are coding a `GROUP` definition statement that defines parameters to be used when it is in a secondary state, you must also code the `REPLYTO` operand. These operands are discussed in "Defining Performance Characteristics" on page 2-76.

Use the PAUSE operand of the LINE definition statement to specify the average duration of the polling cycle. When your NCP is in a primary state, if the expended time in a complete polling cycle equals or exceeds the time you specify in this operand, the next polling cycle begins immediately. If the time expended is less than what you specify, the beginning of the next polling cycle is deferred until the time from the beginning of the cycle just completed to the time you specify has elapsed. During the pause, the link is in poll-wait state; any outgoing data ready for transmission to the adjacent NCP is sent during this pause. When your NCP is in a secondary state, it will hold receive ready (RR) poll/final until a PIU arrives or until the value you specify in the PAUSE operand expires.

Defining Service Order Table Scans

SDLCST	SERVLIM
--------	---------

Use the SERVLIM operand of the SDLCST definition statement if you are coding this definition statement to define parameters to be used when your NCP is in a primary state. Use this operand to specify the maximum number of regular scans of the service order table that the NCP makes for normal servicing of the link station on the link before it makes a special scan of the table. For a subarea link connecting two NCPs, the service order table contains only one entry: the link station representing the adjacent NCP. (See “Defining a Service Order Table” on page 2-78 for a discussion of service order tables.) The regular scan of the table accommodates normal transmission of PIUs between the access method or host processor application programs and the link station on the link. In the special scan of the service order table, the NCP determines whether there are any outstanding commands from the access method to interrogate or alter the online status of the link station on the link. If so, the NCP fulfills the first such command and then resumes regular scans of the table to perform normal servicing. If no status commands are outstanding, the NCP immediately resumes regular scans unless, in the previous regular scan, it found that the NCP that the link station represents was not in the contacted state. In this case, resumption of regular scans occurs after a delay of 2.2 seconds. If more than one status command is outstanding, only one is honored each time the special scan is made; the remaining status commands are fulfilled one at a time, in turn, during subsequent special scans of the table.

Upon completing a regular scan, the NCP begins the special scan if either of the following occurs:

- In the regular scan just completed, it finds no active link station.
- The maximum number of regular scans specified in the SERVLIM operand has been reached.

SDLC, BSC, and SS Devices

Defining Loading and Dumping of Link-Attached NCP

LINE	IPL
------	-----

Use the IPL operand of the LINE definition statement to specify whether your NCP can be loaded and dumped over the subarea link you are defining. If you specify that it can, certain commands from the access method will be accepted over this link to cause the NCP to abend and then the communication controller to be reloaded with another NCP.

Defining the Power-Off Feature in a Link-Attached Controller

BUILD	PWROFF
-------	--------

Use the PWROFF operand of the BUILD definition statement if your NCP is channel-attached. Use this operand to specify whether your NCP can turn off an adjacent link-attached controller's power upon command from a channel-attached access method. Your NCP has this ability only if the link-attached controller has the remote power-off feature installed.

Defining Communication with an NCP Version 1 Release 2.1

PU	SUBAREA
----	---------

Use the SUBAREA operand of the PU definition statement if you are defining a link station that represents a Version 1 Release 2.1 NCP residing in an adjacent communication controller. Use this operand to specify the subarea address of the NCP Version 1 Release 2.1.

Defining NCPs in Communication Controllers Connected by a BSC Data Link

LINE	TADDR, YIELD, CSPMODE	(3725 and 3720)
------	-----------------------------	-----------------

Use the TADDR operand of the LINE definition statement only if you are defining an NCP that is polled and is connected to another NCP by a BSC data link. Use this operand to specify the hexadecimal representation of the transmission code bit pattern of the polling character to which the NCP

you are defining will respond. This polling character is specified in the POLL operand of the TERMINAL definition statement in the NCP that polls the NCP you are defining.

Use the YIELD operand of the LINE definition statement if you are defining an NCP that is not polled and is connected to another NCP by a nonswitched point-to-point BSC data link. Use this operand to specify whether your NCP is to be in a primary state or a secondary state when a contention situation occurs on the link.

Use the CSPMODE operand of the LINE definition statement only if you are defining your NCP for a 3725 or 3720. Use this operand if you are defining an NCP that is connected to another NCP by a BSC data link. Use this operand to specify that the data link must operate in emulation mode.

Defining NCP/Token-Ring Interconnection (NTRI) Resources to NDF

Note: The information in this topic applies to you only if you are using NCP Version 4 Release 2 and SSP Version 3 Release 2.

The NTRI generation process is a part of the NCP/EP Definition Facility (NDF). It allows you to describe to NDF the characteristics and functions of the resources involved in the attachment of an IBM Token-Ring Network to the 3725.

You define the resources using both existing NCP definition statements and operands and some operands that you code specifically for NTRI. An NDF facility allows you to code only a minimal number of definition statements and operands to describe the NTRI configuration. The NTRI processing in NDF generates definition statements and operands whenever possible to simplify the generation process. Refer to Figure 2-9 on page 2-45 for a list of the definition statements and operands generated by NDF. Figure 2-9 also lists the values selected by NDF for these operands. NDF adds these definition statements and operands to the NEWDEFN generation definition.

Defining NTRI Generation Definitions

OPTIONS NEWDEFN

Use the NEWDEFN operand of the OPTIONS definition statement to build a new generation definition that will contain the user-written definition statements along with those generated by the NTRI processing. You must specify NEWDEFN in an OPTIONS definition statement as the first statement in the generation definition.

Defining the Connection Between NTRI and the Token Ring

GROUP ECLTYPE

Use the ECLTYPE operand of the GROUP definition statement to specify whether this GROUP defines a physical or logical connection to the IBM Token-Ring Network. When coding ECLTYPE ensure that you consider the following:

- Code at least one GROUP definition statement (along with its associated LINE, PU, and LU definition statements) as a physical connection to define the Token-Ring interconnection coupler (TIC) to the 3725.
- Code at least one GROUP definition statement (along with its associated LINE and PU definition statements) as a logical connection to define the devices attached to the IBM Token-Ring Network.
- Code the logical definitions *after* the physical definitions in the generation source definition.
- Each physical connection to the IBM Token-Ring Network via a TIC is generated as a leased duplex line.
- Each logical connection to the IBM Token-Ring Network is generated as a switched half-duplex line.
- Code MXRLINE and MXVLINE.
- Code NEWDEFN = YES on the first OPTIONS definition statement.

Coding the ECLTYPE operand causes certain definition statements and operands to be added automatically to the generation definition. You also can manually code these definition statements and operands. During statement/keyword validation, NDF does the following:

- Validates the operands that you manually code
- Replaces some incorrect values with correct values
- Issues error messages when incorrect values are detected.

In addition to the definition statements and operands automatically added to the generation definition, you **must** manually code the following NCP operands:

```
OPTIONS    NEWDEFN=YES  
  
BUILD     MODEL=3275  
          VERSION=V4R2  
          TYPE=NCP/PEP  
  
LINE      ADDRESS=(nnn,FULL)*
```

The following table lists the definition statements and operands automatically coded for NTRI by NDF and shows the values selected for these operands. In addition to the definition statements in this list, NDF adds to the NEWDEFN generation definition a SERVICE definition statement after each NTRI LINE definition statement in a group with ECLTYPE = PHYSICAL coded.

If You Code	NDF Codes These Operands Like This
ECLTYPE=PHYSICAL	<p>GROUP DIAL=NO LEVEL2=ECLNARL2 LEVEL3=ECLNARL3 LEVEL5=NCP LNCTL=SDLC MAXLU=1 MAXPU=1 PUADR=NO PUTYPE=1 SPEED=9600 TIMER=(ECLNART1, ,ECLNART2,ECLNART3) TYPE=NCP USERID=(5668866,ECLRBDT,NORECMS) XIO=(ECLNARXL,ECLNARXS,ECLNARXI,ECLNARXK)</p> <p>PU ADDR=01</p> <p>LU LOCADDR=0 LUDR=NO</p> <p>LINE UACB=(X\$PnAX,X\$PnAR) (see note 1)</p> <p>GENEND INIT=ECLINIT TMRTICK=ECLTICK</p>
ECLTYPE=LOGICAL	<p>GROUP DIAL=YES LEVEL2=ECLNAVL2 LEVEL3=ECLNAVL3 LEVEL5=NCP LINEADD=NONE LINEAUT=YES LNCTL=SDLC MAXLU=1 MAXPU=1 PUTYPE=2 TIMER=(ECLNAVT1, ,ECLNAVT2,ECLNAVT3) TYPE=NCP USERID=(5668866,ECLVBDT,NORECMS) XIO=(ECLNAVXL,ECLNAVXS,ECLNAVXI,ECLNAVXK)</p> <p>LINE UACB=X\$LnA (see note 2)</p> <p>GENEND INIT=ECLINIT TMRTICK=ECLTICK</p>
<p>¹ <i>n</i> is calculated by NDF and is the total number of physical NTRI lines.</p> <p>² <i>n</i> is calculated by NDF and is the total number of logical NTRI lines.</p>	

Figure 2-9. How NDF Automatically Selects Definition Statements, Operands, and Values for NTRI

* See the *NCP and SSP Resource Definition Reference* for an explanation of how to code the ADDRESS operand of the LINE definition statement for NTRI.

SDLC, BSC, and SS Devices

Defining NTRI Physical Connections

BUILD	MXRLINE
LINE	MAXTSL LOCADD PORTADD RCVBUFC

Use the MXRLINE operand of the BUILD definition statement to specify the number of NTRI physical connections that you want included in this generation definition. The value you code for MXRLINE must equal the actual number of NTRI physical connections defined in the generation definition.

Use the MAXTSL operand of the LINE definition statement to specify the maximum amount of data—including the transmission header and the request/response header—that NTRI can transmit.

Use the LOCADD operand of the LINE definition statement to specify the locally administered address for the token ring.

Use the PORTADD operand of the LINE definition statement to specify the physical port address of this line.

Use the RCVBUFC operand of the LINE definition statement to specify the NTRI buffer capacity for receiving data from a data link during one data transfer. This value must be greater than or equal to the maximum amount of data (in bytes)—including the token-ring header, the logical link header (LHH), the transmission header, and the request/response header—that NTRI can receive in one data transfer.

Defining NTRI Logical Connections

BUILD	MXVLINE
LUPPOOL	NUMBER
or	
LUDRPOOL	NUMTYP2
GROUP	PHYPORT AUTOGEN

Use the MXVLINE operand of the BUILD definition statement to specify the total number of NTRI logical connections that you want included in this generation definition. The value you code for MXVLINE must equal the total number of NTRI logical connections that are defined in the

generation source *plus* the total number of lines generated by the AUTOGEN facility.

Use *either* the NUMBER operand of the LUPOOL definition statement *or* the NUMTYP2 operand of the LUDRPOOL definition statement to define the number of logical unit control blocks (LUBs) to be included in the LUB pool for NTRI logical resources. The NCP uses these LUBs when communicating with logical units associated with an NTRI logical connection.

Use the PHYPORT operand of the GROUP definition statement to specify the physical port address that the lines in this group will use for communication. Ensure that the value you specify for PHYPORT is the same as the value specified on the PORTADD operand of the LINE definition statement for physical connections.

Use the AUTOGEN operand of the GROUP definition statement to specify the number of LINE and PU definition statement pairs that need to be added to the GROUP definition statement for logical connections. Ensure that you specify the value so that the number of logical NTRI lines you specified in the generation source and those added through the AUTOGEN facility are exactly equal to the value specified for the MXVLINE operand on the BUILD definition statement.

You can code the AUTOGEN operand on as many as 25 GROUP definition statements for logical connections.

Defining Time-outs for NTRI Logical Connections

BUILD	REMOTTO
	LOCALTO

Use the REMOTTO operand of the BUILD definition statement to specify the NTRI acknowledgment timer value, when a logical connection is established with a terminal connected to a remote token ring.

Use the LOCALTO operand of the BUILD definition statement to specify the NTRI acknowledgment timer value, when a logical connection is established with a terminal connected to a local token ring.

Defining Interconnected Networks

Note: The information in this section, “Defining Interconnected Networks,” does not apply to you if you are defining any of the following configurations,

- *An NCP V4 Subset*
- *The Emulation Program**.

Interconnected networks are those joined by a gateway NCP and a gateway SSCP residing in VTAM Version 2 Release 2 or in later versions of VTAM. The combination of gateway NCPs and gateway SSCPs allows two or more independently defined networks to communicate with one another while still maintaining their own individuality of network characteristics, functions, naming, control, evolution, and security. Unlike networks that are joined by coordinating the placement and definitions of many Version 2 NCPs and Version 1 Release 3 NCPs, networks that are joined by a gateway NCP require the definition of only one or a few Version 3 NCPs.

Figure 2-10 on page 2-49 shows an example of a single gateway NCP and a single gateway SSCP connecting two networks. This gateway NCP and gateway SSCP work together to establish sessions and route data between resources in network A and resources in network B. More complex configurations might have more than one gateway NCP and more than one gateway SSCP connecting two or more networks. See the *Network Program Products General Information* manual and the *Network Program Products Planning* manual for descriptions of possible interconnected network configurations.

An important thing to note about the gateway NCP is that, although it is only one NCP, it is represented by a subarea address in each network that it joins. Not only must it be aware of the characteristics and functions of the resources in its native network, but it must also be aware of certain characteristics and functions of all the non-native networks that it joins.

*

The Emulation Program does not operate with SNA network interconnection. Therefore, if your gateway NCP is operating with the Partitioned Emulation Programming (PEP) extension, link-attached devices operable in emulation mode can communicate with any channel-attached host processor. This concept of separate or native and non-native networks does not apply to devices operating in emulation mode.

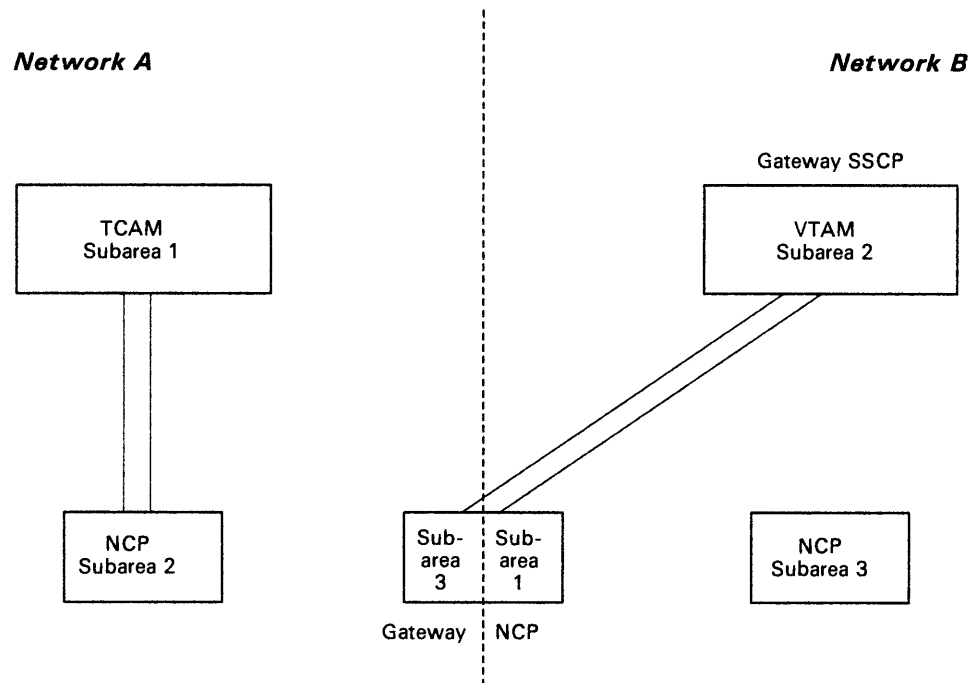


Figure 2-10. Example of a Single Gateway NCP and a Single Gateway SSCP Connecting Two Networks

The gateway NCP's native network is the network containing the access methods that can own the resources attached to the gateway NCP. An interconnected network environment has no one network that always must be the native network. The determination of which network is the native network is made at resource definition time. In other words, before the gateway NCP is defined, any access method in any network can own the resources attached to the gateway NCP. After the gateway NCP is defined and the native network has been determined, however, only the access methods in the native network can own the resources attached to the gateway NCP. The access method in which the gateway SSCP resides does not have to own the resources attached to the gateway NCP, although it can. Likewise, the access method in which the gateway SSCP resides does not have to be in the native network, although it can be. For more information about the SNA network interconnection function, see the *Network Program Products General Information* manual and the *Network Program Products Planning* manual. The definition statements and operands you need to code to define characteristics and functions about interconnected networks are discussed below. Code these definition statements and operands if you are defining a gateway NCP.

Defining the Native Network

```
BUILD NETID
```

Use the NETID operand of the BUILD definition statement to specify the name of the native network in which the gateway NCP is to reside. The name you specify in this operand determines which network will be the native network. The difference between the native network and the other networks that a gateway NCP joins is that only access methods in the native network can own the resources that might be link-attached to the gateway NCP. For example, in Figure 2-10 on page 2-49, if you specified that network A was the native network, then only TCAM subarea 1 could own any resources attached to the gateway NCP. However, if you specified that network B was the native network, then only VTAM subarea 2 could own these resources.

Defining Non-Native Networks

```
NETWORK NETID,  
MAXSUBA,  
SUBAREA,  
NUMHSAS,  
ACTPU
```

The NETWORK definition statement is used to define certain characteristics about the non-native networks that the gateway NCP joins. You must code one NETWORK definition statement for each non-native network.

Use the NETID operand of the NETWORK definition statement to specify the name of the non-native network you are defining.

Use the MAXSUBA operand of the NETWORK definition statement to specify the highest subarea address used in the non-native network you are defining.

Notes:

- 1. If you are defining an NCP Version 3, the value you specify in this operand must match the values specified in the MAXSUBA definition for all NCPs and access methods in the non-native network you are defining.*
- 2. NCP Version 4 contains the extended network addressing function. Therefore, when a back-level node exists in a network with extended network addressing, all of the host systems and communication controllers must have the same value specified for the MAXSUBA*

operand. For a description of the extended network addressing function, see “Defining Access Method and NCP Subareas” on page 2-12.

Use the SUBAREA operand of the NETWORK definition statement to specify the subarea address of the gateway NCP as it will be known in the non-native network you are defining. The subarea address specified in the SUBAREA operand of the BUILD definition statement is the subarea address of the gateway NCP as it is known in the native network. For example, in Figure 2-10 on page 2-49, assuming that network A is the native network, network B knows the gateway NCP as subarea 1 and network A knows it as subarea 3. The gateway NCP can be known by the same subarea address in each network that it joins. However, its address in any one particular network must be a unique address in that network. For example, in Figure 2-10 on page 2-49, the gateway NCP could not be known as subarea 3 by network B because subarea 3 already exists in network B.

Use the NUMHSAS operand of the NETWORK definition statement to specify the number of subareas in the non-native network you are defining (including access method and NCP subareas) that can communicate with the gateway NCP over a channel, plus any that can communicate with it over subarea links through other NCPs. Ensure that the value you specify in this operand equals the number of subareas in the non-native network you are defining that have virtual routes ending in the gateway NCP.

Use the ACTPU operand of the NETWORK definition statement to specify whether access methods in the non-native network you are defining can activate the gateway NCP.

Defining Which Networks Contain Channel-Attached Access Methods

BUILD	CANETID
HOST	NETID

Use the CANETID operand of the BUILD definition statement to specify the names of the networks that contain the access methods attached to the gateway NCP through the channel adapters installed in the communication controller.

Use the NETID operand of the HOST definition statement if you are defining a VTAM that is channel-attached to the gateway NCP. Use this operand to specify the name of the network that contains the access method you are defining.

Defining Which Networks Contain Adjacent NCPs

PU	NETID
----	-------

Use the NETID operand of the PU definition statement if you are defining a link station to represent an adjacent NCP. Use this operand to specify the name of the network that contains the adjacent NCP represented by the link station you are defining. If you do not code the NETID operand, the gateway NCP will assume that the adjacent NCP resides in the native network. Note that the value you specify in the NETID operand of the PU definition statement must specify the name of the network that actually contains the adjacent NCP. The link station that represents the adjacent NCP will always reside in and be activated by access methods in the native network. However, the adjacent NCP itself might reside in a non-native network; in which case, you must specify in the NETID operand the name of the non-native network. For example, in Figure 2-11 on page 2-52, the link station that represents NCP subarea 3 resides in the gateway NCP and will be activated by access methods in network A, which in this case is the native network. However, NCP subarea 3 itself resides in network B, and therefore, the NETID operand of the PU definition statement that defines the link station representing NCP subarea 3 to the gateway NCP must specify the name of network B.

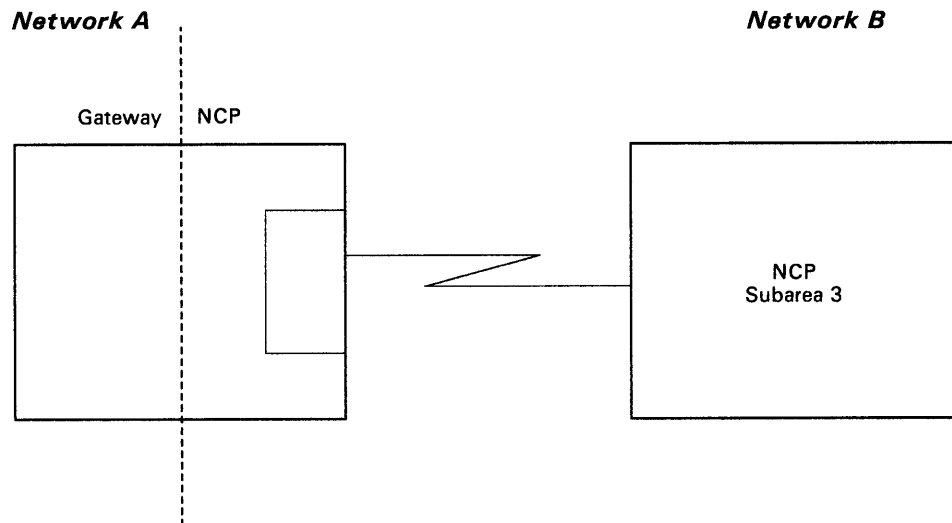


Figure 2-11. Link Station Representing NCP in Non-Native Network

Furthermore, when you define two adjacent gateway NCPs to each other (in separate source programs), you must specify the same name in the NETID operands of the PU definition statements that define the link

stations representing the two NCPs to each other. In other words, the link stations at the ends of a subarea link connecting two gateway NCPs must both be defined as residing in the same network. Keep this rule in mind when defining adjacent gateway NCPs in multiple or back-to-back configurations. For example, in Figure 2-11 on page 2-52, if NCP subarea 3 was another gateway NCP, both of the NETID operands of the PU definition statements representing the link stations at the ends of the subarea link would specify the name of the null network created by the back-to-back configuration.

In more complex configurations, the link stations at the ends of two or more subarea links connecting the same adjacent NCPs can reside in different networks. For example, in Figure 2-12 on page 2-54, although subarea link 1 and subarea link 2 both connect gateway NCP 1 to gateway NCP 2, the link stations at the ends of subarea link 1 reside in network A, while the link stations at the ends of subarea link 2 reside in network B. Therefore, both the PU definition statement that defines link station A1 to gateway NCP 1 and the PU definition statement that defines link station A2 to gateway NCP 2 must specify network A in their NETID operands. The same is true for the PU definition statements that define link station B1 and link station B2, except that their NETID operands must specify network B.

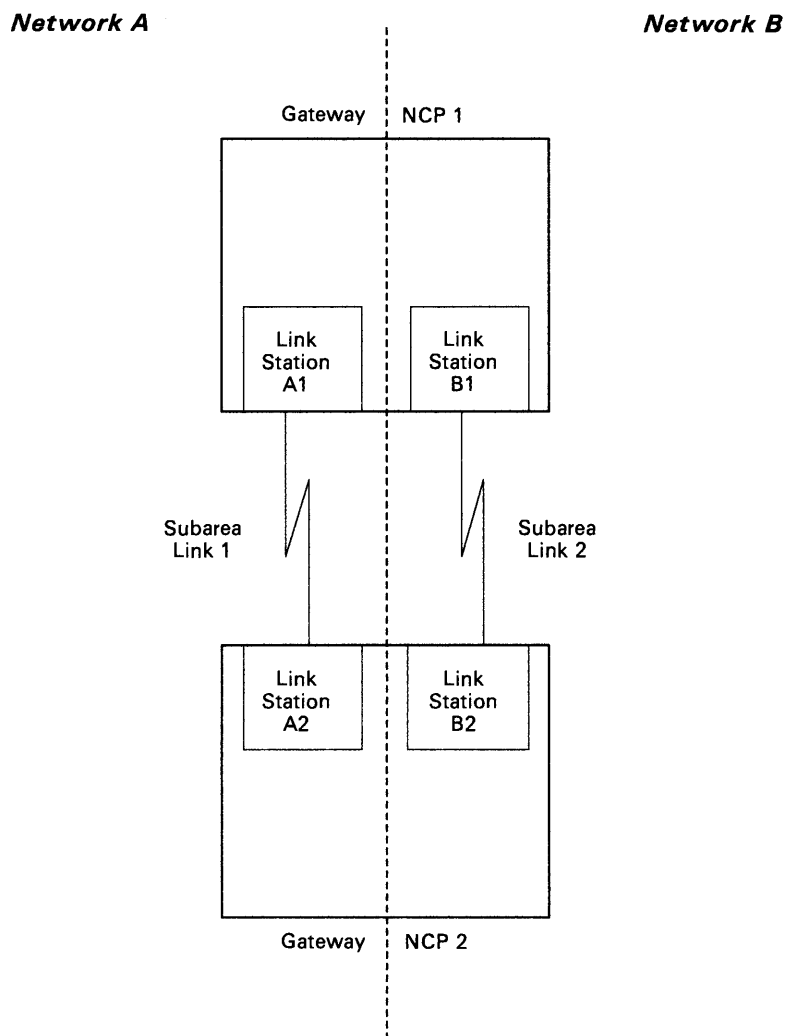


Figure 2-12. Link Stations Representing Adjacent Gateway NCPs

Defining Cross-Network Session Specifications

The gateway NCP must reserve two types of control blocks to allow cross-network sessions to occur between an SSCP or LU in one network and an SSCP or LU in another network. These are:

- Address control blocks
- Half-session control blocks (HSCBs).

Address control blocks are used to allow the gateway NCP to assign alias addresses to SSCPs or LUs that reside in and have real addresses in one network, but that can participate in sessions with SSCPs or LUs in another network. For example, in Figure 2-13 on page 2-56, TERMA1 in network A can participate in a session with IMSB in network B (both TERMA1 and IMSB are LUs, so this represents an LU-LU session). For TERMA1 to be

able to participate in a session with IMSB, IMSB must appear to TERMA1 to reside in network A. Likewise, TERMA1 must appear to IMSB to reside in network B. By reserving address control blocks, the gateway NCP is able to allow IMSB to be assigned an alias address to make it appear as if it resides in network A, and is able to do the same for TERMA1 to make it appear as if it resides in network B.

Each cross-network session involves two address control blocks: one to represent each session partner. However, some LUs, such as IMS and CICS, can participate in multiple concurrent sessions, and although they can participate in more than one session at the same time, they require only one address. For example, in Figure 2-13 on page 2-56, IMSB can participate in concurrent sessions with both TERMA1 and TERMA2, but requires only one address to represent it in network A. TERMA1 and TERMA2, however, because they can each participate in only one session at a time, require separate addresses to represent them in network B. In this case, two sessions are possible, but only three addresses are required. Had IMSB been an application program such as TSO, which can participate in only one session at a time, four addresses would be required: one to represent TSO to TERMA1 in network A, one to represent TSO to TERMA2 in network A, one to represent TERMA1 to TSO in network B, and one to represent TERMA2 to TSO in network B.

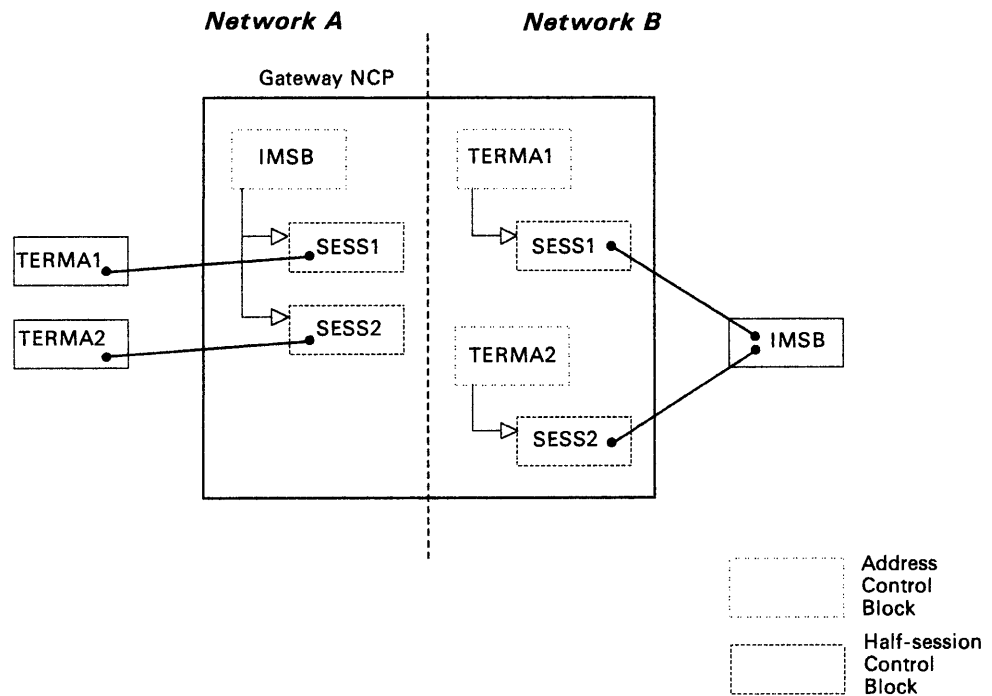


Figure 2-13. Example of How Address Control Blocks and HSCBs Are Used to Represent Cross-Network Sessions

In addition to reserving address control blocks to represent SSCPs and LUs that can participate in cross-network sessions, the gateway NCP also must reserve half-session control blocks (HSCBs) to represent each session. HSCBs are assigned to address control blocks and represent the number of concurrent sessions that the SSCP or LU represented by the address control block can participate in. For example, in Figure 2-13 on page 2-56, the address control block representing IMSB in network A has two HSCBs associated with it. These HSCBs represent the number of concurrent sessions IMSB can participate in in network A; in this case, one with TERMA1 and one with TERMA2. Notice that unlike the assignment of addresses, where one address sometimes represents multiple concurrent sessions, the assignment of HSCBs requires that one HSCB be assigned for *each* session partner. In other words, two HSCBs are required for each cross-network session that can occur. So, in Figure 2-13 on page 2-56, IMSB, although it requires only one address for its multiple sessions with TERMA1 and TERMA2 in network A, requires two HSCBs to represent

these sessions. TERMA1 and TERMA2 each require one HSCB in network B, indicating that they can each participate in one session at a time.

You must define to the gateway NCP the number of address control blocks and HSCBs the NCP is to reserve. The definition statements and operands you need to code for this definition are discussed in the next topic. Other cross-network session specifications that you must define also are discussed.

Defining Address Control Blocks

You can define reservation of address control blocks in two ways: by defining a pool of addresses or by predefining specific addresses. If you define a pool of addresses, the gateway NCP will assign an alias address whenever one is needed to establish a cross-network session. The gateway NCP then will return the address to the pool when the session ends. If you predefine addresses, they always will be reserved and assigned to the same SSCPs or LUs whenever those SSCPs or LUs participate in cross-network sessions.

Defining a Pool of Addresses:

```
GWNAU  NUMADDR
```

Use the NUMADDR operand of the GWNAU definition statement to specify the number of addresses you want the gateway NCP to reserve in a pool to represent SSCPs and LUs that can participate in cross-network sessions with SSCPs and LUs in the network you are defining.

Note: Where you place GWNAU definition statements in your NCP source program determines the network for which the cross-network session specifications apply. See "Placement of GWNAU Definition Statements" on page 2-59 for information on how this works.

Predefining Addresses:

```
GWNAU  NETID,  
        NAME,  
        ELEMENT
```

Use the NETID operand of the GWNAU definition statement to specify the name of the network that contains the SSCP or LU you are predefining an address for.

Use the NAME operand of the GWNAU definition statement to specify the name of the SSCP or LU you are predefining an address for as it is known in its owning network.

Use the ELEMENT operand of the GWNAU definition statement only if the resource you are predefining an address for is an SSCP. Use this operand

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to specify the element address of the SSCP as it is specified in the VTAM CDRM definition statement that defines it.

Defining Half-Session Control Blocks (HSCBs)

You can define reservation of HSCBs in two ways: by defining a pool of HSCBs or by predefining HSCBs. If you define a pool of HSCBs, the gateway NCP will assign the required number of HSCBs to an address control block whenever they are needed to establish a cross-network session. The gateway NCP then will return the HSCBs to the pool when the session ends. If you predefine HSCBs, the same number of HSCBs always will be reserved and assigned to the same predefined address control block whenever the SSCP or LU that the address represents participates in cross-network sessions.

Defining a Pool of HSCBs:

BUILD	HSBPOOL, SESSLIM, NETLIM
NETWORK	SESSLIM, NETLIM

Use the HSBPOOL operand of the BUILD definition statement to specify the number of HSCBs you want the gateway NCP to reserve in a pool for SSCPs and LUs that can participate in cross-network sessions. Ensure that the value you specify in this operand equals at least twice the number of concurrent cross-network sessions you expect to occur through your gateway NCP. Be aware of the cycle and storage usage implications when you code HSBPOOL.

Use the SESSLIM operand of the BUILD definition statement to specify the maximum number of HSCBs that can be assigned to any address in the native network. Notice that although the address resides in the native network, the SSCP or LU that it represents resides in a non-native network. The value you specify in this operand limits the number of concurrent sessions the SSCP or LU represented by the address can participate in with resources in the native network.

Use the NETLIM operand of the BUILD definition statement to specify the total number of HSCBs that can be assigned at any given time to all addresses in the native network. The value you specify in this operand, along with the values you specify in the NETLIM operands of NETWORK definition statements defining non-native networks, prevents the monopolization of the pool by any single network connected through the gateway NCP.

Use the SESSLIM operand of the NETWORK definition statement to specify the maximum number of HSCBs that can be assigned to any address in the non-native network you are defining. Notice that although the address resides in the non-native network, the SSCP or LU that it

represents resides in another network (this other network can be the native network or another non-native network). The value you specify in this operand limits the number of concurrent sessions the SSCP or LU represented by the address can participate in with resources in the non-native network you are defining.

Use the NETLIM operand of the NETWORK definition statement to specify the total number of HSCBs that can be assigned at any given time to all addresses in the non-native network you are defining. The value you specify in this operand, along with the values you specify in the NETLIM operands of the BUILD definition statement and other NETWORK definition statements, prevents the monopolization of the pool by any single network connected through the gateway NCP.

Predefining HSCBs:

GWNAU NUMSESS

Use the NUMSESS operand of the GWNAU definition statement only if you are coding this GWNAU definition statement to predefine an address control block. Use this operand to specify the number of HSCBs you want the gateway NCP to reserve and assign to the address, whenever the SSCP or LU that the address represents establishes a session. Ensure that the value you specify in this operand equals the number of cross-network sessions the SSCP or LU you are predefining an address for can participate in at the same time. If the value you specify in the SESSLIM operand of the BUILD definition statement (for the native network) or NETWORK definition statement (for a non-native network) is greater than the value you specify in the NUMSESS operand of the GWNAU definition statement that predefines an address in the given network, the gateway NCP will dynamically assign HSCBs from the pool to that predefined address, if needed, until the value you specify in the SESSLIM operand is reached. When the sessions involving the predefined addresses end, the gateway NCP will return these HSCBs to the pool.

Placement of GWNAU Definition Statements

GWNAU definition statements, regardless of whether they define a pool of addresses or predefine addresses, can follow either the SYSCNTRL or the NETWORK definition statements in your NCP generation input job stream.

Note: GWNAU definition statements that predefine addresses must come before GWNAU definition statements defining a pool of addresses.

Although the BUILD definition statement defines characteristics about the native network, the GWNAU definition statements that follow the SYSCNTRL definition statement (and at the same time, the BUILD definition statement) do not define specifications for the SSCPs and LUs in the native network. Instead, they define specifications for SSCPs and LUs in a non-native network that can participate in sessions with SSCPs and LUs in the native network. In the same manner, GWNAU definition statements that follow the NETWORK definition statement define

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specifications for SSCPs and LUs in any network (including the native network) that can participate in sessions with SSCPs and LUs in the non-native network that the NETWORK definition statement defines.

For example, in Figure 2-14, LU2 and LU3, which reside in network B, can participate in sessions with LU1, which resides in network A. To participate in cross-network sessions with LU1, LU2 and LU3 must be represented in network A. In other words, LU2 and LU3 must appear to LU1 as if they are in network A. Likewise, LU1 must appear to LU2 and LU3 as if it is in network B. If network A is the native network, the GWNAU definition statements that define specifications for LU2 and LU3 must follow the SYSCNTRL definition statement. The GWNAU definition statements that define specifications for LU1 must follow the NETWORK definition statement that defines network B.

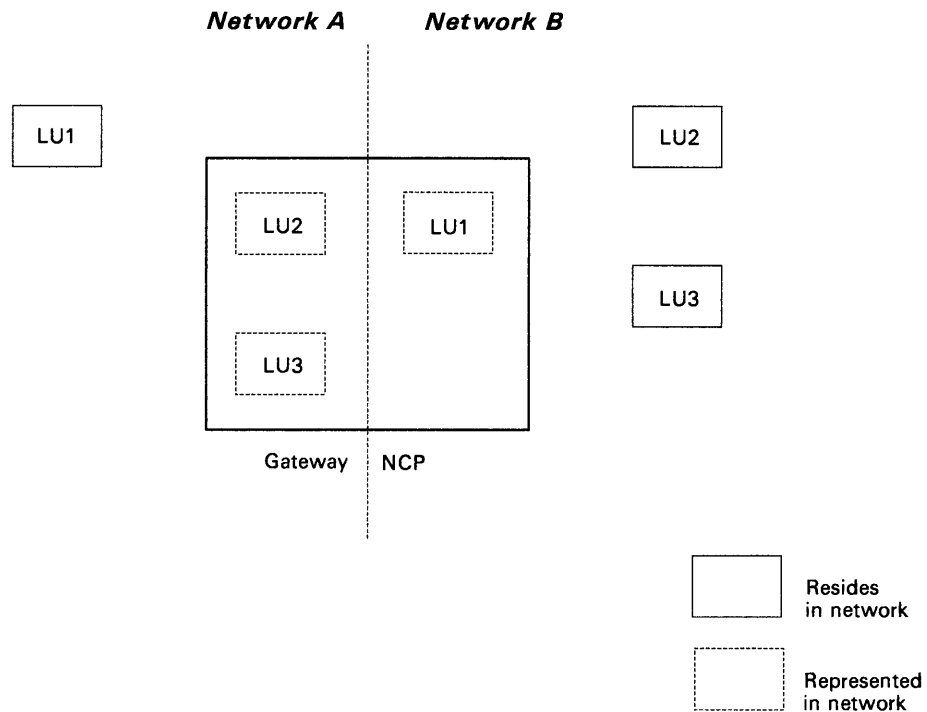


Figure 2-14. LUs Requiring Cross-Network Session Specifications

If LU2 and LU3 were to be dynamically allocated addresses from a pool for participation in cross-network sessions with LU1, the cross-network session specifications for LU2 and LU3 in network A would be defined in the gateway NCP as follows:

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```
BUILD          NETID=A,
               HSBPOOL=4,
               SESSLIM=1,
               NETLIM=2,
               .
               .
               .
SYSCNTRL
               .
               .
               .
GWNAU          NUMADDR=2
```

Notice that the GWNAU definition statement in this example follows the SYSCNTRL definition statement. This indicates that the specifications it defines are for resources in a non-native network that must be represented in the native network. The NUMADDR operand of the GWNAU definition statement specifies that two addresses must be reserved by the gateway NCP to represent LU2 and LU3 in network A. The SESSLIM and NETLIM operands on the BUILD definition statement also indicate that the specifications they define are for resources in a non-native network that must be represented in the native network. The SESSLIM operand specifies that LU2 and LU3 can each participate in a maximum of one session with LU1. The NETLIM operand specifies that the maximum number of half-session control blocks (HSCBs) that the gateway NCP can assign to LU2 and LU3 collectively is two: one for LU2 and one for LU3. Unlike the SESSLIM and NETLIM operands, the HSBPOOL operand of the BUILD definition statement defines specifications for SSCPs and LUs in all networks. It specifies that the gateway NCP is to reserve four half-session control blocks for cross-network sessions between LU1, LU2, and LU3. These would be allocated as follows: one for LU1 and one for LU2 when they are in session, and one for LU1 and one for LU3 when they are in session. Notice that LU1 can be in session with both LU2 and LU3 at the same time, and therefore requires two half-session control blocks. (In this example, LU1 is probably a subsystem, such as CICS, and LU2 and LU3 are probably terminals.)

In the same way that LU2 and LU3 are defined to appear in network A, LU1 must be defined to appear in network B. The coded definition statements and operands that accomplish this are shown below. These definition statements and operands define dynamic allocation of addresses and are in the same definition of the gateway NCP as the BUILD, SYSCNTRL, and GWNAU definition statements and their operands shown above.

```
.
.
.
NETWORK       NETID=B,
               SESSLIM=2,
               NETLIM=2,
               .
               .
               .
GWNAU         NUMADDR=1
```

Notice that the GWNAU definition statement in this example follows the NETWORK definition statement that defines network B. This indicates

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that the specifications the GWNAN definition statement defines are for resources in another network (which could be the native network, as it is in this case, or another non-native network) that must be represented in network B. The NUMADDR operand of the GWNAN definition statement specifies that one address must be reserved by the gateway NCP to represent LU1 in network B. The SESSLIM and NETLIM operands of the NETWORK definition statement also indicate that the specifications they define are for resources in another network that must be represented in network B. The SESSLIM operand specifies that LU1 can participate in a maximum of two sessions with LU2 and LU3: one with LU2 and one with LU3. The NETLIM operand specifies that the maximum number of half-session control blocks that the gateway NCP can assign to LU1 is two: one for when it is in session with LU2 and one for when it is in session with LU3. Notice that the HSBPOOL operand of the BUILD definition statement in the first example above covers the reservation of two half-session control blocks for LU1 for when it is in session simultaneously with LU2 and LU3.

If LU2 and LU3 were to be permanently assigned addresses for participation in cross-network sessions with LU1, the definition statements and operands to define this assignment would be coded in the gateway NCP as follows:

```
BUILD          NETID=A,
               .
               .
               .
SYSCNTRL       .
               .
               .
GWNAN          NETID=B,
               NAME=LU2,
               NUMSESS=1
GWNAN          NETID=B,
               NAME=LU3,
               NUMSESS=1
```

Notice again that the GWNAN definition statements in this example follow the SYSCNTRL definition statement, indicating that they define specifications for resources in a non-native network that can participate in sessions with LU1 in the native network. Notice also that there are two GWNAN definition statements, one for each LU to be represented in network A. The NETID operands of these definition statements indicate that the LUs they define reside in network B. The NAME operands specify the names of the LUs, and the NUMSESS operands indicate that each LU can participate in a maximum of one session with LU1.

In the same definition of the gateway NCP, the definition statements and operands to define LU1 to network B would be coded as follows. (These definition statements and operands also define permanent assignment of an address.)

```
.  
. .  
NETWORK NETID=B,  
. .  
GWNAU NETID=A,  
NAME=LU1,  
NUMSESS=2
```

Notice that the GWNAU definition statement in this example follows the NETWORK definition statement that defines network B, indicating that this GWNAU definition statement defines specifications for resources in another network that can participate in sessions with LU2 and LU3 in network B. The NETID operand of this definition statement indicates that the LU it defines resides in network A. The NAME operand specifies the name of the LU, and the NUMSESS operand indicates that the maximum number of sessions the LU can participate in with LU2 and LU3 is two.

Defining Cross-Network Paths

BUILD	VRACT
PATH	DESTSA, ER0, ER1, ER2, ER3, ER4, ER5, ER6, ER7, VR0, VRPWS00, VRPWS01, VRPWS02, VR1, VRPWS10, VRPWS11, VRPWS12, VR2, VRPWS20, VRPWS21, VRPWS22, VR3, VRPWS30, VRPWS31, VRPWS32, VR4, VRPWS40, VRPWS41, VRPWS42, VR5, VRPWS50, VRPWS51, VRPWS52, VR6, VRPWS60, VRPWS61, VRPWS62, VR7, VRPWS70, VRPWS71, VRPWS72

The definition statements and operands used to define cross-network paths between interconnected networks are the same definition statements and operands that are used to define routes between subareas in an independent network. See "Defining Routes between Subareas" on page 2-17 for information on how these definition statements and operands are used. The following are some unique considerations to keep in mind when defining cross-network paths.

A path between a pair of networks consists of as many separate explicit routes as the number of networks that the path passes through. You define these explicit routes independently for each network and do not have to specify the same explicit route number from network to network. For example, in Figure 2-15 on page 2-65, data traveling from VTAM subarea 1 in network A to NCP subarea 5 in network B travels over an explicit route defined in network A as explicit route 0 and over a separate explicit route defined in network B as explicit route 1.

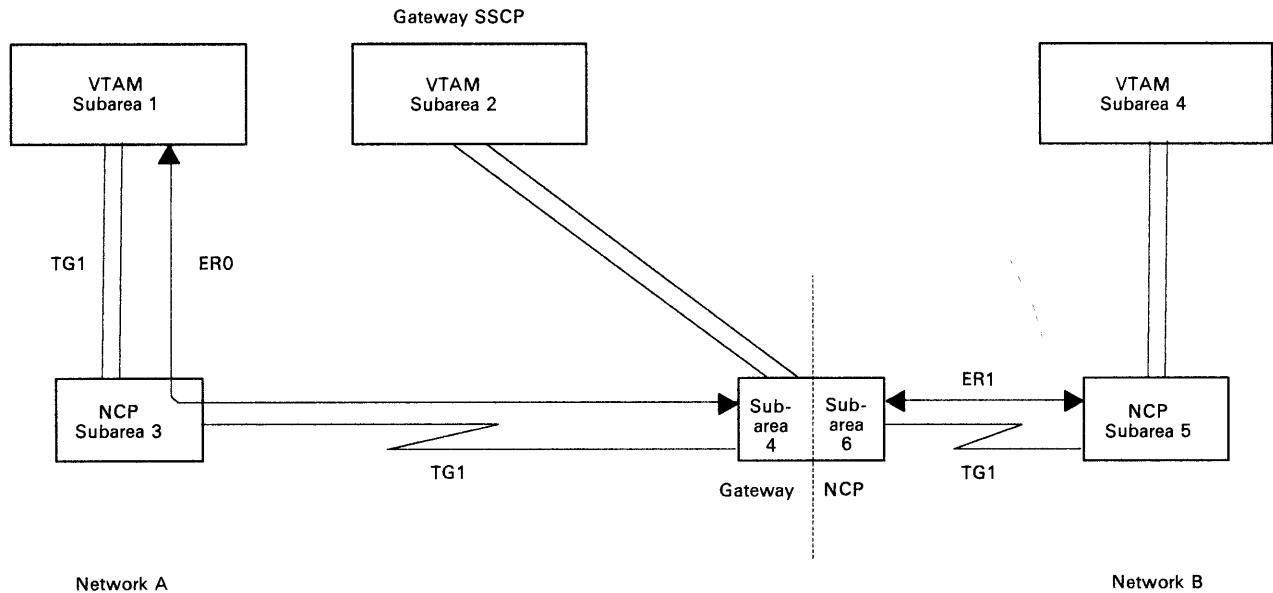


Figure 2-15. Example of a Cross-Network Path in an Interconnected Network

Between any two adjacent networks in a cross-network path, the gateway NCP serves as a destination subarea and an origin subarea for the explicit routes that comprise the path. In network A in Figure 2-15 on page 2-65, the gateway NCP serves as the destination subarea of explicit route 0 (defining forward data flow) from VTAM subarea 1 and as the origin subarea of explicit route 0 (defining reverse data flow) to VTAM subarea 1. Likewise, in network B, the gateway NCP serves as the origin subarea of explicit route 1 (defining forward data flow) to NCP subarea 5 and as the destination subarea of explicit route 1 (defining reverse data flow) from NCP subarea 5.

The PATH definition statements that define the cross-network path from VTAM subarea 1 to NCP subarea 5 are shown below. (This example also shows the PATH definition statements that define the reverse path over which data travels from NCP subarea 5 to VTAM subarea 1.)

In VTAM Subarea 1:

```
PATH      DESTSA=4 ,
          ERO=( 3 , 1 ) ,
          VRO=0
```

In NCP Subarea 5:

```
PATH      DESTSA=6 ,
          ER1=( 6 , 1 )
```

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In NCP Subarea 3:

PATH DESTSA=4,
ERO=(4,1)

In the Gateway NCP (Subarea 6, from Network B's point-of-view):

BUILD SUBAREA=4
NETID=A
.
.
GWNAN
.
.
PATH DESTSA=1
ERO=(3,1),
VRO=0

In the Gateway NCP: (Subarea 4, from Network A's point-of-view)

BUILD SUBAREA=4,
NETID=A
.
.
NETWORK SUBAREA=6,
NETID=B
.
.
GWNAN
.
.
PATH DESTSA=5,
ER1=(5,1),
VR1=1

In NCP Subarea 3:

PATH DESTSA=1,
ERO=(1,1)

Note that PATH definition statements that define explicit routes from the gateway NCP to destination subareas in a non-native network must follow the NETWORK definition statement that defines the non-native network in which those destination subareas exist. Although indeed they do follow the NETWORK definition statement, they also must follow the GWNAN definition statements that define cross-network session specifications for resources in another network that can participate in sessions with resources in the non-native network that the NETWORK definition statement defines. PATH definition statements that define explicit routes from the gateway NCP to destination subareas in the native network must follow the GWNAN definition statements that define cross-network session specifications for resources in a non-native network that can participate in sessions with resources in the native network.

Defining Cross-Network Paths to VTAM

BUILD	COSTAB
NETWORK	COSTAB

Use the COSTAB operand of the BUILD and NETWORK definition statements if you are defining a gateway NCP. See the appropriate *VTAM Installation* manual for a description of this operand.

Defining User-Written Accounting Exit Routine

BUILD	GWAEXIT
-------	---------

Use the GWAEXIT operand of the BUILD definition statement if you have written your own accounting exit routine for cross-network sessions. Use this operand to specify the name of the routine. Ensure that the name you specify is the name as it is known in the user library identified by the INCHI and ORDHI operands of the GENEND definition statement.

Defining the Relationship between the NCP and Link-Attached Devices

You must define to the NCP many physical and operational characteristics about the relationship between the NCP and its link-attached devices. These characteristics and the definition statements and operands you need to code to define them are discussed below.

Defining Data Links

GROUP	LNCTL, TYPE	
LINE	ADDRESS, SPEED, DUPLEX, CLOCKNG, ATTACH, INTPRI, MODULO	(3725 and 3720) (3705) (3725 and 3720)
GENEND	HSPDSEL, SCANCTL	(3705) (3705)

Use the LNCTL operand of the GROUP definition statement to specify the type of line control used for the data links in a group. A group consists of one or more data links that have certain characteristics in common. All data links in a group must be of the same type of line control. There are four possible line control types: SDLC, BSC, SS, or user-written. If you specify that your line control is user-written, you must also code the LEVEL2 and LEVEL3 operands of the GROUP definition statement.

Use the TYPE operand of the GROUP definition statement to specify (1) whether all data links in the group operate in network control mode or emulation mode, (2) whether some operate in network control mode and some in emulation mode, or (3) whether some can operate alternatively in either network control mode or emulation mode.

Note: A group consisting of SDLC data links can operate only in network control mode.

If you are defining your NCP for the 3725 or 3720, use the ADDRESS operand of the LINE definition statement to specify the relative line number of the data link you are defining. This line number is relative to the line numbers of all the data links you are defining to this NCP. It will be converted to an even address or an even-and-odd pair of addresses for the data link it represents.

Use the ADDRESS operand to specify also whether data is transferred across the link in half-duplex mode or duplex mode. If data is transmitted

in half-duplex mode, the line number you specify in this operand will be converted to one even address, and data will be sent and received by way of this address. If data is transmitted in duplex mode, the line number will be converted to an even-and-odd pair of addresses, and data will be sent by way of the even address and received by way of the odd address.

If you are defining your NCP for the 3705, use the ADDRESS operand of the LINE definition statement to specify the line interface address or addresses of the data link you are defining. If the link transfers data in half-duplex mode, you must specify one address. If the link transfers data in duplex mode, you must specify two addresses. Half-duplex mode means that the NCP can only be sending data or only be receiving data at any given time through one line interface address. Duplex mode means that the NCP can be sending and receiving data over the link at the same time through a pair of line interface addresses.

Note: An SDLC data link is the only type that can operate in duplex mode.

If you define this data link as being operable in emulation mode for either the 3725, the 3720, or 3705 Communication Controller, use the ADDRESS operand to specify also the emulation subchannel address or addresses. If you are defining your NCP for the 3705, use this operand to specify also the channel adapters associated with this link.

Use the SPEED operand of the LINE definition statement to specify the data rate for this data link. This rate represents the rate at which the devices attached to the link send and receive data to and from the NCP.

For NCP V4R2 Users: NCP V4R2 can determine the speed for the data link you are defining if you specify certain parameters on the SPEED operand of the LINE definition statement. The speeds that the NCP supports depend on the hardware configuration of your 3725 or 3720. In particular it depends on the level of the installed Internal Clocking Control (ICC) card. To specify the SPEED operand correctly you need to determine if you have installed in your controller an Internal Clocking Card-1 or Internal Clocking Card-2.

Use the DUPLEX operand of the LINE definition statement to specify whether the data link and modem constitute a half-duplex or duplex facility. This operand represents the characteristics of the entire communication path, including common-carrier lines and equipment, and the modems at both ends of the path. Be careful not to confuse this with half-duplex or duplex data transfer. This operand specifies only the physical characteristic of the data link, whether it is made up of a two-wire circuit or a four-wire circuit. Operands that define duplex or half-duplex data transfer are the ADDRESS operand of the LINE definition statement and the DATMODE operand of the PU definition statement. In terms of data transfer, it is important not to assume that a two-wire circuit data link necessarily transfers data in half-duplex mode. If the clear-to-send (or ready-to-send) signal lead in the modem is continuously energized, the data link transfers data in duplex mode, regardless of whether it is a two-wire or four-wire circuit data link.

Use the **CLOCKNG** operand of the **LINE** definition statement to specify whether the modem or the communication scanner for the data link you are defining is to provide clocking. External clocking is provided by a modem, whether the modem is a separate unit or built into the controller. Internal clocking is provided by the scanner. This is also known as business machine clocking.

Use the **ATTACH** operand of the **LINE** definition statement only if you are defining your NCP for the 3725 or 3720 Communication Controller. Use this operand to specify whether the data link you are defining is directly attached to the communication controller or is attached through a modem. If you are defining a subarea link, use the **ATTACH** operand only if the subarea link connects two 3725 or 3720.

Use the **INTPRI** operand of the **LINE** definition statement only if you are defining your NCP for the 3705. Use this operand to specify the interrupt priority for the data link you are defining relative to the other data links attached to the same scanner. Assign high priorities to data links having high data rates. This allows them to be serviced more frequently by the NCP.

Use the **MODULO** operand of the **LINE** definition statement only if you are defining your NCP for the 3725 or 3720. Use this operand to specify whether the link you are defining is to operate as a modulo 8 link or as a modulo 128 link. If the link is to operate as a modulo 8 link, the NCP will send up to 7 information frames (I-frames) to the device attached to the link before a response is required that indicates whether the device received the I-frames. If you specify that the link is to operate as a modulo 128 link, the NCP will send up to 127 I-frames to the attached device before a response is required.

If you specify that the link is to operate as a modulo 128 link, the modulus of the link is dependent on the value specified on the **MAXOUT** operand of the **PU** macro. If you specify **MODULO = 128** and specify a value of eight or greater for the **MAXOUT** operand of the **PU** definition statement, the line operates as a modulo 128 line. If you specify **MODULO = 128** and specify a value of seven or less for the **MAXOUT** operand of the **PU** definition statement, the line operates as a modulo 8 line.

Use the **HSPDSEL** operand of the **GENEND** definition statement only if you are defining your NCP for the 3705. Use this operand if you have any data links that are attached to a type 3 scanner installed in the controller. Use this operand to specify the high-speed select masks for each type 3 scanner installed in the communication controller. These masks are used to cause high-speed line interfaces to be scanned more frequently than interfaces for lower-speed data links. (Lower-speed data links are those accommodating less than 4 800 bps.)

Note: You cannot specify a mask for a type 3 scanner that has a 230.4-kbps data link attached.

Ensure that the bit settings you specify for the **HSPDSEL** operand correspond to the high-speed select data links requiring increased scanning.

Use the SCANTL operand of the GENEND definition statement only if you are defining your NCP for the 3705. Use this operand to specify the scan limits for each type 2 and type 3 scanner installed in the controller and to specify the address-substitution mask for each type 2 scanner installed.

Note: You cannot specify a scan limit for a type 3 scanner that has a 230.4-kbps data link attached.

Defining Switched Data Links

GROUP	DIAL
LINE	CALL, AUTO, REDIAL

Use the DIAL operand of the GROUP definition statement to specify whether the data links in the group you are defining require switched line control procedures.

Note: A subarea link connecting two communication controllers always uses nonswitched line control procedures, even if it is a switched link.

Use the CALL operand of the LINE definition statement to specify who can initiate calls: devices on the switched data link, the NCP, or both.

Note: VTAM Users Only: For SDLC data links, this operand provides information only to the VTAM initialization procedure and has no effect on the generation of the NCP. See the appropriate VTAM Installation manual for information on the use of this operand for SDLC links.

Use the AUTO operand of the LINE definition statement to specify whether an automatic calling unit (ACU) is installed for the data link you are defining. If an ACU is installed, use this operand to specify also the interface address of the calling unit.

Use the REDIAL operand of the LINE definition statement to specify the number of dialing operations you want the NCP to perform in attempting to reach a device over a switched data link. Use this operand to specify also the pause you want the NCP to take between these dialing operations.

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Defining Data Links to VTAM

LINE	OWNER
------	-------

Use the **OWNER** operand of the **LINE** definition statement if the data link you are defining can be owned by VTAM. See the appropriate *VTAM Installation* manual for a description of this operand.

Defining Modems

LINE	DATRATE, SPDSEL
------	--------------------

Use the **DATRATE** operand of the **LINE** definition statement to specify whether the modem is a dual-rate modem. If the modem is a dual-rate modem, use this operand to specify also whether the data link connected to this modem is to operate at a high rate or a low rate, where the rate can be controlled by the NCP.

Use the **SPDSEL** operand of the **LINE** definition statement to specify whether the data rate you specify in the **DATRATE** operand can be changed by request from the access method.

Defining Modems for a Switched Data Link

LINE	ANSTONE, RING
------	------------------

Use the **ANSTONE** operand of the **LINE** definition statement if you are defining this data link to be a call-in link; that is, one over which the NCP is only able to receive calls from devices attached to the link. Use this operand to specify whether you want the NCP to send an answer tone to the calling device to signify completion of the data link connection. Most modems in the United States and Canada provide this answer tone; therefore, you do not usually have to specify that the NCP send it. If you are not sure if your modem provides this tone, ask the supplier or installer of the modem.

Use the **RING** operand of the **LINE** definition statement to specify whether the modem has the ring-indicator interface. If you are not sure if your modem has this feature, ask the supplier or installer of the modem. Specifying this feature for a modem that does not have it can result in

unnecessary delay in establishing the connection. Also, outgoing calls cannot be made if you specify that the modem has this feature.

Note: This operand does not apply to networks in the United States or Canada.

Defining Diagnostic Aids

You must define to the NCP several diagnostic aids if you want them to be included for your NCP. You must also define several characteristics about these and other automatically included diagnostic aids. These diagnostic aids and characteristics and the definition statements and operands you need to code to define them are discussed below.

Defining the Channel Adapter Trace

BUILD	CATRACE
-------	---------

Use the CATRACE operand of the BUILD definition statement to specify whether you want the channel adapter trace facility to be included for your NCP. If you do want the channel adapter trace to be included, use this operand to specify also the number of 32-byte entries you want to be contained in the trace table. The channel adapter trace is a maintenance and debugging tool used to trace channel adapter interrupts. It can be used to diagnose suspected channel adapter hardware errors and suspected NCP errors. It can also be used to monitor all channel external registers. Any combination of up to four channels can be traced. An entry is placed in a table for each level 3 interrupt. The channel adapter trace facility does not interfere with normal operations of the controller. However, performance may diminish somewhat because of the additional processing needed. The amount of decrease in performance depends on how heavily the controller is currently loaded.

Defining the Address Trace

BUILD	TRACE
-------	-------

Use the TRACE operand of the BUILD definition statement to specify whether you want the address trace facility to be included for your NCP. If you do want the address trace facility to be included, use this operand to specify also the number of 16-byte entries you want to be contained in the trace table. The address trace is a maintenance and debugging tool used to record the contents of selected areas of communication controller storage, general registers, and external registers at each successive interrupt. It can

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be used to diagnose suspected errors in the NCP. The address trace is performed only on data links operating in network control mode.

Defining the Branch Trace

BUILD	BRANCH	(3725 and 3720)
-------	--------	-----------------

Use the BRANCH operand of the BUILD definition statement only if you are defining your NCP for the 3725 or 3720. Use this operand to specify the number of entries you want to be contained in the branch trace table. The branch trace is a maintenance and debugging tool used to record the interrupt level and storage address that the NCP is coming from and going to each time a successful branch is taken. It can be used to diagnose suspected errors in the NCP. The branch trace is automatically included for every NCP.

Defining the Line Trace and Scanner Interface Trace

BUILD	LTRACE
LINE	LTRUNC

Use the LTRACE operand of the BUILD definition statement to specify the number of line traces that you want to allow to run at the same time. The line trace is a maintenance and debugging tool used to record the activity on the data links connected to your NCP each time a level 2 interrupt occurs for a particular link. Trace information is placed in buffers, obtained as required from the buffer pool, and is transmitted to the host processor, where the trace information is accumulated in a data set (file) to be printed for analysis. Line trace activity does not interfere with normal operation of a data link. However, performance may diminish somewhat because of the additional processing needed each time a character-service or buffer-service interrupt occurs for the line being traced. The line trace is automatically included for every NCP.

Note: The NCP does not support line trace for communication lines controlled by user-written line control code that includes such products as X.25 Network Packet Switch Interface (NPSI). The request to start or stop the line trace (or scanner internal trace) is passed to the user-written I/O code. Support for the trace then becomes the responsibility of the user code.

If you are defining your NCP for the 3725 or 3720, use the LTRACE operand of the BUILD definition statement to specify also the number of scanner interface traces that you want to allow to run at the same time. The scanner interface trace is a maintenance and debugging tool used to record

the activity within the scanners installed on the 3725 or 3720. The scanner interface trace is automatically included for every:

- NCP Version 3 for the IBM 3725 Communication Controller
- NCP Version 4 for the IBM 3725 and 3720 Communication Controller
- NCP Version 4 Subset for the IBM 3720 Communication Controller.

Use the LTRUNC operand of the LINE definition statement if the data link you are defining is an SDLC or BSC data link. Use this operand to specify whether you want Line Trace Data Copy Truncation to be in effect for the data link.

Defining Online Tests

BUILD	OLT
-------	-----

Use the OLT operand of the BUILD definition statement to specify whether you want the online terminal test facilities included for your NCP. The online terminal test facilities are maintenance and debugging tools used by terminal or console operators to request a variety of tests to be performed on a data link. They are used to diagnose suspected data link and terminal failures.

Defining Backup and Recovery Procedures

Several facilities provide protection for the devices attached to your NCP if any of the other network resources fail. The definition statements and operands you need to code to define the relationship of the NCP to these facilities are discussed below.

Defining Error Recovery and Recording

LINE	RETRIES
------	---------

Use the RETRIES operand of the LINE definition statement if the data link you are defining can operate in network control mode.

If you are defining an SDLC data link, use this operand to specify the number of attempts you want the NCP to make to recover from errors occurring during transmission over the link. Specifying a pause of several seconds between sequences allows time for transient noise conditions on the link, which may be responsible for the repeated errors, to subside. An error

condition occurs when the NCP does not receive a positive indication that a frame it has sent has been successfully received. The NCP continues to retransmit the frame until the frame is successfully received or until the number of retries you specify in this operand have been attempted. If an error occurs while the NCP is receiving data from an SDLC device, it will send the device a command that causes the device to retransmit all frames starting with the frame in error. It repeats this command until (1) it has successfully received the frame, (2) it has retried the receive operation the number of times you specify in this operand, or (3) the device sends an abnormal response (for example, a request for initialization). Ensure that you code the RETRIES operand to provide for recovery of a temporary error, but with a value that does not prevent recognition of a permanent error.

Note: If you are defining a subarea link connecting two NCPs, be aware that there are minimum retry values to be used when loading or dumping of a link-attached NCP occurs over this link. See the NCP and SSP Resource Definition Reference manual for these minimum values.

If you are defining a BSC or SS data link, use this operand to specify the number of attempts you want the NCP to make to recover from errors occurring during transmission over the link. If an error occurs while the NCP is sending data to a BSC or SS device, it will retransmit the block on which the error occurred until it successfully sends the block or until it has retried the send operation the number of times you specify in this operand. If an error occurs while the NCP is receiving data from a BSC or SS device, it sends a negative response to the device, causing it to retransmit the block in error until (1) the block is successfully received, (2) the device sends an end-of-transmission (EOT) character or sequence instead of retransmitting the block, or (3) the NCP has sent the device the number of negative responses you specify in this operand. Ensure that you code the RETRIES operand to provide for recovery of a temporary error, but with a value that does not prevent recognition of a permanent error.

Defining Performance Characteristics

Several operational characteristics about the relationship of the NCP to the resources attached to it affect the performance of the network. How these characteristics affect the performance of the network depends on how you define them. These characteristics and the definition statements and operands you need to code to define them are discussed below. In most cases, it is difficult to determine how your network will perform until all the resources are installed and fully operational. Therefore, the values you specify in the operands discussed in this topic may need to be changed after you have a chance to observe how efficiently your network is operating.

Defining Data Flow Control

BUILD	CWALL, SLODOWN
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Use the CWALL operand of the BUILD definition statement to specify the number of buffers that you want your NCP to reserve to enable control data originating in an access method to flow through the NCP. When this number of buffers is no longer available, no more data will be accepted by the NCP until additional buffers are available.

Use the SLODOWN operand of the BUILD definition statement to specify the minimum percent of NCP buffers that you want to be available before the NCP goes into slowdown mode (slowdown entry threshold). When the percent of available buffers drops below this threshold, the NCP reduces the amount of data it accepts from data links operating in network control mode and from the network control subchannel, but it continues to send data over the data links and subchannel. This reduces the number of buffers in use. When the buffer supply is sufficiently replenished, the NCP automatically resumes normal operation.

If the value you specify in the SLODOWN operand is less than the value you specify in the CWALL operand, plus 24, the value you specify in the CWALL operand, plus 24, will be used as the slowdown entry threshold.

Note: During initialization, the NCP will abend if the total number of buffers contained in the NCP is less than twice the slowdown entry threshold.

Defining Time-out Values

GROUP	REPLYTO, TEXTTO
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Use the REPLYTO operand of the GROUP definition statement to specify reply time-out values for the data links in the group you are defining. If the NCP does not receive a response to a poll, selection, or message text before the specified time expires, a time-out error is indicated, and the appropriate error recovery procedure is initiated.

Note: If you are defining a GROUP definition statement for a subarea link or group of subarea links connecting two NCPs, be aware that there is a minimum reply value to be used when the loading or dumping of a link-attached NCP occurs over these links. See the NCP and SSP Resource Definition Reference manual for these minimum values. Reply time-outs for BSC devices using conversational replies must be long enough to allow the conversational text to be received.

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Use the TEXTTO operand of the GROUP definition statement to specify a text time-out value for the data links in the group you are defining. If the interval between any two successive message characters received from a device exceeds the value you specify in this operand, the NCP will end the read or invite operation with a text time-out error indication. For all data links, the time-out occurs only when the link is operating in network control mode.

Defining a Service Order Table

SERVICE	ORDER
LINE	SERVLIM

Use the ORDER operand of the SERVICE definition statement to specify the order in which the devices attached to a data link are to be serviced by your NCP. If you omit the ORDER operand or the SERVICE definition statement, the NCP/EP Definition Facility (NDF) automatically generates the service order table for a line operating in network control mode. You need to code a SERVICE definition statement following each LINE definition statement that defines a nonswitched data link, except if the data link is a subarea link connecting two NCPs. For a BSC or SS data link, each individually polled and addressed device represented by a TERMINAL or COMP definition statement (or by a CLUSTER definition statement in which the GPOLL operand is coded) must be represented by at least one entry in the ORDER operand. The generation procedure checks entries in the service order table to determine if the devices represented by CLUSTER, TERMINAL, COMP, or PU definition statements are associated with the data link that the service order table represents. The generation procedure also checks to determine if each of these devices is represented in the service order table.

If you are defining an SDLC data link, use the SERVLIM operand of the LINE definition statement to specify the maximum number of regular scans of the service order table that the NCP makes for normal servicing of SDLC devices attached to the link you are defining before it makes a special scan of the table. The regular scan of the table accommodates normal transmission of PIUs between the access method or host processor application programs and SDLC devices or LUs attached to the link. In the special scan of the service order table, the NCP determines whether there are any outstanding commands from the access method to interrogate or alter the online status of any SDLC devices on the link. If so, the NCP fulfills the first such command and then resumes regular scans of the table to perform normal servicing. If no status commands are outstanding, the NCP immediately resumes regular scans unless, in the previous regular scan, it found no devices to be in the contacted state. In this case, resumption of regular scans occurs after a delay of 2.2 seconds. If more than one status command is outstanding, only one is honored each time the special scan is made; the remaining status commands are fulfilled one at a time, in turn, during subsequent special scans of the table.

Upon completing a regular scan, the NCP begins the special scan if either of the following occurs:

- In the regular scan just completed, it finds no active devices.
- The maximum number of regular scans specified in the SERVLIM operand has been reached.

If you are defining a BSC or SS data link, use the SERVLIM operand of the LINE definition statement to specify the number of entries in the service order table that the NCP is to check each time it performs service seeking. If you do not code this operand, the NCP checks half of the table entries each time it does service seeking. For a BSC data link, if the NCP found no devices to be in the contacted state in the previous regular scan, it resumes regular scans after a delay of 0.2 seconds.

Defining Data Transfer Specifications

BUILD	TRANSFR
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Use the TRANSFR operand of the BUILD definition statement to specify the number of NCP buffers corresponding to the maximum length PIU that your NCP is to send to a destination host processor. The principal use of this operand is to limit the amount of line trace data accumulated in NCP buffers to no more than the access method in the destination host processor (and intermediate access methods, if any) can accept in a single PIU, or to no more than the data transfer limit imposed by a subsequent NCP in the path. Upon filling the specified number of buffers with line trace data, the NCP transfers the data to the destination host processor and continues to collect trace data in other buffers. The cycle of obtaining buffers, filling them, and transferring their contents to the host processor continues until the line trace is ended by the operator.

If you omit the TRANSFR operand from the LINE definition statement, you can use the TRANSFR operand of the BUILD definition statement to specify the data transfer limit for data links connected to your NCP. Ensure that you establish the same data transfer limit for line trace data as for message data received from the data links by the NCP. Because the buffers used for both purposes are the same size, the values you specify for the TRANSFR operands of the BUILD and LINE definition statements would be the same.

Defining Timing Specifications

BUILD	DIALTO, DSABLTO, ENABLTO
LINE	PAUSE

Use the DIALTO operand of the BUILD definition statement if you are defining a switched data link. Use this operand to specify a time-out value to be used by the NCP in detecting the failure of an automatic calling unit's abandon-call-and-retry (ACR) signal.

Use the DSABLTO operand of the BUILD definition statement to specify a time-out value to be used by the NCP in detecting the failure of the data-set-ready signal line of a modem. This modem is turned off when the data link it is attached to is disabled. The link remains disabled for the period you specify, regardless of whether the data-set-ready signal line is turned off within the period.

Use the ENABLTO operand of the BUILD definition statement to specify a time-out value to be used by the NCP in detecting the failure of the data-set-ready signal line of the modem to be turned on when the data link connected to the modem is enabled (for nonswitched links), or when a dialing operation is complete (for switched links).

If you are defining an SDLC data link, use the PAUSE operand of the LINE definition statement to specify the minimum values for the duration of the polling cycle. The polling cycle extends from the moment the NCP examines the first entry in the service order table to the moment polling next begins in the same entry. It includes time for polling, reading from, and writing to the devices on the link. If the expended time in a complete polling cycle (servicing all active entries in the service order table) equals or exceeds the time you specify, the next polling cycle begins immediately. If the time expended in a complete polling cycle is less than what you specify, the beginning of the next polling cycle is deferred until the time you specify has elapsed since the beginning of the cycle just completed. During the pause, the link is in poll-wait state; any outgoing data ready for transmission to the SDLC devices on the link is sent during this pause.

Allowing a pause to elapse when activity on a data link is relatively low can reduce the amount of processing time used by unproductive polling. Note that the larger the number of active entries in the service order table, the greater the likelihood that polling cycles will proceed continuously, without intervening pauses.

If you are defining a BSC or SS data link, use the PAUSE operand only if the devices attached to the data link must be polled and addressed. Use this operand to specify the delay between successive service cycles when no sessions currently exist. If you do not code this operand, there is no delay between successive cycles. When at least one new session is established,

the pause is inoperative, because to observe it would delay session servicing.

Defining the Network Performance Analyzer

BUILD	NPA
GROUP	NPARSC
LINE	NPACOLL
LU	MAXCOLL

Note: For more information on defining the Network Performance Analyzer (NPA), see also pages 3-24 and 4-26.

Use the NPA operand of the BUILD definition statement to specify whether you are using the Network Performance Analyzer. The Network Performance Analyzer is a facility that collects performance data about the following devices:

- Communication controllers
- Switched or nonswitched SDLC data links
- Type 1 and type 2 physical units
- Logical units
- BSC links attached to components of the 3270 Information Display System.

NPA consists of two parts: (1) an IBM licensed program, called the Network Performance Monitor (NPM), that runs in the host processor, and (2) an NCP portion that runs in the communication controller. You must have NPM installed in the host processor before the NCP portion of NPA can be used. For more information on NPM, see the *Network Performance Monitor: General Information Manual*, GH20-6359. If you are using the Network Performance Analyzer, you must also code the NPARSC operand of one GROUP definition statement in your NCP definition.

Use the NPARSC operand of one GROUP definition statement to specify that this GROUP definition statement defines a programmed resource group that will be used to send and receive NPA data and commands between the NCP and the field developed program. You must also define the group as supporting programmed resources (with the VIRTUAL operand of the GROUP definition statement), and as using SDLC line control (with the LNCTL operand of the GROUP definition statement). Do not code any other operands in this one GROUP definition statement. However, you must code one LINE definition statement, one PU definition statement, and one LU definition statement under this GROUP definition statement. Ensure that you do not code any operands in the LINE and PU definition statements **under this GROUP definition statement with NPARSC = YES specified**. You may, however, code the MAXCOLL

operand of the LU definition statement under this GROUP definition statement.

Use the NPACOLL operand of the LINE definition statement to specify whether you want data transmitted and received on the data link, which you are defining, to be eligible for collection by NPA. If you specify that you want data to be eligible for collection for this data link, then data will also be eligible for collection for all devices attached to the link, unless you specify in the NPACOLL operands of the related CLUSTER, TERMINAL, PU, and LU definition statements that you do not want data to be eligible for collection for those devices. If you specify that you do not want data to be eligible for collection for this data link, then no data can be collected from any devices attached to the link.

Use the MAXCOLL operand of the LU definition statement only if you are defining the LU within the programmed NPA resource group (under the GROUP definition statement where you code the NPARSC operand). Use this operand to specify the maximum number of resources defined to your NCP that NPA can collect data about at the same time. Be careful not to choose an excessive value here because it can waste NCP storage.

Defining Customized Functions

If you are including special device support and functions in your NCP through special IBM program products, such as the Network Terminal Option (NTO), or through user-written code, you must define to the NCP several physical and operational characteristics about these programs or this code. These characteristics and the definition statements and operands you need to code to define them are discussed below. See the *NCP and SSP Customization* manual for information on the support and functions provided by special IBM program products and on writing and including user-written code in the NCP. See the *Installation* manuals for the special IBM program products you are using for detailed information on how to define these programs. See these manuals also for information on any modifications you have to make to the NCP to include these special programs.

Defining User Line Control

GROUP	COMPACB, LEVEL2, LEVEL3, XIO, TIMER, LEVEL5, USERID, LINEADD, LINEAUT
LINE	AUTUACB, UACB

Use the COMPACB operand of the GROUP definition statement only if you are defining an NCP Version 4 (Release 1 or 2). Use the COMPACB operand to specify whether the user adapter control blocks (UACBs) for the lines in this GROUP definition statement are compatible in format to the NCP's adapter control blocks (ACBs).

Use the LEVEL2 operand of the GROUP definition statement to specify the entry points of the user-written code for level 2 scanner interrupts. If you code this operand, you must also code the LEVEL3 operand of the GROUP definition statement and the SRCLO operand of the GENEND definition statement.

Use the LEVEL3 operand of the GROUP definition statement to specify the entry points of the user-written code for level 3 interrupts.

Use the XIO operand of the GROUP definition statement to specify the four entry points in level 3 of the XIO definition statements executed in the background level 5. These entry points identify user routines for the execute I/O line service routine, the execute I/O set mode service routine, the execute I/O immediate service routine, and the execute I/O link service routine. (The entry point for the execute I/O link service routine is required only if the user-written code has an interface with code that issues an XIO LINK command, such as SNA boundary function code).

Use the TIMER operand of the GROUP definition statement to specify the four entry points for user-written timer routines. These routines are the timer error service routine, the RAS service routine, the shoulder tap routine, and the lagging shoulder tap routine.

Use the LEVEL5 operand of the GROUP definition statement to specify whether level 5 code is provided by the NCP or is user-written. If level 5 code is user-written, only the GROUP, LINE, and SERVICE definition statements can be coded for this group.

Use the USERID operand of the GROUP definition statement to do the following:

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- Specify the identification symbol you want to be used for user-defined control blocks associated with the data link group you are defining. This identification symbol will be placed in the group control block for this data link group when the NCP is initialized.
- Define the entry label of the block dump table to be used for formatting user-defined or NTRI control blocks.
- Define the type of RECMS processing to be performed for this GROUP.

Use the **LINEADD** operand of the **GROUP** definition statement if the data link group you are defining has no physical address interface defined. Use this operand to specify that the data link group has no physical address interface defined.

Use the **LINEAUT** operand of the **GROUP** definition statement if the data link group you are defining is made up of switched links and has no physical address interface defined. Use this operand to specify auto-call for the data link group.

Use the **AUTUACB** operand of the **LINE** definition statement if you are defining a switched data link. Use this operand to specify the name of the user adapter control block associated with the autocall unit (ACU) defined in the **AUTO** operand of the **LINE** definition statement.

Use the **UACB** operand of the **LINE** definition statement to specify the names of the user adapter control blocks associated with the data link you are defining.

Defining Programmed Resources

GROUP	VIRTUAL
LINE	LINEFVT, LINECB
PU	PUCB, PUFVT, PUNTFY
LU	LUCB, LUFVT, LUNTFY, NUMSESS

Use the **VIRTUAL** operand of the **GROUP** definition statement to specify whether programmed resources are included in the group you are defining.

Use the **LINEFVT** operand of the **LINE** definition statement to specify the name of the function vector table associated with the virtual data link you are defining.

Use the LINECB operand of the LINE definition statement to specify the name of a user-defined control block associated with the virtual data link you are defining.

Use the PUCB operand of the PU definition statement to specify the name of a user-defined control block associated with the virtual PU you are defining.

Use the PUFVT operand of the PU definition statement to specify the name of the function vector table associated with the virtual PU you are defining.

Use the PUNTFY operand of the PU definition statement to specify whether the notify byte is included in user-written code for the virtual PU you are defining and whether control is passed to the user-written notify task.

Use the LUCB operand of the LU definition statement to specify the names of user-defined control blocks associated with the virtual LU you are defining.

Use the LUFVT operand of the LU definition statement to specify the names of the function vector tables associated with the virtual LU you are defining.

Use the LUNTFY operand of the LU definition statement to specify whether the notify byte is included in user-written control blocks for the virtual LU you are defining and whether control is passed to a user-written notify task.

Use the NUMSESS operand of the LU definition statement to specify the number of half-session control blocks (HSCBs) associated with the virtual LU you are defining.

Defining Network Addressable Units

NCPNAU	TYPE, NAUFVT, NAUCB, NOTIFY, NUMSESS
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Use the TYPE operand of the NCPNAU definition statement to specify whether you want the NAU you are defining to function as a system services control point (SSCP) or a logical unit (LU).

Use the NAUFVT operand of the NCPNAU definition statement to specify the names of the function vector tables associated with the network addressable unit (NAU) you are defining.

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Use the NAUCB operand of the NCPNAU definition statement to specify the names of the user-defined control blocks associated with the NAU you are defining.

Use the NOTIFY operand of the NCPNAU definition statement to specify the use of the notify byte in user-written control blocks for the NAU you are defining and whether control is passed to a user-written notify task.

Use the NUMSESS operand of the NCPNAU definition statement to specify the number of HSCBs associated with the NAU you are defining.

Defining Channel-Handling Code

BUILD	UCHAN
LINE	ADDRESS (3725 and 3720)
GROUP	CHANLNK, CAEXIT
LU	UCCB

Use the UCHAN operand of the BUILD definition statement to specify whether user-written channel handling code is provided for channel-adapter positions 0 through 5.

Use the ADDRESS operand of the LINE definition statement to specify the channel adapter position for the 3725 or 3720.

Use the CHANLNK operand of the GROUP definition statement to specify whether this group defines a channel link for which user-written routines will handle channel operations.

Use the CAEXIT operand of the GROUP definition statement to specify the entry points of user-written channel service routines. These routines are (1) the level 1 error recovery procedure routine; (2) the system reset routine; (3) the timer interrupt routine; and (4) the routine that handles the program request interrupts, suppress-out monitor requests, and permission-to-process stacked requests.

Use the UCCB operand of the LU definition statement to specify the name of the user channel control block associated with the logical unit you are defining when the channel operation is handled by user-written code.

Defining Entry Points and Library Member Names

GENEND	INIT, SRCHI, SRCLO, TMRTICK
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Use the INIT operand of the GENEND definition statement to specify the entry points of your user-written initialization routines. These routines must be object modules cataloged in the appropriate MVS, VM/SP, or the VSE object library. If you code this operand, you must also code either the INCINIT, INCHI, or INCLO operands of the GENEND definition statement.

Use the SRCHI and SRCLO operands of the GENEND definition statement to specify the source code for user-defined control blocks and tables that must be assembled with the NCP control blocks and tables. The source code must be in definition statement form using the 3725, 3720, or 3705 assembler instructions. Use the SRCHI operand to specify source code that may reside anywhere in the controller storage. Use the SRCLO operand to specify source code that must reside in the low 64K of storage. Use the TMRTICK operand of the GENEND definition statement to specify the entry point of a user-written timer-tick service routine. This routine must be an object module cataloged in the appropriate object library, depending on which operating system you are running under.

Defining Library Members That Contain Linkage Editor Statements

GENEND	INCHI, INCLO, INCL2HI, INCL2LO, INCINIT, ORDHI, ORDLO, ORDL2HI, ORDL2LO, ORDINIT, KEYOINC, (3725 and 3720) KEYOORD (3725 and 3720)
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Note: If you are including special device support and function in your NCP through certain IBM special products or user-written code that utilize the NDF standard attachment facility, some of the previous operands are not applicable.

See the manuals specific to the IBM special products that you are using or the NCP Customization manual for more information.

Use the INCHI and INCLO operands of the GENEND definition statement to specify the library members that contain linkage-editor INCLUDE statements for object modules that are *not* level 2 or level 3 code. Use the INCHI operand to specify the object modules that can reside anywhere in controller storage. These modules will execute with a storage protect key of 1. If you code this operand, you must also code the ORDHI operand. The generation procedure assumes that the block-handling routine linkage-editor control statements are included in the members you specify in this operand and in the ORDHI operand. Use the INCLO operand to specify the object modules that must reside in the low 64K of controller storage. If you code this operand, you must also code the ORDLO operand.

Use the INCL2HI and INCL2LO operands of the GENEND definition statement to specify the library members that contain linkage-editor INCLUDE statements for object modules that *are* level 2 or level 3 code. These modules will execute with a storage protect key of 0. Use the INCL2HI operand to specify the object modules that may reside anywhere in controller storage. If you code this operand, you must also code the ORDL2HI operand. Use the INCL2LO operand to specify the object modules that must reside in the low 64K of controller storage. If you code this operand, you must also code the ORDL2LO operand.

Use the INCINIT operand of the GENEND definition statement to specify the library members that contain linkage-editor INCLUDE statements for user-written initialization code. The modules included in the NCP generation procedure by this operand are overlaid after the initialization is complete. If you do not want the user-written initialization code to be overlaid, use the INCHI or INCLO operands to specify the library members that contain the linkage-editor INCLUDE statements.

Use the ORDHI and ORDLO operands of the GENEND definition statement to specify the library members that contain linkage-editor ORDER statements for object modules that are *not* level 2 or level 3 code. Use the ORDHI operand to specify the object modules that can reside anywhere in controller storage. Use the ORDLO operand to specify the object modules that must reside in the lower 64K of controller storage.

Use the ORDL2HI and ORDL2LO operands of the GENEND definition statement to specify the library members that contain linkage-editor ORDER statements for object modules that *are* level 2 or level 3 code. Use the ORDL2HI operand of the GENEND definition statement to specify the object modules that can reside anywhere in controller storage. Use the ORDL2LO operand to specify the object modules that must reside in the lower 64K of controller storage.

Use the ORDINIT operand only if you also code the INCINIT operand. Use this operand to specify the library members that contain linkage-editor ORDER statements for user-written initialization code. The members included in the NCP generation by this operand are overlaid after the initialization is complete. If you do not want the user-written initialization code to be overlaid, use the ORDHI or ORDLO operands to specify the library members that contain the ORDER statements.

Use the **KEY0INC** operand of the **GENEND** definition statement only if you are defining your **NCP** for the 3725 or 3720. Use this operand to specify the library members that contain linkage-editor **INCLUDE** statements for object modules to be included in read-only storage.

Use the **KEY0ORD** operand of the **GENEND** definition statement only if you are defining your **NCP** for the 3725 or 3720. Use this operand to specify the library members that contain linkage-editor **ORDER** statements for object modules to be included in read-only storage.

Chapter 3. Defining Characteristics and Functions for SDLC Devices

This chapter helps you determine additional definition statements and operands you need to code to define characteristics and functions for any SDLC devices attached to your NCP. It covers such areas as:

- The relationship between the NCP and link-attached SDLC devices
- Dynamic reconfiguration
- Backup and recovery
- Performance.

Defining the Relationship between the NCP and Link-Attached SDLC Devices

You must define to the NCP several physical and operational characteristics about the relationship between the NCP and any link-attached SDLC devices. These characteristics are used in addition to those you defined using the definition statements and operands discussed in Chapter 2. The definition statements and operands you need to code to define unique characteristics about the relationship between the NCP and link-attached SDLC devices are discussed below.

Defining Data Links

LINE	HISPEED	(3725 and 3720)
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Use the HISPEED operand of the LINE definition statement only if you are defining your NCP for the 3725 or 3720. Use this operand to specify whether the data link you are defining is a 230.4-kbps or 256-kbps (for X.21 support) link.

SDLC Devices

Defining Switched Data Links

LUDRPOOL	NUMTYP1, NUMTYP2
GROUP	X21SW, RETRYTO
LINE	AUTODL

Use the NUMTYP1 and NUMTYP2 operands of the LUDRPOOL definition statement to specify the number of logical unit control blocks (LUBs) to be included in the logical unit pool for SDLC PU type-1 and type-2 devices attached to switched data links. Upon establishing a connection with a switched PU type-1 or type-2 device, the NCP allocates a LUB from this pool for each LU associated with the device. These LUBs represent the LU for the duration of the session between the device and the access method. When the session ends, the NCP returns the LUBs to the LU pool for reuse in other sessions. Use the NUMTYP1 operand to specify the number of LUBs to be included in the LU pool for PU type-1 devices. Use the NUMTYP2 operand to specify the number of LUBs to be included in the LU pool for PU type-2 devices.

Use the X21SW and RETRYTO operands of the GROUP definition statement if hardware conforming to CCITT X.21 is attached to each data link in the group you are defining.

Use the X21SW operand to specify that the hardware conforming to CCITT X.21 is installed.

Use the RETRYTO operand to specify an amount of time that you want the NCP to wait after receiving a retry call-progress-signal before retrying a callout operation.

Use the AUTODL operand of the LINE definition statement only if hardware conforming to CCITT X.21 is attached to the data link you are defining. Use this operand to specify whether the hardware accepts dial digits. If it does, the NCP will carry out normal callout procedures for this data link. If it does not, but you have the direct-call feature also installed, the NCP can connect to a link-attached device without transmitting dial digits.

Defining Switched Data Links to VTAM

LINE	ANSWER
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Use the ANSWER operand of the LINE definition statement if the data link you are defining can be owned by VTAM. See the appropriate *VTAM Installation* manual for a description of this operand.

Defining Modems

LINE	NRZI, NEWSYNC, LPDATS, CHNLZ, CORNUM, CHANLA, CLINES, CALINE, TAILING,
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Use the NRZI operand of the LINE definition statement to specify whether the data terminal equipment at the ends of the SDLC data link you are defining must operate in non-return-to-zero change-on-ones (NRZI) mode or in non-return-to-zero (NRZ) mode. The NCP transmits data over an SDLC data link in either an NRZI or NRZ format. The choice is determined by the type of modems serving the line. The modems at each end of the link must maintain synchronism with each other for the complete duration of message transmission. Some modems require bit transitions (0 to 1 or 1 to 0) at intervals in the data stream to maintain synchronism. Such modems are said to be sensitive to transitionless bit streams. When operating in NRZI mode, the data terminal equipment at the ends of the link manipulate the bit stream transferred to the modems in such a way that transitions are introduced into the bit stream even when the message data being transmitted is transitionless. Such binary sequences are likely to occur in messages containing storage dump data or IPL data being sent to programmable controllers or terminals. The transitions thus introduced ensure that the modems remain synchronized. The terminal equipment that receives the altered bit stream reconverts it to its original form.

In NRZI mode, sequences of zeros (000000...) are converted to alternating ones and zeros (101010...), thus satisfying those modems that are sensitive to transitionless bit streams. Certain other modems, however, are sensitive to just this alternating pattern (101010...), rather than to transitionless bit streams. They will lose synchronism if subjected to 101010 patterns of sufficient length. If external (modem) clocking is used for the data link and the modems are sensitive to repeated binary 10 patterns (10101010...), NRZ mode is required. Consult the supplier or installer of your modems to determine whether the modems are sensitive to repeated 101010 bit patterns.

Note: All devices on the same SDLC data link must use the same encoding scheme. Mixing of modes on the same SDLC data link prevents any communication between the devices on the link.

Use the NEWSYNC operand of the LINE definition statement to specify whether the communication controller supplies the new-sync signal to the modem attached to the controller for the data link you are defining. Certain types of synchronous modems are equipped with the new-sync feature. This feature reduces the amount of line-turnaround time usually expended each time the direction of transmission on the data link is reversed. You can specify that the NCP supply the new-sync signal only if (1) the modem can respond to the new-sync signal, (2) the data link is a duplex data link, and (3) more than one secondary modem is attached to the data link. Consult the supplier or installer of your modems for further information about the new-sync signal.

Note: If only one device is attached to the data link you are defining, you must specify that the controller does not send the new-sync signal.

Use the LPDATS operand of the LINE definition statement to specify whether the data link you are defining is attached to synchronous, externally clocked modems that accept and provide responses to Link Problem Determination Aid (LPDA) commands. Use this operand to specify also the types of modems.

For NCP Version 3 and NCP Version 4 Release 1 you can specify the following IBM modems that accept and provide responses to LPDA commands:

3833	3865
3834	3868 modems with
3863	appropriate
3864	configuration switches
	set

For NCP Version 4 Release 2 only : In addition to the previously mentioned modems, for NCP V4R2, you also can specify¹ the following IBM modems that accept and provide responses to LPDA commands:

5865
5866
5868

Other types of modems can operate in combination with the IBM 3867 Link Diagnostic Unit to accept and provide responses to LPDA commands. For information about running Link Problem Determination Aids (LPDA) tests for a PU on a line, see "Defining Diagnostic Aids" on page 3-18.

¹ Specifying modems using NCP Version 4 Release 2 is different from previous releases of the NCP. For information on how to specify modems using NCP Version 4 Release 2, see the description of the LPDATS operand on the LINE definition statement in the *NCP and SSP Resource Definition Reference*.

When you are specifying that a line uses modems that support Link Problem Determination Aids (LPDA) commands, be aware that, when an LPDA test is running on that line, the remote device(s)² are not polled. Therefore, ensure that remote device timeouts—the time a device waits to be polled before going offline—are large enough to allow for the LPDA test(s) to be run. Note that with a multipoint configuration, it is possible for LPDA tests to be run on two or more successive devices, during which time none of the other remote devices are polled. Therefore, with multipoint configurations, larger device timeout values may be required than with point-to-point configurations.

Specifically, for point-to-point configurations, device timeout values should be greater than 20 seconds for LPDA1 lines and 30 seconds for LPDA2 (NCP V4R2 only) lines. This prevents the possibility of device outages—the device is not repolled within the required time interval—due to the execution of an LPDA test.

For multipoint lines, in rare cases, a succession of tests on consecutive devices can lead to device outages unless larger device timeouts are used. To ensure that no outages occur because of LPDA tests on multipoint lines, use the following guideline for choosing timeout values:

For LPDA1: Use device timeout values of at least $20 \times n^*$ seconds.

For LPDA2: Use device timeout values of at least $30 \times n^*$ seconds.

Do not construe these timeout values to be the amount of time it normally takes to perform an LPDA test. These timeout values are related to the rare situations in which no response is received to a modem test. When the LPDA test returns a response, the test duration time is much shorter.

586X modems can be defined to operate in one of two modes: migration or normal. *Migration* mode utilizes the LPDA capabilities of a 38XX modem and, for NCP V4R2, is referred to as LPDA1. *Normal* mode utilizes the LPDA capabilities of a 586X modem and, for NCP V4R2, is referred to as LPDA2.

Use the CHNLZ³, CORNUM³, CHANLA³, CLINES³, CALINE³, and TAILING operands of the LINE definition statement if the data link you are defining is attached to an IBM 3865 Modem with the Data Multiplexer feature (sometimes called a channelized modem).

Use the CHNLZ operand to specify that the data link you are defining is attached to an IBM 3865 Modem with the Data Multiplexer feature.

Use the CORNUM operand to specify a correlation number for the data link you are defining. This correlation number must be specified in the

² Can be more than one device if you are specifying a multipoint line.

^{*} Where n is the number of remote devices on the multipoint line.

³ CHANLA, CLINES, CHNLZ, CORNUM, and CALINE do not apply to 586X modems.

CORNUM operand of the LINE definition statement for each data link that is attached to the same IBM 3865 Modem.

Use the CHANLA operand to specify whether the data link you are defining is attached to channel A on the IBM 3865 Modem. Channel A is the LPDA control channel.

Use the CLINES operand if the data link you are defining is attached to channel A. Use this operand to specify the names of the other data links attached to the same IBM 3865 Modem that the data link you are defining is attached to. These other data links can be attached to channel B, C, or D.

Use the CALINE operand if the data link you are defining is attached to channel B, C, or D. Use this operand to specify the name of the data link attached to channel A of the same IBM 3865 Modem that the data link you are defining is attached to.

Use the TAILING operand to specify whether a second-level LPDA circuit is attached to the data link you are defining.

While defining data links attached to a channelized or tailed modem, keep the following restrictions and considerations in mind:

Note: These restrictions apply only to 38XX and 586X modems with LPDA1 support specified (that is, LPDATS= YES for NCP V3 and V4R1, or LPDATS= LPDA1 for NCP V4R2).

- You must not specify LPDA1 support in the LPDATS operand for a channelized data link if the modems on that data link do not have the Data Multiplexer feature. Likewise, you must not specify LPDA1 support for a tailed data link if the modems on that data link do not have the Tail Circuit Attachment.
- If you specify LPDA1 support in the LPDATS operand and YES in the CHNLZ operand of a LINE definition statement, you also must specify YES in either the CHANLA or TAILING operands of that LINE definition statement. Note that you cannot specify YES in both the CHANLA and TAILING operands of the same LINE definition statement.
- If you specify YES in the CHNLZ operand for a given channelized modem, you must also specify YES in the CHANLA operand of the LINE definition statement that defines the data link attached to channel A on the modem. Only one CHANLA operand can specify YES for a given modem.
- Data links are defined as being attached to the same modem by having the same correlation number specified in the CORNUM operands of the LINE definition statements that define those data links. The maximum number of data links that can have the same correlation number specified in the CORNUM operand is four. In other words, no more than four data links can be attached to a given channelized modem.

- The number of data links that can be attached to the same channelized modem is limited by the speeds of the links. The speeds of the links also determine which channels the links must be attached to and which position the options switch on the front of the modem must be set to. A single channelized modem can accommodate only one of the following combinations:
 - One 9600-bps link attached to channel A, with the options switch set to 1
 - Two 4800-bps links attached to channels A and B, with the options switch set to 2
 - One 4800-bps link attached to channel A and two 2400-bps links attached to channels B and C, with the options switch set to 3
 - Four 2400-bps links attached to channels A, B, C, and D, with the options switch set to 4.
- Only SDLC data links or only BSC data links can be attached to a given channelized modem. No mixing of protocols is allowed.

The following restriction applies to LPDA1 and LPDA2 (that is, LPDATS=YES for NCP V3 and V4R1, or LPDATS=LPDA1 or LPDATS=LPDA2 for NCP V4R2) :

- If you specify in the TAILING operand that a second-level LPDA circuit is attached to the data link you are defining, ensure that no SDLC device attached to that link uses X'FD' or X'FF' as its station address, and that no BSC device attached to that link uses X'FD' or X'FF' as the first character of its polling or addressing sequence.

The following examples show how you code the LINE definition statements to define the data links attached to the modems in Figure 3-1 on page 3-9 and Figure 3-2 on page 3-10. In the first example, LINK4 is attached to a second-level LPDA circuit. In the second example, LINK2 is attached to a second-level LPDA circuit.

For these examples, the definition statements are not shown in standard assembler language format. For example, continuation characters have been omitted, and definition statements and operands do not start in columns 10 and 16 respectively. When you code your NCP source program, however, you must be sure that it conforms to standard assembler language format.

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LPDATS Example for NCP V3 or V4R1

```
LINK1      LINE      SPEED=2400 ,
            LINE      LPDATS=(YES,3865) ,
            LINE      CHNLZ=YES ,
            LINE      CORNUM=24 ,
            LINE      CHANLA=YES ,
            LINE      CLINES=(LINK2,LINK3,LINK4) ,
            LINE      .
            LINE      .
            LINE      .

LINK2      LINE      SPEED=2400 ,
            LINE      LPDATS=NO ,
            LINE      CHNLZ=YES ,
            LINE      CORNUM=24 ,
            LINE      CHANLA=NO ,
            LINE      CALINE=LINK1 ,
            LINE      .
            LINE      .
            LINE      .

LINK3      LINE      SPEED=2400 ,
            LINE      LPDATS=NO ,
            LINE      CHNLZ=YES ,
            LINE      CORNUM=24 ,
            LINE      CHANLA=NO ,
            LINE      CALINE=LINK1 ,
            LINE      .
            LINE      .
            LINE      .

LINK4      LINE      SPEED=2400 ,
            LINE      LPDATS=(YES,3865) ,
            LINE      CHNLZ=YES ,
            LINE      TAILING=YES ,
            LINE      CORNUM=24 ,
            LINE      CHANLA=NO ,
            LINE      CALINE=LINK1 ,
            LINE      .
            LINE      .
            LINE      .
```

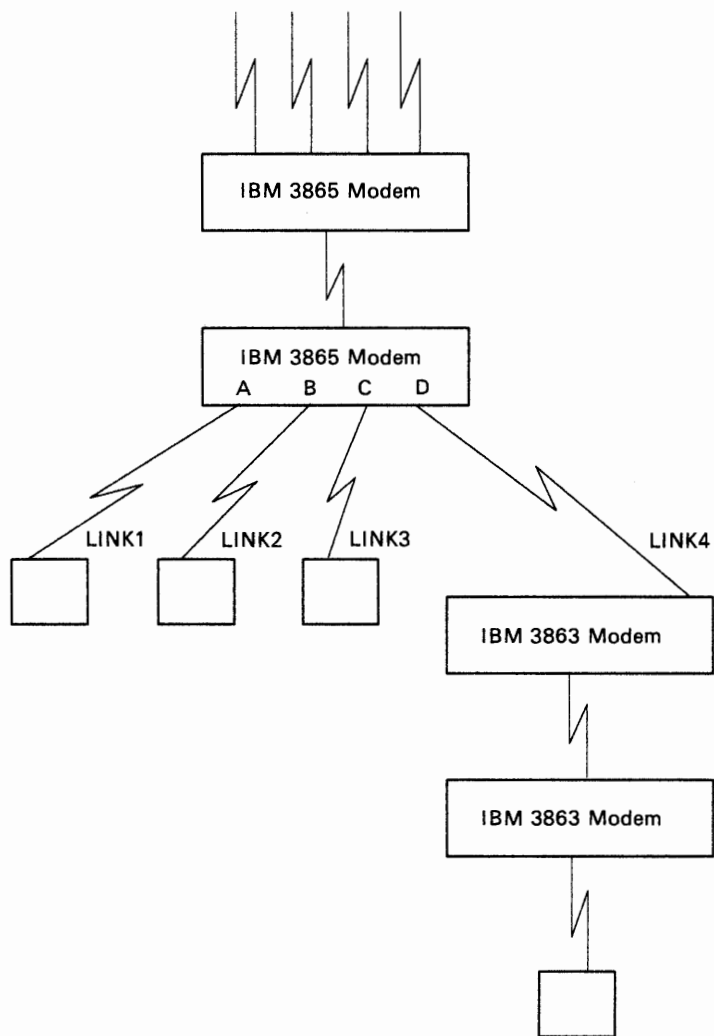


Figure 3-1. 38XX Channelized and Tailed Modems on SDLC Data Links

SDLC Devices

LPDATS Example for NCP V4R2

```
LINK1  LINE      SPEED=9600,  
          LPDATS=LPDA2,  
          TAILING=NO,  
          .  
          .  
LINK2  LINE      SPEED=9600,  
          LPDATS=LPDA1,  
          TAILING=YES,  
          .  
          .
```

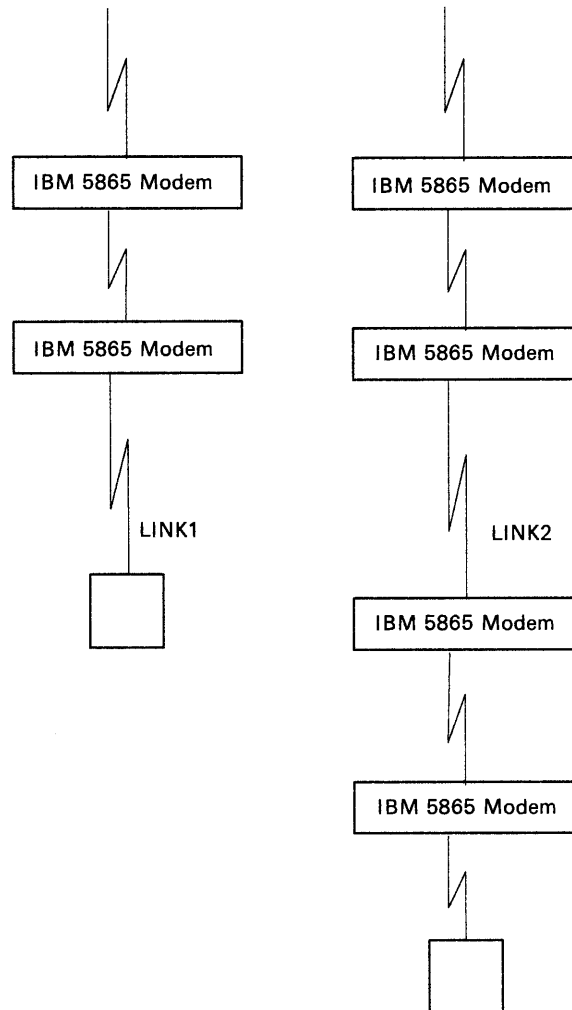


Figure 3-2. 586X Non-Tailed and Tailed Modems on SDLC Data Links

Defining Devices

PU	PUTYPE, BNNSUP
----	-------------------

Use the PUTYPE operand of the PU definition statement to specify the physical unit type of the SDLC device you are defining. See the *SNA Reference Summary* handbook for a cross-reference listing of device types to PU types if you are not sure what PU type your device is. See also the manuals describing the particular device. If you are defining an NCP that is connected to another NCP, use this operand to specify the existence of a link station in an adjacent communication controller. See “Defining Connections between NCPs” on page 2-32 and “Defining Link Stations” on page 2-36 for information on link stations.

Use the BNNSUP operand of the PU definition statement if the SDLC device you are defining is a PU type-1 IBM 3270 Information Display System device attached to a nonswitched SDLC data link. Use this operand to specify that the device is a PU type-1 3270 device.

Defining Devices Attached to a Switched Data Link

LUPOOL	NUMBER
--------	--------

Use the NUMBER operand of the LUPOOL definition statement only if the NCP is to communicate with logical units associated with a type 1 and type 2 physical unit attached to a switched SDLC link. Use the NUMBER operand of the LUPOOL definition statement to specify the number of logical unit control blocks (LUBs) to be included in the LUB pool. The NCP uses these LUBs when communicating with logical units associated with a type 1 and type 2 physical unit attached to a switched SDLC link.

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Defining Devices to VTAM

LUPOOL	OWNER
PU	DISCNT, DLOGMOD, ENCR, FEATUR2, ISTATUS, LOGAPPL, LOGTAB, MODETAB, SPAN, SSCPFM, TERM, USSTAB, VPACING
LU	DLOGMOD, ENCR, FEATUR2, ISTATUS, LOGAPPL, LOGTAB, MODETAB, SPAN, SSCPFM, TERM, USSTAB, VPACING

Use the above operands of the LUPOOL, PU, and LU definition statements if the SDLC device you are defining can be owned by VTAM. See the appropriate *VTAM Installation* manual for a description of these operands.

Defining Polling Specifications

GROUP	RNRLIMIT
LINE	HDXSP
PU	AVGPB

Use the RNRLIMIT operand of the GROUP definition statement to specify the interval that the NCP will allow a given station to refuse to accept data before identifying the station inoperative. For example, a station will be considered inoperative if it responds with a Receive-Not-Ready (RNR) command to every poll sent by the NCP during the specified interval. RNRLIMIT is not valid if you specify the LEVEL2 operand or LNCTL=USER.

Use the HDXSP operand of the LINE definition statement if the data link you are defining transfers data in half-duplex mode, as specified on the ADDRESS operand of the LINE definition statement, and has more than one active SDLC device attached. Use this operand to specify whether you want the NCP to send data to a device as soon as possible after data is available. Otherwise, the NCP will wait until that device is to be serviced as determined by the service order table.

Use AVGPB to control the use of buffers when NCP buffer space is limited and to control the number of buffers that are allocated at one time.

The NCP maintains a count of the number of buffers which are likely to be required to complete operations that are in progress. Before a device is polled, a request must be made to add buffers to the count. When the requested buffers have been filled, the NCP makes a new request. If the sum of this count and the number of buffers that has actually been allocated becomes too large, the NCP limits the start of new operations and queues new requests. The NCP stops polling and sends Receive-Not-Ready commands as requests fail.

The size of a request to add buffers to the count is determined by AVGPB. If the request is made because the last buffer request has been exhausted, the size will be for the number of buffers required to hold the number of bytes specified in AVGPB. If the request is made *before* a poll, the size will be for the number of buffers used to hold the PIUs received in response to the last poll as long as that number falls between one and the number of buffers required to hold AVGPB bytes. If no data was received, one buffer will be used. If more than AVGPB bytes was received, the number of buffers required to hold AVGPB bytes is used.

The size of a request also has an effect on the number of buffers that will be allocated to the device at one time. If the size is smaller than the value that was coded for the TRANSFR operand in the LINE or BUILD definition statements, all of the buffers will be allocated at one time. If buffer space is not a limited resource, the performance of the NCP usually will be improved by allocating more buffers at one time.

The size of a request has two significant effects on the performance of the NCP:

- Controlling the allocation of buffers when unused NCP buffer space is limited.
 - When unused NCP buffer space is limited, performance of the NCP may be improved if the value coded for AVGPB is as large as the size of the biggest PIUs that NCP will receive from a device.
- Controlling how much of NCP's buffer space is allocated to a device at one time.
 - The allocation will be determined by the value coded for AVGPB unless this value is greater than the space occupied by the number of buffers coded for TRANSFR on the LINE or BUILD definition statements. If this device is connected to the NCP by a high-speed

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INN line, and if buffer space is not a limiting resource to the NCP, the NCP will perform better if the value coded for AVGPB is as large as the space held by the number of buffers coded on the TRANSFR operand.

Defining Device and Logical Unit Addresses

PU	ADDR
LU	LOCADDR

Use the ADDR operand of the PU definition statement if the SDLC device you are defining is not a PU type-4 device and is attached to a nonswitched data link. Use this operand to specify the address of the device. This address is a hexadecimal representation of the 8-bit address of the device.

Use the LOCADDR operand of the LU definition statement to specify the address of a logical unit associated with the SDLC device you are defining. This address is a decimal representation of the LU's address.

Defining Dynamic Reconfiguration

Dynamic reconfiguration is a function that allows you to add and delete SDLC PU type-1 and type-2 devices and logical units (LUs) to and from a nonswitched SDLC data link connected to your NCP without having to regenerate the NCP. It does not allow you to add data links or to add and delete BSC and SS devices or programmed resources.

The NCP definition statements and operands that you need to code to include the dynamic reconfiguration function in your NCP, and to define the specifications for adding and deleting SDLC devices and LUs, are discussed below.

ADD	TO
DELETE	FROM

To dynamically reconfigure the NCP, you must define a dynamic reconfiguration data set (DRDS) consisting of ADD statements, DELETE statements, or both, and their associated PU and LU definition statements.

The ADD statement adds a PU to an existing link or an LU to a PU. Use the TO operand associated with the ADD statement to specify the name of the link or PU defined in the NCP generation that the new device will be added to.

The **DELETE** statement deletes a PU or LU from an existing link or PU. Use the **FROM** operand associated with the **DELETE** statement to specify the name of the link or PU that the device will be deleted from. If a PU is deleted from a link, all LUs associated with that PU are also deleted.

Use the reconfiguration information in the DRDS to modify NCP control blocks so that they will reflect the changed configuration. Each time you change the NCP configuration, you must define a new DRDS that contains only the current modifications. For example, do not add and delete the same PU or LU to the network in one DRDS. If you want to delete a device that was added through dynamic reconfiguration, define a new DRDS to delete it; do not put the **DELETE** statement in the same DRDS as the **ADD** statement.

If an **ADD** or **DELETE** statement specifies a link in the **TO** or **FROM** operand, it must be followed by a PU definition statement. The PU definition statement may then be followed by one or more LU definition statements.

If the **ADD** or **DELETE** statement specifies a PU in the **TO** or **FROM** operand, it must be followed by one or more LU definition statements.

For example, if you wanted to move PU6 and its associated LUs (LU1 and LU2) from LINE6 to LINE7, you would place the following statements in the DRDS:

```

name      DELETE   FROM=LINE6
PU6       PU       operands(optional)
name      ADD      TO=LINE7
PU6       PU       operands
LU1       LU       operands
LU2       LU       operands

```

As another example, if you wanted to move only one LU (LU1) from PU3 to PU4, the DRDS would contain:

```

name      DELETE   FROM=PU3
LU1       LU       operands(optional)
name      ADD      TO=PU4
LU1       LU       operands

```

Note: The **name** on the **ADD** and **DELETE** statement is optional.

When deleting a PU or LU from the configuration, you need to code only the symbol on the respective PU and LU definition statements. If you code any operands, they will be ignored.

For more information on defining and using the DRDS with TCAM, see the appropriate *TCAM Base Installation Guide*, or for more information on defining and using the DRDS with VTAM, see the appropriate *VTAM Installation* manual.

Defining the Addition and Deletion of Devices to and from a Data Link

PUDRPOOL	NUMBER, MAXLU
LINE	MAXPU
SERVICE	MAXLIST
PU	PUDR

Use the NUMBER operand of the PUDRPOOL definition statement to specify the number of PUs to be included in the physical unit pool. This physical unit pool contains empty physical unit control blocks that are used for new SDLC devices when they are added to data links connected to your NCP. Ensure that the value you specify for this operand represents the number of devices you expect to add to data links connected to your NCP at a later date.

Use the MAXLU operand of the PUDRPOOL definition statement to specify the maximum number of LUs that can be added to any SDLC device included in the PU pool.

Use the MAXPU operand of the LINE definition statement to specify the maximum number of SDLC devices that can be attached to the data link you are defining. Ensure that the value you specify here represents the number of actual SDLC devices that are attached to the link plus the number of devices you expect to add to the link at a later date.

Use the MAXLIST operand of the SERVICE definition statement to specify the maximum number of entries in the service order table for the data link you are defining. Ensure that the value you specify here represents the number of actual SDLC devices attached to the data link plus the number of SDLC devices you expect to add to the link at a later date.

Use the PUDR operand of the PU definition statement if the SDLC device you are defining is not a PU type-4 device and is attached to a nonswitched data link. Use this operand to specify whether you want the device you are defining to be able to be deleted from the data link connecting it to your NCP at a later date. If you specify that you do want it to be able to be deleted, address pointers for the quantity you specify in the MAXLU operand of the PUDRPOOL definition statement will be generated.

Defining the Addition and Deletion of LUs to and from a Device

LUDRPOOL	NUMTYP1, NUMTYP2
PU	MAXLU
LU	LUDR

Use the NUMTYP1 and NUMTYP2 operands of the LUDRPOOL definition statement to specify the number of LUs to be included in the logical unit pools. These logical unit pools contain empty logical unit control blocks (LUBs) that are used for new LUs when they are added to SDLC devices attached to your NCP. Use the NUMTYP1 operand to specify the number of LUBs to be included in the LU pool for PU type-1 devices. Use the NUMTYP2 operand to specify the number of LUBs to be included in the LU pool for PU type-2 devices. Ensure that the values you specify for these operands represent the number of LUs you expect to add to PU type-1 and type-2 devices at a later date.

Use the MAXLU operand of the PU definition statement to specify the maximum number of LUs that can be associated with the SDLC device you are defining. Ensure that the value you specify here represents the actual number of LUs that are associated with the device plus the number of LUs you expect to add to the device at a later date.

Use the LUDR operand of the LU definition statement to specify whether you want the LU you are defining to be able to be deleted from its associated device at a later date.

Defining Addresses for Deleted and Reused Devices and LUs

BUILD	RESOEXT
-------	---------

Use the RESOEXT operand of the BUILD definition statement to specify the number of network addresses to be included in the resource vector table (RVT) extension. When an SDLC device or LU is deleted from your NCP, its address is returned to its respective pool and becomes available for reuse. However, in order for its address to be reused, the address you originally defined for the device or LU must be replaced with an address from the RVT extension. Ensure that the value you specify for this operand represents the number of SDLC devices and LUs attached to your NCP that you want to be able to be deleted and reused. If the RVT extension is depleted, generation-defined resources can still be deleted but not reused. However, unlike the addresses defined during the NCP generation, the addresses in the RVT extension can be reused after they have been deleted.

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Defining Dynamic Reconfiguration for SDLC PU Type-1 3270 Devices

BUILD	DR3270
-------	--------

Use the DR3270 operand of the BUILD definition statement to specify whether you want SDLC PU type-1 IBM 3270 Information Display System devices to be able to be added to data links connected to your NCP at a later date.

Defining Diagnostic Aids

PU	LPDA	(3725 and 3720)
----	------	-----------------

Use the LPDA operand of the PU definition statement only if you are defining an NCP Version 4 for the IBM 3725 or 3720 Communication Controller. Use this operand to specify whether you want Link Problem Determination Aids (LPDA) tests to be run for a PU on a line. LPDA is a set of test commands performed by any of the following devices:

- IBM 3833, 3834, 3863, 3864, 3865, or 3868 modems
- IBM 5865, 5866, or 5868 modems
- IBM 3867 Link Diagnostic Unit.

This set of test commands is used to determine which of various network components may be causing an error in the network.

Defining Backup and Recovery Procedures

Several facilities provide protection for the SDLC devices attached to your NCP if any of the other network resources fail. The definition statements and operands you need to code to define the relationship of the NCP to these facilities are discussed below.

Defining Automatic Network Shutdown

PU	ANS
----	-----

Use the ANS operand of the PU definition statement to specify whether you want the SDLC device you are defining to continue operating or to stop if your NCP enters automatic network shutdown mode for the access method that started the device. Automatic network shutdown (ANS) is a procedure that occurs for those devices started by a particular access method when the NCP can no longer communicate with that access method.

Warning: If you have specified ANS = CONT for a device on a switched link, the NCP does not automatically deactivate the link even if no sessions are active. You *must* use forced deactivation to disable the link. Any attempts to reactivate the link without first using forced deactivation results in a negative response because the link is still active. Also notice that because the link is not deactivated automatically by the NCP—and thus can stay active for an indefinite period of time—increased switched-link connection costs are likely to occur.

ANS can have the following results for SDLC data links:

- The NCP will dissociate a data link from the owning access method with which communication has been lost.
- The NCP will cancel any line traces or online tests that are being carried out on the data link for the access method with which communication has been lost.

ANS can have the following results for SDLC devices:

- If the device you are defining is attached to a nonswitched data link and you specify that it is to continue operating in a cross-domain session, the NCP, although it is in shutdown mode with respect to the activating access method with which it can no longer communicate, will continue to service the device. The device can then continue participating in sessions with access methods not affected by the shutdown.
- If the device you are defining is attached to a nonswitched data link and you specify that it is to stop operating, the NCP will deactivate the link.
- If the device you are defining is attached to a switched data link with user line control that is to continue operating, the NCP **does not** deactivate the link. (Note that ANS = CONT is only valid for switched data links if user line control is specified.) Because the NCP does not

automatically disconnect the switched line defined with ANS = CONT, ensure that you define switched user-line-control lines with ANS = CONT only under the following conditions:

- If you want permanent connectivity of the link.
- If the link is to have logical units associated with it that will be participating in cross-domain sessions. You need to be aware of this condition because the applications in an owning host are lost when connectivity to this host is lost.
- If the device you are defining is another communication controller, the NCP will continue to communicate with it.

Defining Error Recovery and Recording

LINE	ETRATIO
PU	RETRIES, IRETRY, SRT

Use the ETRATIO operand of the LINE definition statement to specify the error-to-transmission ratio for the data link you are defining. This ratio is used by programs that analyze statistical maintenance records; for example, the IBM NetView program.

Use the RETRIES operand of the PU definition statement to specify the number of attempts you want the NCP to make to recover from errors occurring during transmission to or from the SDLC device you are defining. Code this operand along with the RETRIES operand of the LINE definition statement.

Use the IRETRY operand of the PU definition statement to specify whether the NCP will repoll a given secondary station before advancing to the next station in the service order table. If the primary station detects an error during a poll cycle, and you have specified that you want the NCP to repoll a secondary station, it does so before advancing to the next station in the service order table. While errors persist, the NCP continues to poll a given station up to *m* times, where the number of repolls is determined by the *m* parameter of the RETRIES operand of the LINE definition statement.

Use the SRT operand of the PU definition statement to specify a threshold value for the total number of transmissions (including polling) and a threshold value for the total number of error retries related to the SDLC device you are defining. If either of these thresholds is reached, the NCP generates a Record Maintenance Statistics (RECMS) RU to inform the access method of this condition. The RECMS RU data is stored in the operating system error records data base. The RU may also be used by an application program that collects Communication Network Management

(CNM) data from the network. This application program, of which NetView is an example, can then organize the data for presentation to network problem determination operators. The value of this data is greatly increased if the modems used on the data link have the LPDA capability. Besides recording the ratio of retransmissions caused by errors to the total traffic, which is normally provided by the RECMS RU data, LPDA reports add information on the quality of the data link as a transmission medium.

Defining Backup Sessions

BUILD	BACKUP
-------	--------

Use the BACKUP operand of the BUILD definition statement to define the total number of logical units (LUs) that will use the Extended Recovery Facility (XRF). Be careful in specifying the BACKUP operand because you can use up excess storage with too large a number.

XRF provides the capability for a second host subsystem to take over LU to LU sessions in the event of a failure of the active subsystem. The takeover is accomplished with minimal disruption to the end user's session.

Defining Performance Characteristics

Several operational characteristics about the relationship of the NCP to the SDLC devices attached to it, depending on how you define them, affect the performance of your network. These characteristics and the definition statements and operands you need to code to define them are discussed below. In most cases, it is difficult to determine how your network will perform until all the resources are installed and fully operational. Therefore, the values you specify in the operands discussed in this topic may need to be changed after you have a chance to observe how efficiently your network is operating.

Defining Pacing

LU	PACING
----	--------

Use the PACING operand to specify whether you want the NCP to pace the data it sends to the LU you are defining. Pacing allows the NCP to require

SDLC Devices

the LU to acknowledge, at intervals, receipt of the data sent to it by the NCP and the LU's ability to accept more data. Use the PACING operand to specify the number of requests you want the NCP to send to the LU before stopping transmission to await a pacing response from that LU and to specify in which request the NCP is to turn on the pacing bit. Consider the following points when choosing a value for the PACING operand:

- If you do not want to have pacing controlled by session parameters, as defined by LU session-initiation procedures and access method tables, you must specify zero in the BIND command and use the PACING operand to specify the required pacing value. The default value might, of course, be suitable in this case. Note that if you specify a non-zero value in the BIND command, that value will override the value you specify in the PACING operand.
- If you do want to have pacing controlled by session parameters, specify zero as the value of the PACING operand. Specifying zero in the PACING operand allows the selection of zeros as the pacing values in the session parameters, if this is required for any particular session.

Note: Restrictions might be placed on the value you choose for this operand, depending on the types of SDLC devices you have attached to your NCP. See the appropriate programming publications for the types of devices attached to your NCP for such restrictions.

Defining Data Transfer Specifications

PU	DATMODE, MAXDATA, PASSLIM, MAXOUT
----	--

Use the DATMODE operand of the PU definition statement if the SDLC device you are defining is attached to a nonswitched data link that is defined in the ADDRESS operand of the LINE definition statement as transferring data in duplex mode. Use the DATMODE operand of the PU definition statement to specify whether the NCP is to communicate with the device in half-duplex or duplex mode. Specify duplex if the device can send and receive data at the same time on a full-duplex data link. Otherwise, specify half-duplex if the device can only send or receive at any one time. Note that although devices attached to a duplex data link may only be capable of half-duplex data transfer, the NCP could be sending to one device over the data link while at the same time receiving from another. If separate transmitting and receiving paths are available, an NCP in a channel-attached controller will operate the subarea link to an adjacent NCP in duplex data mode, unless you specify half-duplex mode in the DATMODE operand of the PU definition statement representing the link-attached NCP.

Use the MAXDATA operand of the PU definition statement if the SDLC device you are defining is a PU type-1 or type-2 device attached to a nonswitched data link. Use this operand to specify the maximum amount of data that the device you are defining can receive in one data transfer; that is, in one PIU or PIU segment (including the transmission header and request/response header). See the manuals for the specific device you are defining to determine the amount of data it can receive. The value you specify for the MAXDATA operand divided by the value you specify for the BFRS operand of the BUILD definition statement determines the number of NCP buffers whose contents are sent in one data transfer to the device you are defining. The maximum amount of user data the NCP can send to the device you are defining is the value you specify for the MAXDATA operand minus 5 bytes (for a PU type-1 device) or minus 9 bytes (for a PU type-2 device). For a PU type-1 device, these 5 bytes represent the sum of the lengths of the transmission header (2 bytes) and the request/response header (3 bytes). For a PU type-2 device, these 9 bytes represent the sum of the lengths of the transmission header (6 bytes) and the request/response header (3 bytes).

Note: Restrictions might be placed on the value you choose for this operand, depending on the types of SDLC devices you have attached to your NCP. See the appropriate programming publications for the types of devices attached to your NCP for such restrictions.

Use the PASSLIM operand of the PU definition statement if the SDLC device you are defining is attached to a nonswitched data link. Use this operand to specify the maximum number of consecutive PIUs you want the NCP to send at one time to the device you are defining. When the value you specify in this operand is reached, the NCP will service the next entry in the service order table.

If you are defining your NCP for the 3725 or 3720, use the MAXOUT operand of the PU definition statement for a PU type 1 or PU type 2 to specify the maximum number of frames you want the NCP to send to the SDLC device you are defining before an SDLC response from the device is required. Use this operand also for a PU type 4 to specify the maximum number of frames you want the NCP to receive from the SDLC device before an SDLC response is required.

If you are defining your NCP for the 3705, use the MAXOUT operand to specify the maximum number of PIUs or PIU segments you want the NCP to send to the SDLC device you are defining before requesting an SDLC response from the device.

The higher the value you specify in the MAXOUT operand, the greater the utilization of the data link to which the device is attached. However, the maximum-outstanding value also results in more PIU retransmissions if an error occurs. Thus, for links on which high error rates are experienced, you may wish to select a maximum-outstanding value lower than that used for links having low error rates.

Note: Restrictions might be placed on the value you choose for this operand, depending on the types of SDLC devices you have attached to your NCP and, if you are defining your NCP for the 3725 or 3720, on the

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modulus (modulo 8 or modulo 128) selected for the link. See the appropriate programming publications for the types of devices attached to your NCP for such restrictions.

Defining Processing Priority for LUs

LU	BATCH
----	-------

Use the BATCH operand of the LU definition statement to specify whether you want the NCP to use a high or low processing priority for the LU you are defining. Most interactive applications require high processing priorities. Batch applications, on the other hand, require low priorities.

Defining the Network Performance Analyzer

PU	NPACOLL
LU	NPACOLL

Use the NPACOLL operand of the PU definition statement to specify whether you want data sent to and from the SDLC device, which you are defining, to be eligible for collection by NPA. If you specify that you want data to be eligible for collection for this device, you must also specify that data is to be eligible for collection for the data link that the device is attached to. If you specify that you do not want data to be eligible for collection for this device, then no data can be collected from any LUs associated with the device.

Use the NPACOLL operand of the LU definition statement to specify whether you want the data that is transmitted and received by the LU, which you are defining, to be eligible for collection by NPA. If you specify that you want data to be eligible for collection for this LU, you must also specify that data is to be eligible for collection for the SDLC device that this LU is associated with, and for the data link that the device is attached to.

Defining Customized Functions

If you are including special device support and functions in your NCP through user-written code, you must define to the NCP several physical and operational characteristics about this code. These characteristics and the definition statement and operand you need to code to define them are discussed below. See the *NCP and SSP Customization* manual for information on writing and including user-written code in the NCP.

Defining the Entry Point for User-Written Box Error Records Routine

GROUP	BERPROC	(3725 and 3720)
-------	---------	-----------------

Use the BERPROC operand of the GROUP definition statement only if you are defining your NCP for the 3725 or 3720. Use this operand if the SDLC device you are defining is attached to a non-switched data link. This operand is required if you specify CHANLNK=yes. Use this operand to specify the entry point of the user-written routine that handles the building of Box Error Records (BERs) for line errors in user-controlled lines.

Chapter 4. Defining Characteristics and Functions for BSC Devices

This chapter helps you determine additional definition statements and operands you need to code to define characteristics and functions for any BSC devices attached to your NCP. It covers such areas as:

- The relationship between the NCP and link-attached BSC devices
- Backup and recovery
- Performance
- Block handlers
- BSC devices that can operate in emulation mode.

Defining the Relationship between the NCP and Link-Attached BSC Devices

You must define to the NCP many physical and operational characteristics about the relationship between the NCP and any link-attached BSC devices. These characteristics are used in addition to those you defined using the definition statements and operands discussed in Chapter 2. The definition statements and operands you need to code to define unique characteristics about the relationship between the NCP and link-attached BSC devices are discussed below.

Defining Data Links

LINE	TYPE, HISPEED	(3725 and 3720)
------	------------------	-----------------

Use the TYPE operand of the LINE definition statement to specify whether the data link you are defining is to operate only in network control mode, only in emulation mode, or alternatively in either network control mode or emulation mode. A data link cannot operate in emulation mode unless you are using the Partitioned Emulation Programming (PEP) extension to include emulation functions in your NCP. In addition, the TYPE operand of the GROUP definition statement that defines the group to which the data link belongs must specify that the link can operate in emulation mode only or alternatively in either network control mode or emulation mode. If you

specify that the data link can operate in network control mode only, you can code all operands discussed in this chapter except for those in “Defining BSC Devices That Can Operate in Emulation Mode” on page 4-33. If you specify that the data link can operate in emulation mode only, you can code those operands discussed in “Defining BSC Devices That Can Operate in Emulation Mode” on page 4-33. You also can code, for emulation mode only, some other definition statements and operands discussed in this chapter. See the *EP Installation, Resource Definition, and Diagnosis* manual, or the *EP/3705 Generation and Utilities Guide and Reference* manual to determine the other definition statements and operands you can code. If you specify that the data link can operate alternatively in either network control mode or emulation mode, you can code all operands discussed in this chapter, including those discussed in “Defining BSC Devices That Can Operate in Emulation Mode” on page 4-33.

Use the HISPEED operand of the LINE definition statement only if you are defining your NCP for the 3725 or 3720. Use this operand to specify whether the data link you are defining is a 230.4-kbps or 256-kbps (for X.21 support) link.

Defining Switched Data Links

DIALSET	LINES, DIALALT, QLIMIT, QLOAD, RESERVE
LINE	DIALSET, MPTALT

Use the LINES operand of the DIALSET definition statement to specify the names of the data links that you want to make up a dial set. A dial set is a group of switched data links from which the NCP selects a link to call a device. It can contain any number of links if they all have similar characteristics. This allows the NCP to use any of these links to call a device of a specific type. The names of the data links you specify in this operand are the names of the LINE definition statements that define those data links.

Use the DIALALT operand of the DIALSET definition statement to specify the name of an alternative dial set. You define an alternative dial set by coding another DIALSET definition statement immediately following the DIALSET macro where you code this DIALALT operand. The alternative dial set must consist of the same type of data links as the primary dial set. The name you specify in this operand is the name of the DIALSET definition statement that defines the alternative dial set.

Use the QLIMIT operand of the DIALSET definition statement to specify the maximum number of requests you want the NCP to allow to collect on

the queue for the dial set you are defining. When this limit is reached, the NCP rejects any further call-out requests it receives. It continues to do this until the number of requests becomes less than the value you specify in this operand. If you specify a queue limit of 0, the NCP rejects any call-out sequence it cannot immediately service.

Use the **QLOAD** operand of the **DIALSET** operand to specify the number of call-out requests you want the NCP to allow to collect on the queue for the dial set you are defining before using a data link from the alternative dial set. The number you specify must not exceed that specified in the **QLIMIT** operand, for then the number of unfulfilled requests could not reach the value that would cause the NCP to use the alternative dial set.

Use the **RESERVE** operand of the **DIALSET** definition statement to specify the number of data links in the dial set that you want to be reserved for incoming calls from devices. This is needed only if all the data links in the dial set are designated as available for both incoming and outgoing calls, and all the links could become occupied with outgoing calls, thus preventing any device from being able to call the NCP.

Use the **DIALSET** operand of the **LINE** definition statement to specify the name of the **DIALSET** definition statement that defines the dial set to which the data link you are defining belongs.

Use the **MPTALT** operand of the **LINE** definition statement if the data link you are defining is a call-out link. Use this operand to specify whether you want this link to be used as an alternative link for communicating with BSC devices usually reached over a nonswitched multipoint link. If failure of the multipoint link prevents the NCP from communicating with a device over that link, the switched network backup facility can be used to reach the station over any data link that you specify can be used as an alternative link.

Defining Switched Network Backup

LINE	DIALALT
------	---------

Use the **DIALALT** operand of the **LINE** definition statement to specify the name of a dial set you want your NCP to use to select an alternative data link to communicate with a device when it is unable to communicate with that device over a regular nonswitched point-to-point or multipoint link. Upon request from the access method, the NCP calls the device over a link included in the dial set you specify in this operand. The data links in the dial set you specify must have the same characteristics as the nonswitched link. In addition, you must specify in the **OPTIONS** operand of the **SYSCNTRL** definition statement that you want the switched network backup facility included for your NCP.

Defining Modems

LINE	NEWSYNC, LPDATS, CHNLZ, CORNUM, CHANLA, CLINES, CALINE, TAILING
------	--

Use the NEWSYNC operand of the LINE definition statement to specify whether the communication controller supplies the new-sync signal to the modem attached to the controller for the data link you are defining. You can specify that the NCP supply the new-sync signal only if (1) the modem can respond to the new-sync signal, (2) the data link is a duplex data link, and (3) more than one secondary modem is attached to the data link. Consult the supplier or installer of the modem for further information about these signals.

Note: If only one device is attached to the data link you are defining, you must specify that the controller does not send the new-sync signal.

Use the LPDATS operand of the LINE definition statement to specify whether the data link you are defining is attached to synchronous externally clocked modems that accept, and provide responses to, Link Problem Determination Aid (LPDA) commands. Use this operand to specify also the types of modems.

For NCP Version 3 and NCP Version 4 Release 1 you can specify the following IBM modems that accept, and provide responses to, LPDA commands:

3833	3865
3834	3868 modems with
3863	appropriate
3864	configuration switches
	set

In addition, for NCP Version 4 Release 2, you can also specify¹ the following IBM modems that accept, and provide responses to, LPDA commands:

¹ Specifying modems using NCP Version 4 Release 2 is different from previous releases of the NCP. For information on how to specify modems using NCP Version 4 Release 2, see the description of the LPDATS operand on the LINE definition statement in the *NCP and SSP Resource Definition Reference*.

5865
5866
5868

Other types of modems can operate in combination with the IBM 3867 Link Diagnostic Unit to accept, and provide responses to, LPDA commands.

When you are specifying that a line uses modems that support Link Problem Determination Aids (LPDA) commands, be aware that, when an LPDA test is running on that line, the remote device(s)² are not polled. Therefore, ensure that remote device timeouts—the time a device waits to be polled before going offline—are large enough to allow for the LPDA test(s) to be run. Note that with a multipoint configuration, it is possible for LPDA tests to be run on two or more successive devices, during which time none of the other remote devices are polled. Therefore, with multipoint configurations, larger device timeout values may be required than with point-to-point configurations.

Specifically, for point-to-point configurations, device timeout values should be greater than 20 seconds for LPDA1 lines and 30 seconds for LPDA2 (NCP V4R2 only) lines. This prevents the possibility of device outages—the device is not repolled within the required time interval—due to the execution of an LPDA test.

For multipoint lines, in rare cases, a succession of tests on consecutive devices can lead to device outages unless larger device timeouts are used. To ensure that no outages occur because of LPDA tests on multipoint lines, use the following guideline for choosing timeout values:

For LPDA1: Use device timeout values of at least $20 \times n^*$ seconds.

For LPDA2: Use device timeout values of at least $30 \times n^*$ seconds.

Do not construe these timeout values to be the amount of time it normally takes to perform an LPDA test. These timeout values are related to the rare situations in which no response is received to a modem test. When the LPDA test returns a response, the test duration time is much shorter.

586X modems can be defined to operate in one of two modes: migration or normal. *Migration* mode utilizes the LPDA capabilities of a 38XX modem and, for NCP V4R2, is referred to as LPDA1. *Normal* mode utilizes the LPDA capabilities of a 586X modem and, for NCP V4R2, is referred to as LPDA2.

Use the CHNLZ³, CORNUM³, CHANLA³, CLINES³, CALINE³, and TAILING operands of the LINE definition statement if the data link you are defining is attached to an IBM 3865 Modem with the Data Multiplexer feature (sometimes called a channelized modem).

² Can be more than one device if you are specifying a multipoint line.

^{*} Where n is the number of remote devices on the multipoint line.

³ CHANLA, CLINES, CHNLZ, CORNUM, and CALINE do not apply to 586X modems.

Use the CHNLZ operand to specify that the data link you are defining is attached to an IBM 3865 Modem with the Data Multiplexer Feature.

Use the CORNUM operand to specify a correlation number for the data link you are defining. This correlation number must be specified in the CORNUM operand of the LINE definition statement for each data link that is attached to the same IBM 3865 Modem.

Use the CHANLA operand to specify whether the data link you are defining is attached to channel A on the IBM 3865 Modem. Channel A is the LPDA control channel.

Use the CLINES operand if the data link you are defining is attached to channel A. Use this operand to specify the names of the other data links attached to the same IBM 3865 Modem that the data link you are defining is attached to. These other data links can be attached to channel B, C, or D.

Use the CALINE operand if the data link you are defining is attached to channel B, C, or D. Use this operand to specify the name of the data link attached to channel A of the same IBM 3865 Modem that the data link you are defining is attached to.

Use the TAILING operand to specify whether a second-level LPDA circuit is attached to the data link you are defining.

While defining data links attached to a channelized or tailed modem, keep the following restrictions and considerations in mind:

Note: These restrictions apply only to 38XX and 586X modems with LPDA1 support specified (that is, LPDATS = YES for NCP V3 and V4R1, or LPDATS = LPDA1 for NCP V4R2).

- You must not specify LPDA1 support in the LPDATS operand for a channelized data link if the modems on that data link do not have the Data Multiplexer feature. Likewise, you must not specify LPDA1 support for a tailed data link if the modems on that data link do not have the Tail Circuit Attachment.
- If you specify LPDA1 support in the LPDATS operand and YES in the CHNLZ operand of a LINE definition statement, you also must specify YES in either the CHANLA or TAILING operands of that LINE definition statement. Note that you cannot specify YES in both the CHANLA and TAILING operands of the same LINE definition statement.
- If you specify YES in the CHNLZ operand for a given channelized modem, you must also specify YES in the CHANLA operand of the LINE definition statement that defines the data link attached to channel A on the modem. Only one CHANLA operand can specify YES for a given modem.
- Data links are defined as being attached to the same modem by having the same correlation number specified in the CORNUM operands of the

LINE definition statements that define those data links. The maximum number of data links that can have the same correlation number specified in the CORNUM operand is four. In other words, no more than four data links can be attached to a given channelized modem.

- The number of data links that can be attached to the same channelized modem is limited by the speeds of the links. The speeds of the links also determine which channels the links must be attached to and which position the options switch on the front of the modem must be set to. A single channelized modem can accommodate only one of the following combinations:
 - One 9600-bps link attached to channel A, with the options switch set to 1
 - Two 4800-bps links attached to channels A and B, with the options switch set to 2
 - One 4800-bps link attached to channel A and two 2400 bps links attached to channels B and C, with the options switch set to 3
 - Four 2400-bps links attached to channels A, B, C, and D, with the options switch set to 4.
- Only SDLC data links or only BSC data links can be attached to a given channelized modem. No mixing of protocols is allowed.

The following restriction applies to LPDA1 and LPDA2 (that is, LPDATS= YES for NCP V3 and V4R1, or LPDATS=LPDA1 or LPDATS=LPDA2 for NCP V4R2) :

- If you specify in the TAILING operand that a second-level LPDA circuit is attached to the data link you are defining, ensure that no SDLC device attached to that link uses X'FD' or X'FF' as its station address, and no BSC device attached to that link uses X'FD' or X'FF' as the first character of its polling or addressing sequence.

The following examples show how you code the LINE definition statements to define the data links attached to the modems in Figure 4-1 on page 4-9 and Figure 4-2 on page 4-10. In the first example, LINK4 is attached to a second-level LPDA circuit. In the second example, LINK2 is attached to a second-level LPDA circuit.

For these examples, the definition statements are not shown in standard assembler language format. For example, continuation characters have been omitted, and definition statements and operands do not start in columns 10 and 16 respectively. When you code your NCP source program, however, you must be sure that it conforms to standard assembler language format.

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LPDATS Example for NCP V3 or V4R1

```
LINK1    LINE    SPEED=2400,
           LPDATS=( YES, 3865) ,
           CHNLZ=YES ,
           CORNUM=24 ,
           CHANLA=YES ,
           CLINES=( LINK2, LINK3, LINK4) ,
           .
           .
           .

LINK2    LINE    SPEED=2400,
           LPDATS=NO,
           CHNLZ=YES ,
           CORNUM=24 ,
           CHANLA=NO,
           CALINE=LINK1,
           .
           .
           .

LINK3    LINE    SPEED=2400,
           LPDATS=NO,
           CHNLZ=YES ,
           CORNUM=24 ,
           CHANLA=NO,
           CALINE=LINK1,
           .
           .
           .

LINK4    LINE    SPEED=2400,
           LPDATS=( YES, 3865) ,
           CHNLZ=YES ,
           TAILING=YES ,
           CORNUM=24 ,
           CHANLA=NO,
           CALINE=LINK1,
           .
           .
           .
```

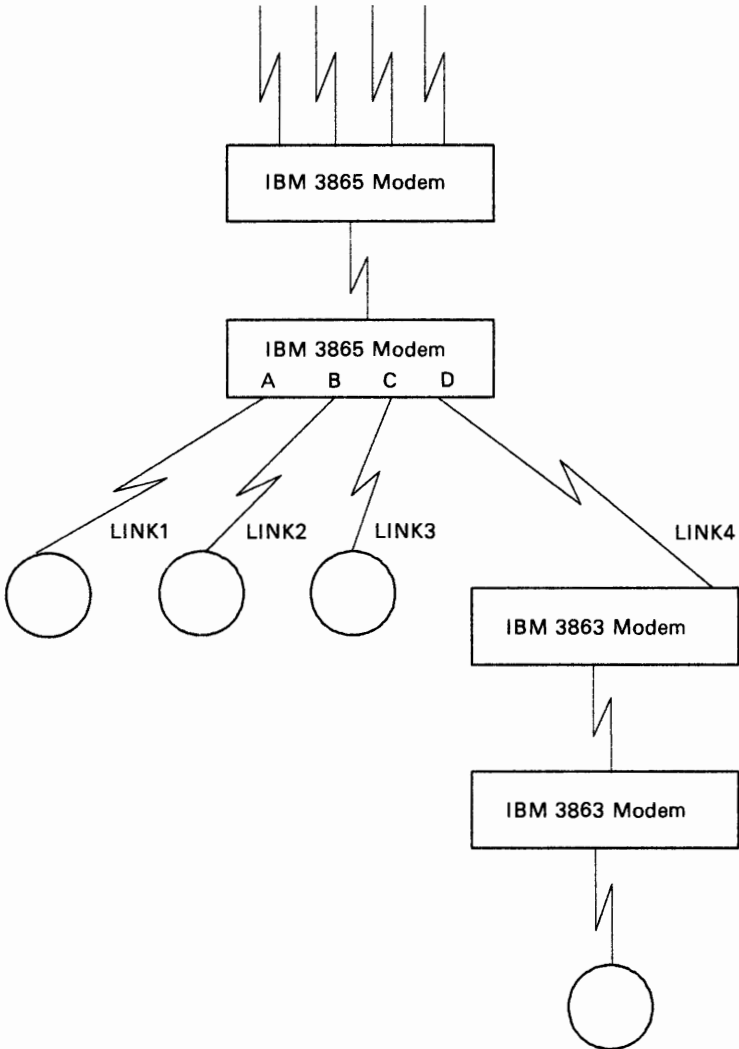


Figure 4-1. 38XX Channelized and Tailed Modems on BSC Data Links

BSC Devices

LPDATS Example for NCP V4R2

```
LINK1  LINE      SPEED=9600,  
          LPDATS=LPDA2,  
          TAILING=NO,  
          .  
          .  
          .  
  
LINK2  LINE      SPEED=9600,  
          LPDATS=LPDA1,  
          TAILING=YES,  
          .  
          .  
          .
```

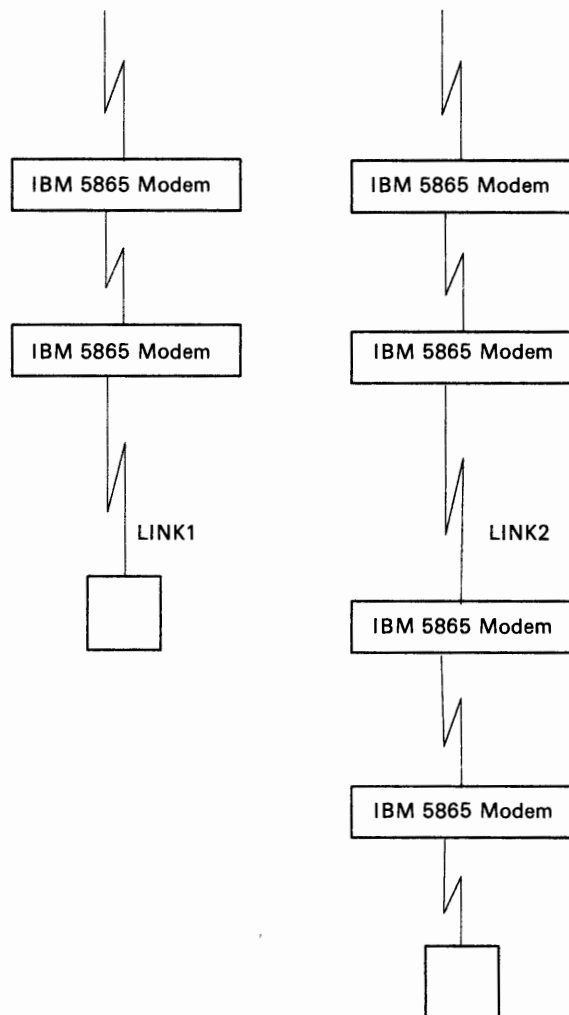


Figure 4-2. 586X Non-Tailed and Tailed Modems on BSC Data Links

Defining Devices

CLUSTER	CUTYPE, FEATURE, LGRAPHS
TERMINAL	TERM, FANOUT, CONV, LGRAPHS, VPRINT,
COMP	CONV, LGRAPHS

Use the **CUTYPE** operand of the **CLUSTER** definition statement if you are defining a clustered BSC station attached to a nonswitched multipoint data link. A clustered BSC station is a collection of devices that comprise an IBM 3270 Information Display System or an IBM 2972 General Banking Terminal System. Use the **CUTYPE** operand to specify the type of cluster controller used by the clustered station you are defining. You define the individual devices attached to this controller by coding a **TERMINAL** definition statement for each device.

Use the **FEATURE** operand of the **CLUSTER** definition statement to specify whether you want your NCP to include serial searching of attached devices for the cluster controller you are defining.

Use the **LGRAPHS** operand of the **CLUSTER** definition statement to specify whether you want the NCP to accept or reject leading graphics sent by the clustered station you are defining. Use this operand to specify the acceptance or rejection of leading graphics for both read and write operations.

Use the **TERM** operand of the **TERMINAL** definition statement to specify the type of BSC device you are defining. If you are defining a call-in logical-connection station representing more than one type of BSC device, use this operand to specify one of any of these types. A logical-connection station is a set of control blocks within the NCP that represents all devices that are attached to a switched data link and can send calls to the NCP.

Use the **FANOUT** operand of the **TERMINAL** definition statement if you have more than one BSC device attached to the same modem. All **TERMINAL** definition statements defining BSC devices attached to the same modem must appear in the same sequence, one after the other. Use the **FANOUT** operand to specify the name of the last **TERMINAL** definition statement in this sequence. You need to code the **FANOUT** operand only on the first **TERMINAL** definition statement in the sequence.

Use the **CONV** operand of the **TERMINAL** definition statement to specify whether you want the BSC device you are defining to accept message data from the NCP instead of a positive response to a block of text the device

BSC Devices

has sent. This is called conversational response and occurs only if the NCP has data to send to the device. Otherwise, it sends the usual positive response. Transmitting message data instead of a positive response eliminates the turnaround time incurred when the NCP sends a positive response character followed by an addressing character to the device, then waits for a response to the addressing character before sending message data to the device.

Use the LGRAPHS operand of the TERMINAL definition statement to specify whether you want the NCP to accept or reject leading graphics sent by the BSC device you are defining. Use this operand to specify the acceptance or rejection of leading graphics for both read and write operations.

Use the VPRINT operand of the TERMINAL definition statement to specify whether this device is to be treated as a virtual printer. The device being defined must be a graphics device.

Use the CONV operand of the COMP definition statement to specify whether you want the input or output component of the BSC device you are defining to accept message data from the NCP instead of a positive response to a block of text the device has sent. This is called conversational response and occurs only if the NCP has data to send to the component. Otherwise, it sends the usual positive response. Transmitting message data instead of a positive response eliminates the turnaround time incurred when the NCP sends a positive response character followed by an addressing character to the component, then waits for a response to the addressing character before sending message data to the component.

Use the LGRAPHS operand of the COMP definition statement to specify whether you want the NCP to accept or reject leading graphics sent by the input or output component of the BSC device you are defining. Use this operand to specify the acceptance or rejection of leading graphics for both read and write operations.

Defining Devices Attached to a Switched Data Link

BUILD	CUID
IDLIST	IDSEQ, MAXLEN, NOMATCH
TERMINAL	DIALNO, DIALSET, IDSEQ, CUIDLEN, CTERM

Use the CUID operand of the BUILD definition statement to specify the identification characters the NCP is to send to the BSC devices attached to

switched data links. It sends these characters to each device for which you have coded the CUIDLEN operand of the TERMINAL or COMP definition statement. The NCP receives ID sequences from the BSC devices that call it over a switched data link. Upon receipt of one of these ID sequences, the NCP either checks it against a list of valid sequences within itself or passes it along to the access method for checking against a list kept there. If the NCP does not recognize the sequence as being valid, it either breaks the data link connection or maintains the connection and sends the unrecognized sequence to the access method for checking. In the latter case, the access method can signal the NCP to continue with message transmission or to break the connection. After either the NCP or the access method has verified that an ID sequence is valid, the NCP sends an ID sequence to the device in reply. This is the sequence you define in the CUID operand.

Use the IDSEQ operand of the IDLIST definition statement to specify an identification sequence to be used by each BSC device that will call the NCP. Use this operand to specify also the name of the TERMINAL definition statement representing the device associated with the identification sequence you are defining.

Use the MAXLEN operand of the IDLIST definition statement to specify the maximum size of the list of ID sequences you specify in the IDSEQ operand. Code the MAXLEN operand only if the access method uses the dynamic control facility to either add entries to the list or to increase the size of one or more existing entries in the list. This operand specifies the size of the *list* (in bytes), not the number of entries in the list. It includes the number of bytes in all entries and the control field that precedes the list.

Use the NOMATCH operand of the IDLIST definition statement to specify the action the NCP is to carry out if it does not receive an ID sequence from a calling device, or if it receives an ID sequence that is not defined in this IDLIST definition statement. You can specify that the NCP indicate in a response to the access method that no ID sequence was received and that the NCP pass on any unrecognized ID sequences. Otherwise, you can specify that the NCP break the data link connection and not send any unrecognized ID sequences to the access method.

Use the DIALNO operand of the TERMINAL definition statement to specify the sequence of dial digits and the length of the number the NCP will use to call the BSC device you are defining. The sequence of dial digits may include separator or end-of-number characters if an auto-call unit is installed on the communication controller and can accept these characters. A separator character causes the auto-call unit to delay sending the next dial digit until it receives a secondary dial tone. An end-of-number character is sent to the auto-call unit after the last dial digit signals the auto-call unit that the auto-call unit has received the last digit of the number, and causes the auto-call unit to start monitoring the data link for an answer tone from the device. Use of the end-of-number character can reduce the time needed to establish a connection. If the auto-call unit is not equipped to use separator characters, you can introduce a programmed dialing pause into the dialing action to allow time to receive a secondary dial tone. The value you specify in this operand can be changed later,

BSC Devices

during the running of the program, by means of the dynamic control facility.

Use the DIALSET operand of the TERMINAL definition statement if the BSC device you are defining will be called by the NCP. Use this operand to specify the name of the DIALSET definition statement that defines the dial set to be used whenever the NCP gets a call-out request for this device. The NCP attempts to call this device over one of the data links in the dial set you specify in this operand.

Use the IDSEQ operand of the TERMINAL definition statement to specify whether you want the BSC device you are defining to send an ID sequence when it calls or is called by the NCP and, if so, how the NCP is to react to the sequence.

Use the CUIDLEN operand of the TERMINAL definition statement to specify the length of the ID sequence the NCP is to send to the device you are defining. This ID sequence is defined in the CUID operand of the BUILD definition statement.

Use the CTERM operand of the TERMINAL definition statement if the BSC device you are defining can only send calls or can both send and receive calls. Do not code this operand if the device can only receive calls. Use this operand to specify a logical-connection station. You need to code only one TERMINAL definition statement with the CTERM operand specified for each data link that has call-in devices attached. No operand in any definition statement can refer to the name of this TERMINAL definition statement. For example, you cannot name this TERMINAL definition statement in the IDSEQ operand of the IDLIST definition statement.

Defining Devices to VTAM

LINE	PU, SECNET	(3725 and 3720)
CLUSTER	DISCNT, DLOGMOD, FEATUR2, ISTATUS, LOGAPPL, LOGTAB, MODETAB, USSTAB, VPACING	
TERMINAL	DLOGMOD, FEATUR2, ISTATUS, LOGAPPL, LOGTAB, MODETAB, USSTAB	

Use the above operands of the LINE, CLUSTER, and TERMINAL definition statements if you are defining a clustered BSC 3270 station that can be owned by VTAM. See the appropriate *VTAM Installation* manual for a description of these operands.

Defining the Maximum Number of Sessions to Be Maintained

LINE	SESSION
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Use the SESSION operand of the LINE definition statement if you are defining a nonswitched multipoint data link. Use this operand to specify the number of concurrent sessions you want the NCP to maintain on this link. The NCP will not only limit the number of sessions to the number you specify in this operand, but it will also try to maintain that many sessions so as to make maximum use of the data link. The number of sessions will be less than the number you specify in this operand whenever the NCP has requests for fewer devices than the number you specify in this operand, or whenever fewer devices are ready to communicate with the access method. This operand does not limit the number of sessions on the link if any clustered BSC stations are attached and general polling is used by the cluster controller to solicit input from its attached devices. The NCP cannot control the number of devices that may respond to a general poll by the cluster controller, and a separate session is established with each device that responds. However, for clustered BSC IBM 3270 Information Display System stations, ensure that the session limit equals the sum of the number of cluster controllers and the number of devices attached to the link.

Defining Polling and Addressing Specifications

LINE	POLLED, AVGPB, POLIMIT
CLUSTER	GPOLL
TERMINAL	POLL, ADDR
COMP	POLL, ADDR

Use the POLLED operand of the LINE definition statement to specify whether BSC devices attached to the data link you are defining must be polled and addressed. If so, you must specify unique polling and addressing characters or sequences for each device by using the POLL and ADDR operands of the TERMINAL definition statement, which are discussed later

in this topic. To receive data from a particular device, the NCP sends it the polling character you have assigned to the device. When the device receives this character, it unlocks its keyboard, allowing the operator to enter data or activate an input component. Similarly, to send data to the device, the NCP sends it the addressing character you have assigned to the device. This signals the device to be ready to receive data from the NCP. If a device has more than one input component, such as a card reader or tape reader, as well as a keyboard, you can specify unique polling characters or sequences for each component by using the POLL operand of the COMP definition statement, which is discussed later in this topic. This allows the NCP to solicit data from individual components. If the device has more than one output component, such as a display unit, a card punch or tape punch, as well as a printer, you can specify a unique addressing character or sequence for each component by using the ADDR operand of the COMP definition statement, which is discussed later in this topic.

Directly following a LINE definition statement that defines a BSC data link with polling, code a SERVICE definition statement that defines the service order table to be used for that link. The NCP requires a service order table for each BSC data link that uses polling. This table contains one or more entries representing each device and each component of a device with which the NCP can establish a session upon request from the access method. The NCP attempts to establish sessions with devices and components in the same sequence as their respective entries appear in the service order table.

Use the AVGPB and POLIMIT operands of the LINE definition statement if the data link you are defining is a nonswitched multipoint link.

Use the AVGPB operand to specify the average number of bytes expected from a BSC device attached to the data link you are defining when that device is polled. The value you specify here is used by the NCP to determine if enough buffer space exists to receive the expected data from a device that answers its poll. If buffer space is not sufficient, the NCP will delay the poll until it can ensure that all the data from the device can be handled without overrun.

Use the POLIMIT operand to specify the number of consecutive negative responses to polling you want the NCP to accept, and the action that you want it to take if this number is reached. The actions it can take are as follows:

- It can maintain the logical connection, notify the access method that the negative response limit has been reached, and wait for another request from the access method before performing any further action on the link.
- It can break the logical connection, notify the access method that it has done so, and terminate the current read request.
- It can break the logical connection, notify the access method that it has done so, and queue the current read request onto the beginning of the queue for the device.

Use the GPOLL operand of the CLUSTER definition statement if you are defining a clustered BSC station. Use this operand to specify whether general polling is to be used for this station and to specify the general polling characters assigned to the cluster controller to which the devices in the station are attached. General polling allows the NCP to ask the cluster controller whether it has any data (collected from its attached devices) to send to the NCP. Otherwise, the NCP must ask each device individually.

Use the POLL operand of the TERMINAL definition statement to specify the hexadecimal representation of the polling character you are assigning to the BSC device you are defining. You do not have to code the POLL operand if the device you are defining is to be used for output only.

Use the ADDR operand of the TERMINAL definition statement to specify the hexadecimal representation of the addressing character you are assigning to the BSC device you are defining. You do not have to code the ADDR operand if the device you are defining is to be used for input only.

Use the POLL operand of the COMP definition statement if you are defining an input component of the device you defined in the TERMINAL definition statement. Use this operand to specify the hexadecimal representation of the polling character you are assigning to the input component.

Use the ADDR operand of the COMP definition statement if you are defining an output component of the device you defined in the TERMINAL definition statement. Use this operand to specify the hexadecimal representation of the addressing character you are assigning to the output component.

Defining Data Characteristics

BUILD	XITB	(3705)
LINE	CODE	
CLUSTER	ITBMODE	
TERMINAL	ITBMODE	
COMP	ITBMODE	

Use the XITB operand of the BUILD definition statement only if you are defining your NCP for the 3705. Use this operand to specify whether you want the NCP to insert transparent intermediate-text-block (ITB) sequences and error-information-blocks (EIBs) in transparent text sent to devices for which the NCP performs intermediate block checking. You specify whether the NCP performs intermediate block checking for a particular device by using the ITBMODE operand of either the CLUSTER, TERMINAL, or the COMP definition statement. If you specify in any ITBMODE operand that the NCP is to insert an EIB character following each ITB character

received from the device, the NCP will substitute an EIB for each data-link-escape character (DLE) ITB sequence in transparent text it receives from the device. If you specify in any ITBMODE operand that each ITB character received from the access method is followed by an EIB character, the NCP will insert DLE ITB sequences into transparent text it sends to the device.

Use the CODE operand of the LINE definition statement to specify the transmission code the NCP is to use when communicating with the BSC devices attached to the data link you are defining. The NCP translates outgoing data characters from its internal processing code, EBCDIC, to the code you specify in this operand, and vice versa for incoming characters. The code you specify in this operand also informs the NCP which line control scheme is to be used; the transmission code and the line control scheme are related for BSC devices.

Use the ITBMODE operand of the CLUSTER definition statement if you are defining a clustered BSC station. Use this operand to specify whether you want the NCP to insert an error-information-block (EIB) character following each intermediate text block (ITB) character received from the station before sending the data to the access method, and whether each EIB character received from the access method is followed by an ITB character. If you specify insertion of EIBs, the application program in the host processor can scan the received data for ITB—the error information byte—to determine whether an error occurred in the intermediate block. If you specify that each ITB character received from the access method is followed by an EIB character, the NCP will delete the first character following each ITB it detects within the data to be sent to the station. Specify that each ITB character received from the access method is followed by an EIB character only if each first-following character is an EIB. Otherwise, the receiving station will not receive the first data character of each intermediate block.

Use the ITBMODE operand of the TERMINAL definition statement to specify whether you want the NCP to insert an EIB character following each ITB character received from the BSC device you are defining before sending the data to the access method, and whether each EIB character received from the access method is followed by an ITB character. If you specify insertion of EIBs, the application program in the host processor can scan the received data for ITB—the error information byte—to determine whether an error occurred in the intermediate block. If you specify that each ITB character received from the access method is followed by an EIB character, the NCP will delete the first character following each ITB it detects within the data to be sent to the device. Specify that each ITB character received from the access method is followed by an EIB character only if each first-following character is an EIB. Otherwise, the receiving device will not receive the first data character of each intermediate block.

Use the ITBMODE operand of the COMP definition statement to specify whether you want the NCP to insert an EIB character following each ITB character received from the input or output component of the device you are defining before sending the data to the access method, and whether each EIB character received from the access method is followed by an ITB character. If you specify insertion of EIBs, the application program in the

host processor can scan the received data for ITB—the error information byte—to determine whether an error occurred in the intermediate block. If you specify that each ITB character received from the access method is followed by an EIB character, the NCP will delete the first character following each ITB it detects within the data to be sent to the component. Specify that each ITB character received from the access method is followed by an EIB character only if each first-following character is an EIB. Otherwise, the receiving component will not receive the first data character of each intermediate block.

Defining Delay between Successive Transmissions for Buffered Devices

TERMINAL BFRDLAY

Use the BFRDLAY operand of the TERMINAL definition statement if the BSC device you are defining is a buffered device and is attached to a nonswitched multipoint data link. The following devices are buffered BSC devices:

- IBM 2770 Data Communication System
- IBM 3275 Display Station
- IBM 3284 Printer
- IBM 3286 Printer
- IBM 3780 Data Communication Terminal
- IBM 2980 Teller Station and Administrative Station (only for use with the 3705).

These devices receive incoming data into buffers at a high speed and then print the data at a much slower speed. If the NCP has multiple data blocks to send to the same device, it must wait after sending each block for the device to print the contents of its buffer before the NCP can send the next block. Use the BFRDLAY operand of the TERMINAL definition statement to specify the time you want the NCP to wait after sending a block of data to the device before sending the next one. If the buffered device is attached to a nonswitched multipoint data link, the NCP can use the time the data link would otherwise be idle for communicating with other devices. That is, at any given moment the NCP can be sending data to one of several devices while the others are displaying or printing data received earlier.

Defining Backup and Recovery Procedures

Several facilities provide protection for the BSC devices attached to your NCP if any of the other network resources fail. The definition statements and operands you need to code to define the relationship of the NCP to these facilities are discussed below.

Defining Automatic Network Shutdown Notification

BUILD	CSMSG, CSMSGC, CSMHDR, CSMHDRC
TERMINAL	CRITSIT

Automatic network shutdown (ANS) is a procedure that occurs when the NCP can no longer communicate with an access method that owns some of its link-attached devices. ANS can have the following results for BSC data links:

- The NCP will dissociate a data link from the owning access method with which communication has been lost.
- The NCP will cancel any line traces or online tests that are being performed on the data link.
- The NCP will cancel the command currently being run for the data link.
- If the data link is switched, the NCP will break the switched connection.

ANS can have the following results for BSC devices:

- The NCP will stop general polling of clustered stations.
- The NCP will cancel any commands currently pending for the device.
- The NCP will send a predefined message to devices that you specify to receive this message, notifying them of the impending shutdown.
- The NCP will cancel any sessions in which the device is currently active.

Use the CSMSG and CSMSGC operands of the BUILD definition statement to specify the text of a critical situation message that you want the NCP to send to each active BSC device notifying it of an impending shutdown.

Use the CSMHDR and CSMHDRC operands of the BUILD definition statement if you have any IBM 3270 Information Display System clustered stations attached to your NCP. Use these operands to specify the header of the critical-situation message that you want the NCP to send to each station notifying it of an impending shutdown.

Use the CRITSIT operand of the TERMINAL definition statement to specify that you want the NCP to send a message to the BSC device you are defining, notifying it of an impending shutdown. This message is the

message you specify in the CSMSG and CSMSGC operands of the BUILD definition statement. The NCP does not automatically send a message to notify devices when the network is again operational; this is the responsibility of the access method.

Defining Error Recovery and Recording

GROUP	CRETRY
LINE	ETRATIO
TERMINAL	SRT
COMP	SRT

Use the CRETRY operand of the GROUP definition statement to specify the maximum number of error recovery attempts you want the NCP to make if recoverable errors occur during polling and addressing operations on any data link in the group you are defining.

Use the ETRATIO operand of the LINE definition statement to specify the error-to-transmission ratio for the data link you are defining. This ratio is used by programs that analyze statistical maintenance records; for example, the IBM NetView program.

Use the SRT operand of the TERMINAL definition statement to specify a threshold value for the total number of PIUs you want the device to be able to send or receive, and a threshold value for the total number of temporary errors you want to be able to occur for this device. If either of these thresholds is reached, the NCP will generate a Record Maintenance Statistics (RECMS) RU to inform the access method of this condition. The RECMS RU data is stored in the operating system error records data base. The RU may also be used by an application program that collects Communication Network Management (CNM) data from the network. This application program, of which NetView is an example, can then organize the data for presentation to network problem determination operators. The value of this data is greatly increased if the modems used on the data link have the LPDA capability. In addition to recording the ratio of retransmissions caused by errors to the total traffic, which is normally provided by the RECMS RU data, LPDA reports add information on the quality of the data link as a transmission medium.

Use the SRT operand of the COMP definition statement to specify a threshold value for the total number of PIUs you want the input or output component of the device you are defining to be able to send or receive, and the total number of temporary errors you want to be able to occur for this component. When either of these thresholds is reached, the NCP will generate a Record Maintenance Statistics (RECMS) RU to inform the access method of this condition. The RECMS RU data is stored in the operating system error records data base. The RU may also be used by an application program that collects CNM data from the network. This

application program, of which NetView is an example, can then organize the data for presentation to network problem determination operators. The value of this data is greatly increased if the modems used on the data link have the LPDA capability. In addition to recording the ratio of retransmissions caused by errors to the total traffic, which is normally provided by the RECMS RU data, LPDA reports add information on the quality of the data link as a transmission medium.

Defining Performance Characteristics

Depending on how you define them, several operational characteristics about the relationship of the NCP to the BSC devices attached to it affect the performance of the network. These characteristics and the definition statements and operands you need to code to define them are discussed below. In most cases, it is difficult to determine how your network will perform until all the resources are installed and fully operational. Therefore, the values you specify in the operands discussed in this topic may need to be changed after you have a chance to observe how efficiently your network is operating.

Defining Data Transfer Specifications

LINE	CUTOFF
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Use the CUTOFF operand of the LINE definition statement to specify the maximum number of subblocks you want the NCP to accept from a BSC device attached to the data link you are defining. A subblock is the sequence of message text occupying the number of buffers you specify in the TRANSFR operand of the LINE definition statement. If the NCP receives the number of subblocks you specify in the CUTOFF operand before receiving an end-of-block character from the device, it stops transmission. Otherwise, it continues to accept data from the device until it receives an end-of-block character. If any subblock contains an error (indicated by a bit in the response header for the subblock), the application program will normally discard all of the subblocks in the block, not only the one in error. There is no provision for requesting retransmission of subblocks in error.

Defining Timing Specifications

BUILD	ITEXTTO
GROUP	TTDCNT, WACKCNT, WAKDLAY
LINE	NEGPOLP, SERVPRI

Use the ITEXTTO operand of the BUILD definition statement to specify a text time-out value that will override the value you specify in the TEXTTO operand of the GROUP definition statement. This value will override the GROUP definition statement text time-out specification only if you specify in the INHIBIT operand of the TERMINAL definition statement that this value will be initially overridden for the data link to which the device you are defining is attached.

Use the TTDCNT operand of the GROUP definition statement to specify the maximum number of times you want the NCP to accept the temporary text-delay (TTD) sequence from a BSC device attached to any of the data links in the group you are defining before the NCP aborts the operation. The TTD sequence notifies the NCP that the device is temporarily unable to send the next block of data.

Use the WACKCNT operand of the GROUP definition statement to specify the number of times you want the NCP to accept a wait-before-transmit positive acknowledgement (WACK) from a nonbuffered BSC device attached to any of the data links in the group you are defining before the NCP aborts the operation. The WACK sequence notifies the NCP that the device is temporarily not ready to receive.

Note: This operand has no effect for buffered devices because the NCP, upon receiving a WACK sequence from such a device, sends an EOT to end the transmission.

Use the WAKDLAY operand of the GROUP definition statement to specify an amount of time that you want the NCP to wait before responding to message text received from a BSC device attached to any of the data links in the group you are defining. If the NCP is unable to respond with a positive acknowledgment by the specified time, it will send a WACK sequence instead.

Use the NEGPOLP operand of the LINE definition statement to specify an amount of time you want the NCP to pause after receiving a negative response to polling before it resumes a polling operation. A negative polling pause limits the amount of nonproductive polling on the link and, therefore, reduces the amount of processing overhead. Be careful, however, when you choose a value for this operand. Too large a pause can increase

the response time experienced by the operators of the devices attached to the link.

Use the **SERVPRI** operand of the **LINE** definition statement if you are defining a multipoint data link. Use this operand to specify whether you want the NCP to give priority to servicing current sessions on the link or to establishing new sessions on the link.

Defining Initial Inhibition of NCP Functions

CLUSTER	INHIBIT
TERMINAL	INHIBIT
COMP	INHIBIT

Use the **INHIBIT** operand of the **CLUSTER** definition statement if you are defining a BSC clustered station. Use this operand to specify which of certain NCP functions you do not want to be in effect for this station when the NCP first begins running. The functions that can be initially inhibited for a BSC clustered station are:

- The **WACK** limit you specify in the **WACKCNT** operand of the **GROUP** definition statement. If you specify that this limit be initially inhibited, the first **WACK** received from the station you are defining will cause the NCP to return the request to the access method rather than to respond to that and subsequent **WACKs** with an **ENQ** character.
- The subblocking you specify in the **TRANSFR** operand of the **LINE** definition statement. If you specify that this subblocking be initially inhibited, when the number of buffers specified by the **TRANSFR** operand is filled by received text, the NCP will terminate the receive operation just as if the cutoff limit specified by the **CUTOFF** operand of the **LINE** definition statement had been reached.
- The recovery procedures for text-read errors specified by the **RETRIES** operand of the **LINE** definition statement. If you specify that these procedures be initially inhibited, the NCP will not attempt recovery for text-read errors.
- The recovery procedures for text-write errors specified by the **RETRIES** operand of the **LINE** definition statement. If you specify that these procedures be initially inhibited, the NCP will not attempt recovery for text-write errors.

Use the **INHIBIT** operand of the **TERMINAL** definition statement to specify which of certain NCP functions you do not want to be in effect for the BSC device you are defining when the NCP first starts running. The functions that can be initially inhibited for a BSC device are:

- The text time-out value specified on the TEXTTO operand of the GROUP definition statement. If you specify that the text time-out value be initially inhibited, the NCP will use the value specified in the ITEXTTO operand of the BUILD definition statement as the time limit between receipt of successive text characters.
- The WACK limit you specify in the WACKCNT operand of the GROUP definition statement. If you specify that this limit be initially inhibited, the first WACK received from the device you are defining will cause the NCP to return the request to the access method rather than to respond to that and subsequent WACKs with an ENQ character.
- The subblocking you specify in the TRANSFR operand of the LINE definition statement. If you specify that this subblocking be initially inhibited, when the number of buffers specified by the TRANSFR operand is filled by received text, the NCP will terminate the receive operation just as if the cutoff limit specified by the CUTOFF operand of the LINE definition statement had been reached.
- The recovery procedures for text-read errors specified by the RETRIES operand of the LINE definition statement. If you specify that these procedures be initially inhibited, the NCP will not attempt recovery for text-read errors.
- The recovery procedures for text-write errors specified by the RETRIES operand of the LINE definition statement. If you specify that these procedures be initially inhibited, the NCP will not attempt recovery for text-write errors.

Use the INHIBIT operand of the COMP definition statement to specify which of certain NCP functions you do not want to be in effect for the input or output component of the BSC device you are defining when the NCP first starts running. The functions that can be initially inhibited for a BSC device are:

- The text time-out value specified on the TEXTTO operand of the GROUP definition statement. If you specify that the text time-out value be initially inhibited, the NCP will use the value specified in the ITEXTTO operand of the BUILD definition statement as the time limit between receipt of successive text characters.
- The WACK limit you specify in the WACKCNT operand of the GROUP definition statement. If you specify that this limit be initially inhibited, the first WACK received from the component you are defining will cause the NCP to return the request to the access method rather than to respond to that and subsequent WACKs with an ENQ character.
- The subblocking you specify in the TRANSFR operand of the LINE definition statement. If you specify that this subblocking be initially inhibited, when the number of buffers specified by the TRANSFR operand is filled by received text, the NCP will terminate the receive operation just as if the cutoff limit specified by the CUTOFF operand of the LINE definition statement had been reached.

- The recovery procedures for text-read errors specified by the RETRIES operand of the LINE definition statement. If you specify that these procedures be initially inhibited, the NCP will not attempt recovery for text-read errors.
- The recovery procedures for text-write errors specified by the RETRIES operand of the LINE definition statement. If you specify that these procedures be initially inhibited, the NCP will not attempt recovery for text-write errors.

Defining the Interval between BSC Synchronizing Characters

GROUP	SYNDLAY	(3705)
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Use the SYNDLAY operand of the GROUP definition statement only if you are defining your NCP for the 3705. Use this operand if the data links in the group you are defining are attached to a type 2 scanner. Use this operand to specify the amount of time you want the NCP to wait between transmissions of the BSC synchronizing characters (SYN) on data links that are operating in text-transmit mode. The NCP conforms to normal BSC practice by sending the SYN characters once each second. In rare circumstances it may be appropriate to change this interval.

Defining the Network Performance Analyzer

CLUSTER	NPACOLL
TERMINAL	NPACOLL

Use the NPACOLL operand of the CLUSTER and TERMINAL definition statements if you are defining a clustered BSC IBM 3270 Information Display System station.

Use the NPACOLL operand of the CLUSTER definition statement to specify whether you want data sent to and from the cluster controller, which you are defining, to be eligible for collection by NPA. If you specify that you want data to be eligible for collection for this controller, you also must specify that data is to be eligible for collection for the data link that the controller is attached to. If you specify that you do not want data to be eligible for collection for this controller, then no data can be collected from any devices attached to the cluster controller.

Use the NPACOLL operand of the TERMINAL definition statement to specify whether you want data sent to and from the device in the station, which you are defining, to be eligible for collection by NPA. If you specify that you want data to be eligible for collection for this device, you must

also specify that data is to be eligible for collection for the cluster controller that the device is attached to and for the data link that the controller is attached to.

Defining Block Handlers

A block handler is a set of routines that perform special functions for blocks of message data received by the NCP. These functions can be performed on data the NCP receives from the access method before it sends it to the device. The functions can also be performed on data the NCP receives from the device before it sends the data to the access method. The requirements for determining how the NCP is to process message data depend on the application and may vary for different devices and different components of devices.

The definition statements and operands you need to code to define block handlers are discussed below.

Defining the Beginning of a Block Handler

STARTBH	BHEXEC
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Use the STARTBH definition statement to indicate that this is the beginning of the block handler you are defining. Use the BHEXEC operand of the STARTBH definition statement to specify at which point the block handler you are defining will be run. The points at which block handlers can be run are:

- Point 1: Block handlers at this point process data immediately upon receipt from the access method (output to the device), before the NCP has determined that a data link is available for communicating with the device.
- Point 2: Block handlers at this point:
 - Process output data just before sending data on the link after the NCP has determined that a data link is available for communicating with the device.
 - Process input data just after receiving data from the link and while the link is still being held for the device.
- Point 3: Block handlers at this point process data received from a device (input from the device), after the NCP has released the data link to which the device is attached for use in communicating with another device.

Defining Time and Date Routine

DATETIME	DATE, DATEFMT, TIME, INSERT, PT2EXEC
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Use the DATE operand of the DATETIME definition statement to specify whether you want the NCP to insert the current date in a block of data. It will insert the date immediately before the first text character in the block.

Use the DATEFMT operand of the DATETIME definition statement to specify how you want the NCP to print the date. The date can be in any of four formats:

- Month/day/year. For example, 04/22/84
- Year/month/day. For example, 84/04/22
- Day/month/year. For example, 22/04/84
- Year followed by day of year. For example, 84.112 (April 22 is the 112th day of the year.).

Use the TIME operand of the DATETIME definition statement to specify whether you want the NCP to insert the current time in a block of data. It will insert the time immediately before the first text character in the block. If you specify that you want the date to also be inserted, the time will follow the date.

Note: You must specify that either the date or the time be inserted. You cannot specify that both of them not be inserted.

Use the INSERT operand of the DATETIME definition statement to specify whether you want the NCP to insert the date and time only in the first block of each message or in all blocks.

Use the PT2EXEC operand of the DATETIME definition statement if the block handler you are defining is executable only at point 2. Use this operand to specify whether the NCP is to insert the date and time before the I/O operation on output or after the I/O operation on input.

Defining Edit Routine

EDIT	BKSP
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Use the EDIT definition statement if the block handler you are defining is executable at point 2 on input or point 3. Use this definition statement to specify whether you want the NCP to include the text correction function. Use the BKSP operand of the EDIT definition statement to specify the character you want to be used as a text canceling character. A text canceling character allows the keyboard operator to signal the NCP to correct text incorrectly entered. The NCP corrects incorrectly entered text by scanning each block of data received for any text canceling characters. It then deletes from the block each such character it finds, plus one preceding text character for each canceling character. For example, the keyboard operator might enter COMMUNCIATE, and, seeing that it is misspelled, enter five text canceling characters to back-up to the first erroneous character. The keyboard operator must then re-enter the correct characters. If you specified in the BKSP operand that the text canceling character is the backspace character, the keyboard operator would enter:

COMMUNCIATE bks bks bks bks bks ICATE

The NCP will delete the five text canceling characters (backspaces) plus the five text characters before those backspaces. The remaining characters form the correctly spelled word, COMMUNCIATE.

The text canceling character does not have to be a backspace character. You can use any other character (except a line control character), as long as it is not used in any other way within message text.

Defining User-Written Routines

UBHR	NAME, ENTRY, ACCESS, COMMAND, PT2EXEC
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Use the UBHR definition statement to specify that you are including user-written block-handling routines in the block handler you are defining. User-written block-handling routines permit you to add certain data-handling functions to the NCP. These routines typically examine and manipulate incoming or outgoing data contained in NCP buffers. If you have a good understanding of the NCP and your access method, you may add such routines to the NCP with little likelihood of disrupting the NCP code. However, adding routines that perform more complex functions, such as leasing and releasing buffers or scheduling I/O operations, requires that

you have a thorough understanding of the internal operation of the NCP and the access method. Adding such routines must be approached with care to avoid disrupting the NCP logic.

You code a user-written block-handling routine using the communication controller assembler language and assemble it using the controller assembler. Specific rules and guidelines to be observed in coding user-written block-handling routines are as follows:

Note: In the following list, the term *macro invocation* refers to 3725 assembler language.

- All registers can be used in a user-written block-handling routine. Before passing control to a user-written routine, the NCP saves all registers. When receiving control from the routine, it restores all registers.
- At entry to a user-written block-handling routine, register 2 points to the queue on which the block being handled is enqueued.
- A POINT (2), (3) macro invocation causes the address of the block at the head of the queue to be returned in register 3.
- You can use a SCAN macro invocation to scan the text in chained NCP buffers containing the block being processed.
- You can use the DEQUEUE, ENQUEUE, and INSERT macro invocation to dequeue, enqueue, and insert the block whose address was returned by the POINT macro invocation.
- You can use the LEASE macro invocation to obtain NCP buffers. You must use a RELEASE macro invocation to release any buffers thus obtained.
- Use a SYSXIT macro invocation to return control from the user-written block-handling routine to the NCP.
- If a user-written block-handling routine is to be run for more than one BSC device or data link, code it such that it is serially reusable.
- The *NCP Customization* manual describes the macro formats, gives details for use of supervisory macros, and describes NDF internal utilities.
- If the user-written routine changes the amount of message text accompanying a basic transmission unit (BTU), the routine must accordingly update the BCUTLEN field of the BTU and the data count fields of the buffer prefix areas.
- Ensure that user-written block-handling routines do not modify any part of the first 34 bytes (the BTU) of a header buffer or the first 4 bytes of any other buffer.

- Logic errors encountered in user-written block-handling routines can cause the NCP to abend.

Use the **NAME** operand of the **UBHR** definition statement to specify the name of the user-written module. This name must be the file you specify in the job control language or **EXEC** for the linkage editor step in the generation procedure.

Use the **ENTRY** operand of the **UBHR** definition statement to specify the name of the entry point within the user-written module you specify in the **NAME** operand.

Use the **ACCESS** operand of the **UBHR** definition statement if the block handler you are defining is executable at point 2 or point 3. Use this operand to specify whether you want the user-written block-handling routine to process only error-free blocks of data or only blocks containing errors.

Use the **COMMAND** operand of the **UBHR** definition statement if the block handler you are defining is executable at point 2 or point 3 and processes error-free, incoming data. Use this operand to specify whether you want the user-written block-handling routine to process data received in response to a Read request, an Invite request, or both.

Use the **PT2EXEC** operand of the **UBHR** definition statement if the block handler you are defining is executable only at point 2. Use this operand to specify whether you want the user-written block-handling routine to process outgoing message data before the I/O operation or input message data after the I/O operation.

Defining the End of a Block Handler

ENDBH

Use the **ENDBH** definition statement to indicate that this is the end of the block handler you are defining. This definition statement has no operands.

Defining Block Handler Sets

BHSET	EXEC, PT1, PT2, PT3
CLUSTER	BHEXEC, BHSET, PT3EXEC
TERMINAL	BHEXEC, BHSET, PT3EXEC
COMP	BHEXEC, BHSET, PT3EXEC

Use the EXEC operand of the BHSET definition statement to specify whether the block-handler set you are defining can be run when it is dynamically assigned to a device by command from the access method.

Use the PT1 operand of the BHSET definition statement to specify the name of the block handler to be run at point 1.

Use the PT2 operand of the BHSET definition statement to specify the name of the block handler to be run at point 2.

Use the PT3 operand of the BHSET definition statement to specify the name of the block handler to be run at point 3.

Use the BHSET operand of the CLUSTER definition statement if you are defining a clustered BSC station. Use this operand to specify the name of the block-handler set associated with the station you are defining. Use this operand to specify also whether you want the block-handler set to be run without being activated by the access method. If you do, the block-handler set will be activated during initialization of the NCP. If you do not, it must be activated by a request from the access method. You can also use the BHSET operand to specify that no block-handler set is initially assigned to the station you are defining but that one can be assigned dynamically by the access method.

Use the BHEXEC operand of the CLUSTER definition statement if you are defining a clustered BSC station. Use this operand to specify which block handlers in the block-handler set you specify in the BHSET operand of the CLUSTER definition statement are to be run.

Use the PT3EXEC operand of the CLUSTER definition statement if you are defining a clustered BSC station. Use this operand to specify whether a block handler that is run at point 3 is to be associated with the station you are defining.

Use the BHSET operand of the TERMINAL definition statement to specify the name of the block-handler set associated with the BSC device you are defining. Use this operand to specify also whether you want the block-handler set to be run without being activated by the access method. If you do, the block-handler set will be activated during initialization of the NCP. If you do not, it must be activated by a request from the access method. You can also use the BHSET operand to specify that no block-handler set is initially assigned to the device you are defining but that one can be assigned dynamically by the access method.

Use the BHEXEC operand of the TERMINAL definition statement to specify which block handlers in the block-handler set you specify in the BHSET operand of the TERMINAL definition statement are to be run.

Use the PT3EXEC operand of the TERMINAL definition statement to specify whether a block handler that is run at point 3 is to be associated with the device you are defining.

Use the BHSET operand of the COMP definition statement to specify the name of the block-handler set associated with the input or output component of the BSC device you are defining. Use this operand to specify also whether you want the block-handler set to be run without being activated by the access method. If you do, the block-handler set will be activated during initialization of the NCP. If you do not, it must be activated by a request from the access method. You can also use the BHSET operand to specify that no block-handler set is initially assigned to the component you are defining but that one can be assigned dynamically by the access method.

Use the BHEXEC operand of the COMP definition statement to specify which block handlers in the block-handler set you specify in the BHSET operand of the COMP definition statement are to be run.

Use the PT3EXEC operand of the COMP definition statement to specify whether a block handler that is run at point 3 is to be associated with the component you are defining.

Defining BSC Devices That Can Operate in Emulation Mode

Devices that can operate in emulation mode are those attached to data links that you specify can operate either in emulation mode only or, alternatively, in either network control mode or emulation mode. Remember, a data link cannot operate in emulation mode unless you are using the Partitioned Emulation Programming (PEP) extension to include emulation functions in your NCP. You must define to the NCP many physical and operational characteristics about the relationship of the NCP to these devices. The definition statements and operands you need to code to define these characteristics are discussed below.

Defining the Communication Controller

CSB	WRAPLN	(3705)
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Use the WRAPLN operand of the CSB definition statement only if you are defining your NCP for the 3705. Use this operand to specify the line address the NCP will use to send test data when performing a wraparound test. The data link whose line address you specify need not be dedicated to the wraparound test operation. It can be any data link that can be conveniently closed to normal message traffic when a wraparound test is needed. Both the link you specify in this operand and the link to be tested must be closed to normal message traffic for the duration of the test. The online terminal test program selects the link to be tested.

Defining the Channel

BUILD	HICHAN, LOCHAN
LINE	CHNPRI

Use the HICHAN operand of the BUILD definition statement to specify the highest subchannel address on each channel adapter associated with any data link that can operate in emulation mode.

Use the LOCHAN operand of the BUILD definition statement to specify the lowest subchannel address on each channel adapter associated with any data link that can operate in emulation mode.

The address range specified by the HICHAN and LOCHAN operands applies only to emulation subchannels. The network control subchannel address may, but need not, lie within this range. The range of emulation subchannel addresses must not include any addresses associated with shared unit control words (UCWs) in the host processor. Optimum storage utilization is obtained by sequential addressing of all emulation subchannels. Each unassigned subchannel address between the values specified by the HICHAN and LOCHAN operands adds 10 bytes to the NCP storage requirements.

Specify values in the HICHAN and LOCHAN operands to correspond to the high and low subchannel addresses actually installed within the communication controller. Failure to follow this recommendation might cause the following:

- All commands (except Sense, Test I/O, and I/O No-Op) issued to unassigned subchannels within the range you specify will be rejected. Unassigned subchannels are those not specified in the ADDRESS

operand of any LINE definition statement or in the DYNADMP operand of the BUILD definition statement.

- All commands issued to subchannels outside the range you specify will result in a permanently busy (hung) subchannel. Although the channel adapter recognizes as valid any commands issued for a subchannel address outside of this range, the emulation program does not recognize the address and, therefore, ignores any such commands received from the host processor channel.
- If a unit control block (UCB) exists for a device associated with a subchannel outside the range you specify but within the channel adapter's range, initial program load (IPL) of the operating system in the host processor cannot be completed because Test I/O and Sense commands, though accepted by the controller, are ignored.

Use the CHNPRI operand of the LINE definition statement to specify the priority of the emulation subchannel associated with the data link you are defining. The priority can be either normal or high. Normal priority is ordinarily appropriate unless the data rate of the link is 19,200 bps or more and the majority of the remaining links are slow-speed links (2,400 bps or less).

Defining Data Links

LINE	DUALCOM, USE
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Use the DUALCOM operand of the LINE definition statement if the data link you are defining is emulating a data link connected to an IBM 2701 Data Adapter Unit with the dual communication interface feature. Use this operand to specify the alternative relative line number of the data link formerly attached to the 2701 dual communication interface and to specify which interface the data link you are defining corresponds to.

Use the USE operand of the LINE definition statement to specify whether you want the data link you are defining to operate initially in network control mode or in emulation mode. If you specify in the TYPE operand of the LINE definition statement that this link can operate alternatively in network control mode or emulation mode, you can switch the link from one mode to the other by command from the access method.

BSC Devices

Defining Modems

LINE	DISABLE, MODEM
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Use the **DISABLE** operand of the **LINE** definition statement to specify whether the modem attached to the data link you are defining requires a long disable time-out when it is disconnecting from the link. Most modems do not require a long time-out. If you specify that one does, a 25.6-second time-out will be provided.

Use the **MODEM** operand of the **LINE** definition statement to specify whether the data link you are defining (1) is enabled immediately after the communication controller has been loaded or the System Reset key has been pressed or (2) is disabled after the controller has been loaded or the System Reset key has been pressed and subsequently must be enabled by command from the access method. Use this operand to specify also if the modems attached to this data link are from the Nippon Telegraph and Telephone Company.

Defining Devices

LINE	TERM, FEATURE
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Use the **TERM** operand of the **LINE** definition statement to specify the type of BSC device attached to the data link you are defining. If different types of BSC devices are attached to the link, specify only one of the types.

Use the **FEATURE** operand of the **LINE** definition statement to specify which features you want your NCP to include for the BSC devices attached to the data link you are defining. These features are:

- Emulation of the dual-code feature of the IBM 2701 Data Adapter Unit. The dual-code feature allows message transmission over the link in either EBCDIC or USASCII.
- Support of the Society for Worldwide Interbank Financial Telecommunication (SWIFT) network. (3725 and 3720 only)

Defining Control Units

LINE	CU, CUTYPE
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Use the CU operand of the LINE definition statement to specify which transmission control unit functions the NCP is to emulate for the data link you are defining. The value you specify here is the type of transmission control unit that the data link was attached to before installation of the communication controller.

Use the CUTYPE operand of the LINE definition statement if the data link you are defining has any clustered BSC stations attached. Use this operand to specify the type of cluster controller to which the individual devices in the clustered station are attached. If the data link you are defining can operate alternatively in either network control mode or emulation mode, specify the cluster controller type in both this operand and the CUTYPE operand of the CLUSTER definition statement.

Defining Data Characteristics

BUILD	OPCSB2	(3705)
LINE	BUFSIZE, PAD, UNITXC	

Use the OPCSB2 operand of the BUILD definition statement only if you are defining your NCP for the 3705. Use this operand to specify whether you want four 5-byte data buffers to be provided for data links that (1) can operate in emulation mode, (2) are attached to a type 2 scanner, and (3) have a high priority specified in the CHNPRI operand of the LINE definition statement. This buffer is permanently assigned to all such links and provides extra protection against overruns that can result from temporary slowdowns in channel operation or temporary peaks in data traffic in the network. If you specify that you do want four 5-byte buffers to be provided, do not code both the CHNPRI operand and the TADDR operand in the same LINE definition statement. Either operand, however, can be specified alone.

Use the BUFSIZE operand of the LINE definition statement to specify the size of the emulation mode buffers you want for this data link. Each link has two buffers for data being sent or received over the link. The value you specify in this operand becomes the size of each buffer. Specifying large buffers offers more protection against possible overruns than does specifying small buffers. Use of large buffers also results in less interrupt-processing overhead for channel operations.

Use the PAD operand of the LINE definition statement if you are defining your NCP to emulate the functions of the IBM 2703 Transmission Control Unit. Use this operand to specify whether you want the NCP to verify the first 4 bits of trailing pad characters it receives from the data link you are defining. If you specify that you want the NCP to check the first 4 bits of trailing pad characters, it will check each pad character received and indicate a data check error if the first 4 bits are not all 1s.

Use the UNITXC operand of the LINE definition statement to specify whether you want the NCP to signal unit-exception status to the access method whenever it receives an end-of-transmission (EOT) character from the data link you are defining. It is usually appropriate to specify that the NCP signal the access method in this way. However, if read and write commands within the access method are command chained, you may want to specify that the NCP not signal unit-exception status because this will break the command chain. By specifying that the NCP not signal unit-exception status in this case, you prevent the command chain from being broken.

Defining the Dynamic Dump

BUILD	DYNADMP
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Use the DYNADMP operand of the BUILD definition statement to specify whether you want the dynamic dump facility included for the NCP you are defining. The dynamic dump facility is a maintenance and debugging tool that allows you to transfer the storage contents of the communication controller to the access method without disrupting the operation of the NCP. It also allows you, without disrupting the operation of the NCP, to display portions of controller storage on the host processor operator's console, activate an emulation program line trace, and dump an emulation program line trace table. In addition, if you are defining your NCP for the 3725 or 3720, the dynamic dump facility is used to activate the emulation program scanner interface trace table.

Use the DYNADMP operand to specify also the addresses of the subchannels to be used by the NCP to transfer dynamic dump data to the access method. The following rules govern which type of subchannel (native or emulation) can be used to transfer this data.

If you are defining your NCP for the 3725 or 3720:

For a type 5 channel adapter:

Only an emulation subchannel can be used for transferring dynamic dump data.

If you are defining your NCP for the 3705:

For a type 2 or type 3 channel adapter:

These types of channel adapters cannot be used for transferring dynamic dump data.

For a type 4 channel adapter:

An emulation subchannel can be used for transferring dynamic dump data regardless of whether the native subchannel is being used for network control mode operations.

The native subchannel can be used for transferring dynamic dump data as long as it is not being used for network control mode operations.

Defining the Line Trace and Scanner Interface Trace

BUILD	LINETRC
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Use the LINETRC operand of the BUILD definition statement to specify whether you want the line trace included for the data links attached to your NCP and operating in emulation mode. Use this operand to specify the maximum number of data links operating in emulation mode that you want to be able to be traced at the same time. Use this operand to specify also the number of entries to be contained in the trace table. The line trace for data links operating in emulation mode is a maintenance and debugging tool used to record the activity on all such links in the network. It is automatically included for every NCP.

Note: The NCP does not support line trace for communication lines controlled by user-written line control code that includes such products as X.25 Network Packet Switch Interface (NPSI). The request to start or stop the line trace (or scanner internal trace) is passed to the user-written I/O code. Support for the trace then becomes the responsibility of the user code.

If you are defining your NCP for the 3725 or 3720, use the LINETRC operand of the BUILD definition statement to specify also that you want the scanner interface trace included for the data links attached to your NCP operating in emulation mode. The scanner interface trace is a maintenance and debugging tool used to record the activity within the scanners installed in the communication controller. If you specify that you do want these traces included, use this operand to specify also the number of scanner interface traces you want to be able to run at the same time and the number of 512-byte blocks (containing 63 entries each) to be contained in the trace table.

Chapter 5. Defining Characteristics and Functions for SS Devices

This chapter helps you determine additional definition statements and operands you need to code to define characteristics and functions for any SS devices attached to your NCP. It covers such areas as:

- The relationship between the NCP and link-attached SS devices
- Backup and recovery
- Performance
- Block handlers
- Multiple Terminal Access (MTA) terminals
- Teletypewriter Exchange (TWX) terminals
- World Trade Teletypewriter (WTTY) terminals
- SS devices that can operate in emulation mode.

Defining the Relationship between the NCP and Link-Attached SS Devices

You must define to the NCP many physical and operational characteristics about the relationship between the NCP and any link-attached SS devices. These characteristics are in addition to those you defined using the definition statements and operands in Chapter 2. The definition statements and operands you need to code to define unique characteristics about the relationship between the NCP and link-attached SS devices are discussed below.

Defining Data Links

LINE	TYPE, LNQTCNT, MONITOR, SCLSET, (3705) SPEED, (V4R2) SPSHIFT (3705)
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Use the TYPE operand of the LINE definition statement to specify whether the data link you are defining is to operate only in network control mode,

only in emulation mode, or alternatively in either network control mode or emulation mode. A data link cannot operate in emulation mode unless you are using the Partitioned Emulation Programming (PEP) extension to include emulation functions in your NCP. In addition, the TYPE operand of the GROUP definition statement that defines the group to which the data link belongs must specify that the link can operate in emulation mode only or alternatively in either network control mode or emulation mode. If you specify that the data link can operate in network control mode only, you can code all operands discussed in this chapter except for those in “Defining SS Devices That Can Operate in Emulation Mode” on page 5-31. If you specify that the data link can operate in emulation mode only, you can code those operands discussed in “Defining SS Devices That Can Operate in Emulation Mode” on page 5-31, plus a restricted group of the other definition statements and operands discussed in this chapter. See the *EP Installation, Resource Definition, and Diagnosis* or the *EP/3705 Generation and Utilities Guide and Reference* manual for a list of these restricted definition statements and operands. If you specify that the data link can operate alternatively in either network control mode or emulation mode, you can code all operands discussed in this chapter, including those discussed in “Defining SS Devices That Can Operate in Emulation Mode” on page 5-31.

Use the LNQTCNT operand of the LINE definition statement to specify the number of times you want the NCP, after receiving data, to test the data link to ensure that the link has become electrically quiet. The link must become electrically quiet before the next data transmission begins, or loss of message data might occur.

Use the MONITOR operand of the LINE definition statement if the data link you are defining has IBM 1050 Data Communication System terminals, IBM 2741 Communication Terminals, TWX terminals, or MTA terminals attached. Use this operand to specify whether you want the NCP to monitor the link for an attention signal or a disconnect condition at the terminal. If you specify that you do want the link to be monitored, the NCP will monitor it regardless of whether the NCP is executing a command for that link. The NCP will notify the access method if it detects an attention signal or a disconnect condition. This option is required if terminals attached to the link will communicate with TSO applications.

Use the SCLSET operand of the LINE definition statement only if you are defining your NCP for the 3705. Use this operand to specify whether the data link is attached to a type 2A line set (telegraph single current line set).

Use the SPSHIFT operand of the LINE definition statement only if you are defining your NCP for the 3705. Use this operand if the data link you are defining has 83B3 Selective Calling Stations, Western Union (WU) Plan 115A Outstations, or World Trade Teletypewriter (WTTY) terminals attached to it. Use this operand to specify whether you want the NCP to react to space characters received from these devices as downshift characters. If you specify that you want the NCP to react to these characters as downshift characters, each space character it receives from a device causes the NCP to send all subsequent text characters to the access method in their downshifted form.

Defining Switched Data Links

DIALSET	LINES, DIALALT, QLIMIT, QLOAD, RESERVE
LINE	DIALSET, SECURE

Use the **LINES** operand of the **DIALSET** definition statement to specify the names of the data links that you want to make up a dial set. A dial set is a group of switched data links from which the NCP selects a link to call a device. It can contain any number of links, as long as they all have similar characteristics. This allows the NCP to use any of these links to call a device of a specific type. The names of the data links you specify in this operand are the names of the **LINE** definition statements that define those data links.

Use the **DIALALT** operand of the **DIALSET** definition statement to specify the name of an alternative dial set. You define an alternative dial set by coding another **DIALSET** definition statement immediately following the **DIALSET** macro in which you code this **DIALALT** operand. The alternative dial set must consist of the same type of data links as the primary dial set. The name you specify in this operand is the name of the **DIALSET** definition statement that defines the alternative dial set.

Use the **QLIMIT** operand of the **DIALSET** definition statement to specify the maximum number of requests you want the NCP to allow to accumulate on the queue for the dial set you are defining. When this limit is reached, the NCP rejects any further call-out requests it receives. It continues to do this until the number of requests becomes less than the value you specify in this operand. You can specify a queue limit of 0, in which case the NCP will reject any call-out request it cannot immediately service.

Use the **QLOAD** operand of the **DIALSET** operand to specify the number of call-out requests you want the NCP to allow to accumulate on the queue for the dial set you are defining before using a data link from the alternative dial set. The number you specify must not exceed that specified in the **QLIMIT** operand, for then the number of unfulfilled requests could not reach the value that would cause the NCP to use the alternative dial set.

Use the **RESERVE** operand of the **DIALSET** definition statement to specify the number of data links in the dial set that you want to be reserved for incoming calls from devices. This is needed only if all the data links in the dial set are designated as available for both incoming and outgoing calls, and all the links could become occupied with outgoing calls, thus preventing any device from being able to call the NCP.

SS Devices

Use the DIALSET operand of the LINE definition statement to specify the name of the DIALSET definition statement that defines the dial set to which the data link you are defining belongs.

Use the SECURE operand of the LINE definition statement if the data link you are defining is a duplex link. Use this operand to specify whether you want the NCP to use the secure option for the link. Use of this option prevents access to an application program's data by a SS device that dials the communication controller over this link at the moment the existing connection to a different device is lost. If you specify that this option is to be included, the NCP will continuously monitor the data carrier detect signal from the modem to give positive assurance that the switched connection is still established.

Defining Switched Network Backup

LINE	DIALALT
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Use the DIALALT operand of the LINE definition statement to specify the name of a dial set you want your NCP to use to select an alternative data link to communicate with a device when it is unable to communicate with that device over a regular nonswitched point-to-point link. Upon request from the access method, the NCP calls the device over a link included in the dial set you specify in this operand. The data links in the dial set you specify must have the same characteristics as the nonswitched link. In addition, you must specify in the OPTIONS operand of the SYSCNTRL definition statement that you want the switched network backup facility included for your NCP.

Defining Devices

LINE	CRRATE, LINESIZ
TERMINAL	TERM, ATTN, CONV, LGRAPHS, FEATURE, CRDLAY
COMP	ATTN, CONV, LGRAPHS

Use the **CRRATE** operand of the **LINE** definition statement to specify the number of print positions the carriage is to return for each idle character the NCP sends to any printers attached to the data link you are defining.

Use the **LINESIZ** operand of the **LINE** definition statement to specify the length of the print line for any printers attached to the data link you are defining. If the printers attached to the link have differing line lengths, specify in the **LINESIZ** operand the maximum length used by any printer on the link.

*Note: The value you specify for the **LINESIZ** operand divided by the value you specify for the **CRRATE** operand equals the number of idle characters that will be sent by the NCP. Carefully select the values for **LINESIZ** and **CRRATE** to suit the types of devices attached to the link. Too few idle characters following a carriage return character or a tab character will allow insufficient time for the mechanism to reach the next printing position, resulting in random printing of text characters on the print line. Too many characters, on the other hand, will cause excessive delay in the resumption of printing, resulting in wasted time on the link.*

Use the **TERM** operand of the **TERMINAL** definition statement to specify the type of SS device you are defining.

Use the **ATTN** operand of the **TERMINAL** definition statement if you are defining an IBM 1050 Data Communication System terminal, IBM 2741 Communication Terminal, TWX terminal, or WTTY terminal. If you are defining your NCP for the 3705, use this operand also if you are defining an 83B3 Selective Calling Station or a WU Plan 115A Outstation. Use this operand to specify to the NCP whether the attention feature of the SS device you are defining is enabled or disabled. If you specify that the feature is to be enabled, an attention signal received from the device will cause the NCP to stop sending to the device and to notify the access method. If you specify that the feature is disabled, the NCP will ignore the signal.

Use the **CONV** operand of the **TERMINAL** definition statement to specify whether you want the SS device you are defining to accept message data from the NCP instead of a positive response to a block of text the device has sent. This is called conversational response and occurs only if the NCP has data to send to the device. Otherwise, it sends the usual positive response. Transmitting message data instead of a positive response eliminates the turnaround time incurred when the NCP sends a positive response character followed by an addressing character to the device, then waits for a response to the addressing character before sending message data to the device.

Use the **LGRAPHS** operand of the **TERMINAL** definition statement to specify whether you want the NCP to accept or reject leading graphics sent by the SS device you are defining. Use this operand to specify the acceptance or rejection of leading graphics for both read and write operations.

Use the **FEATURE** operand of the **TERMINAL** definition statement to specify the machine features with which certain SS devices may be equipped. These features and the devices that may be equipped with them are:

- **Transmit Interrupt** (for an *IBM 1050 Data Communication Terminal, IBM 2741 Communication Terminal, IBM 3767 Communication Terminal [in 2741 mode], TWX terminal, WTTY terminal, MTA terminal, 83B3 Selective Calling Station, and WU Plan 115A Outstation*): If the device you are defining has this feature, the NCP can interrupt a transmission from the device by sending a break signal.
- **Attention Signal** (for an *IBM 1050 Data Communication Terminal, IBM 2741 Communication Terminal, IBM 3767 Communication Terminal [in 2741 mode], TWX terminal, WTTY terminal, MTA terminal, 83B3 Selective Calling Station, and WU Plan 115A Outstation*): If the device you are defining has this feature, it can interrupt the NCP while it is sending data to the device. This is true for an IBM 1050 device only if it is equipped with the receive interrupt feature. This is true for an IBM 2741 device and an IBM 3767 device (in 2741 mode) only if they are equipped with the interrupt feature.
- **Accelerated Carrier Return** (for an *IBM 1050 Data Communication System terminal*): If the IBM 1050 device you are defining has this feature, the NCP will send fewer idle characters than if the device did not have this feature. This saves a small amount of transmission time whenever the new line (NL) character occurs in message data.
- **Record Checking** (for an *IBM 2740 Communication Terminal*): If the IBM 2740 device you are defining has this feature, it will affect the command sequence the NCP uses to communicate with the device.
- **Station Control** (for an *IBM 2740 Communication Terminal, Model 1*): If the IBM 2740 device you are defining has this feature, it will affect the command sequence the NCP uses to communicate with the device.
- **Transmit Control** (for an *IBM 2740 Communication Terminal Model 1*): If the IBM 2740 device you are defining has this feature, it will affect the command sequence the NCP uses to communicate with the device.
- **Time-Out Suppression** (for an *IBM 1050 Data Communication System terminal*).

Use the **CRDLAY** operand of the **TERMINAL** definition statement if you are defining an IBM 1050 Data Communication System terminal; IBM 2740 Communication Terminal, Model 1; IBM 2741 Communication Terminal; TWX terminal; or MTA terminal. Use this operand to specify whether you want the NCP to delay executing a Write operation after receiving a carriage return. This delay will not be performed if there is a Read command queued in the NCP as the next operation for the device you are defining.

Use the **ATTN** operand of the **COMP** definition statement if you are defining an input or output component of an IBM 1050 Data Communication System terminal or a **WTTY** terminal. If you are defining your **NCP** for the 3705, use this operand also if you are defining an input or output component of a **WU Plan 115A** Outstation. Use the **ATTN** operand of the **COMP** definition statement to specify to the **NCP** whether the attention feature of the component you are defining is enabled or disabled. If you specify that the feature is enabled, an attention signal received from the component will cause the **NCP** to stop sending to the device and to notify the access method. If you specify that the feature is disabled, the **NCP** will ignore the signal.

Use the **CONV** operand of the **COMP** definition statement to specify whether you want the input or output component of the **SS** device you are defining to accept message data from the **NCP** instead of a positive response to a block of text the component has sent. This is called conversational response and occurs only if the **NCP** has data to send to the component. Otherwise, it sends the usual positive response. Transmitting message data instead of a positive response eliminates the turnaround time incurred when the **NCP** sends a positive response character followed by an addressing character to the component, then waits for a response to the addressing character before sending message data to the component.

Use the **LGRAPHS** operand of the **COMP** definition statement to specify whether you want the **NCP** to accept or reject leading graphics sent by the input or output component of the **SS** device you are defining. Use this operand to specify the acceptance or rejection of leading graphics for both read and write operations.

Defining Devices Attached to a Switched Data Link

<table style="width: 100%; border: none;"> <tr> <td style="text-align: center; vertical-align: middle;"> TERMINAL </td> <td style="text-align: center; vertical-align: middle;"> DIALNO, DIALSET, CTERM </td> </tr> </table>	TERMINAL	DIALNO, DIALSET, CTERM
TERMINAL	DIALNO, DIALSET, CTERM	

Use the **DIALNO** operand of the **TERMINAL** definition statement to specify the sequence of dial digits and the length of the number the **NCP** will use to call the **SS** device you are defining. The sequence of dial digits may include separator or end-of-number characters if an auto-call unit is installed on the communication controller and can accept these characters. A separator character causes the auto-call unit to delay sending the next dial digit until it receives a secondary dial tone. An end-of-number character is sent to the auto-call unit after the last dial digit signals the auto-call unit that it has received the last digit of the number, and causes the auto-call unit to start monitoring the data link for an answer tone from the device. Use of the end-of-number character can reduce the time needed to establish a connection. If the auto-call unit is not equipped to use separator characters, you can introduce a programmed dialing pause into the dialing action to allow time to receive a secondary dial tone. This

SS Devices

operand can be changed later, during program execution, by means of the dynamic control facility.

Use the DIALSET operand of the TERMINAL definition statement if the SS device you are defining will be called by the NCP. Use this operand to specify the name of the DIALSET definition statement that defines the dial set to be used whenever the NCP gets a call-out request for this device. The NCP attempts to call this device over one of the data links in the dial set you specify in this operand.

Use the CTERM operand of the TERMINAL definition statement if the SS device you are defining can only send calls or can both send and receive calls. Do not code this operand if the device can only receive calls. Use this operand to specify a logical-connection station. You need to code only one TERMINAL definition statement with the CTERM operand specified for each data link that has call-in devices attached. No operand in any definition statement can refer to the name of this TERMINAL definition statement.

Defining the Maximum Number of Sessions to Be Maintained

LINE	SESSION
------	---------

Use the SESSION operand of the LINE definition statement if you are defining a nonswitched multipoint data link. Use this operand to specify the number of concurrent sessions you want the NCP to maintain on this link. The NCP will not only limit the number of sessions to the number you specify in this operand, but it will also try to maintain that many sessions so as to make maximum use of the data link. The number of sessions will be less than the number you specify in this operand whenever the NCP has requests for fewer devices than the number you specify in this operand or whenever fewer devices are ready to communicate with the access method.

Defining Polling and Addressing Specifications

LINE	POLLED, AVGPB, POLIMIT
TERMINAL	POLL, ADDR
COMP	POLL, ADDR

Use the POLLED operand of the LINE definition statement to specify whether SS devices attached to the data link must be polled and addressed. If so, you must specify unique polling and addressing characters or sequences for each device by using the POLL and ADDR operands of the TERMINAL definition statement, which are discussed later in this topic. To receive data from a particular device, the NCP sends it the polling character you have assigned to the device. When the device receives this character, it unlocks its keyboard, allowing the operator to enter data or activate an input component. Similarly, to send data to the device, the NCP sends it the addressing character you have assigned to the device. This signals the device to be ready to receive data from the NCP. If a device has more than one input component, such as a card reader or tape reader, as well as a keyboard, you can specify unique polling characters or sequences for each component by using the POLL operand of the COMP definition statement, which is discussed later in this topic. This allows the NCP to solicit data from individual components. If the device has more than one output component, such as a display unit, a card punch or tape punch, as well as a printer, you can specify a unique addressing character or sequence for each component by using the ADDR operand of the COMP definition statement, which is discussed later in this topic.

Note: A device having multiple input and output components requires only a TERMINAL definition statement if the device has the common polling and addressing capability. (An example is an IBM 1050 Data Communication System device, for which the common polling character is 0 and the common addressing character is 9.) The common polling and addressing characters must be specified in the POLL and ADDR operands of the TERMINAL definition statement.

Directly following a LINE definition statement that defines an SS data link with polling, you can code a SERVICE definition statement that defines the service order table to be used for that link. For NCP lines, the NCP/EP Definition Facility (NDF) will build a default service order table if either the SERVICE definition statement or the ORDER operand on the SERVICE definition statement is omitted. The default will be a single entry for each resource on the line in the order specified in the generation deck. Code this statement only if you want more than one poll during each cycle or if you want a different sequence. This table contains one or more entries representing each device and each component of a device with which the NCP can establish a session upon request from the access method. The NCP attempts to establish sessions with devices and components in the same sequence as their respective entries appear in the service order table.

Use the AVGPB and POLIMIT operands of the LINE definition statement if the data link you are defining is a nonswitched multipoint link.

Use the AVGPB operand to specify the average number of bytes expected from an SS device attached to the data link you are defining when that device is polled. The value you specify here is used by the NCP to determine if enough buffer space exists to receive the expected data from a device that answers its poll. If buffer space is not sufficient, the NCP will delay the poll until it can ensure that all the data from the device can be handled without overrun.

SS Devices

Use the POLIMIT operand to specify the number of consecutive negative responses to polling you want the NCP to accept, and the action that you want it to take if this number is reached. The actions it can take are as follows:

- It can maintain the logical-connection, notify the access method that the negative response limit has been reached, and wait for another request from the access method before performing any further action on the link.
- It can break the logical-connection, notify the access method that it has done so, and terminate the current read request.
- It can break the logical-connection, notify the access method that it has done so, and queue the current read request onto the beginning of the queue for the device.

Use the POLL operand of the TERMINAL definition statement to specify the hexadecimal representation of the polling character you are assigning to the SS device you are defining. You do not have to code the POLL operand if the device you are defining is to be used for output only.

Use the ADDR operand of the TERMINAL definition statement to specify the hexadecimal representation of the addressing character you are assigning to the SS device you are defining. You do not have to code the ADDR operand if the device you are defining is to be used for input only.

Use the POLL operand of the COMP definition statement if you are defining an input component of the device you defined in the TERMINAL definition statement. Use this operand to specify the hexadecimal representation of the polling character you are assigning to the input component.

Use the ADDR operand of the COMP definition statement if you are defining an output component of the device you defined in the TERMINAL definition statement. Use this operand to specify the hexadecimal representation of the addressing character you are assigning to the output component.

Defining Data Characteristics

LINE	CODE	
	FGSLTRS	(3705)

Use the CODE operand of the LINE definition statement to specify the transmission code the NCP is to use when communicating with the SS devices attached to the data link you are defining. The NCP translates outgoing data characters from its internal processing code, EBCDIC, to the code you specify in this operand, and vice versa for incoming characters. The transmission code used on a multipoint data link must be the same for

all devices attached to that link. Associated with each transmission code is a translation table contained within the NCP. The contents of the translation tables are defined in the *NCP and EP Reference Summary and Data Areas* manual.

Use the FGSLTRS operand of the LINE definition statement only if you are defining your NCP for the 3705. Use this operand if the data link you are defining has 83B3 Selective Calling Stations, WU plan 115A Outstations, or WTTY terminals attached. Use this operand to specify whether you want the NCP to delete FIGS and LTRS characters from message text received from 83B3, 115A, or WTTY terminals. The NCP will delete these characters unless you specify that you do not want it to.

Defining End of Transmission

TERMINAL	ENDTRNS
COMP	ENDTRNS

Use the ENDTRNS operand of the TERMINAL definition statement to specify whether you want the NCP to consider a transmission from the SS device you are defining terminated by either an end-of-transmission (EOT) character or an end-of-block (EOB) character.

Use the ENDTRNS operand of the COMP definition statement to specify whether you want the NCP to consider a transmission from the input or output component of the SS device you are defining terminated by either an end-of-transmission (EOT) character or an end-of-block (EOB) character.

Defining Delay between Successive Transmissions for Buffered Devices

TERMINAL	BFRDLAY
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Use the BFRDLAY operand of the TERMINAL definition statement if the SS device you are defining is a buffered device and is attached to a nonswitched multipoint data link. The IBM 2740 Communication Terminal (Model 2, with buffered receive feature) is a buffered device. This device receives incoming data into buffers at a high speed and then presents the data at a much slower speed. If the NCP has multiple data blocks to send to the same device, it must wait after sending each block for the device to present the contents of its buffer before the NCP can send the next block. Use the BFRDLAY operand of the TERMINAL definition statement to specify the time you want the NCP to wait after sending a block of data to the device before sending the next one. If the buffered device is attached to a nonswitched multipoint data link, the NCP can use the time the data link would otherwise be idle for communicating with other devices. That is, at

any given moment the NCP can be sending data to one of several devices while the others are displaying data received earlier.

Defining Backup and Recovery Procedures

Several facilities provide protection for the SS devices attached to your NCP if any of the other network resources fail. The definition statements and operands you need to code to define the relationship of the NCP to these facilities are discussed below.

Defining Automatic Network Shutdown Notification

BUILD	CSMSG, CSMSGC
TERMINAL	CRITSIT

Automatic network shutdown (ANS) is a procedure that occurs when the NCP can no longer communicate with an access method that owns some of its link-attached devices. ANS can have the following results for SS data links:

- The NCP will dissociate a data link from the owning access method with which communication has been lost.
- The NCP will cancel any line traces or online tests that are being performed on the data link.
- The NCP will cancel the command currently being run for the data link.
- If the data link is switched, the NCP will break the switched connection.

ANS can have the following results for SS devices:

- The NCP will cancel any commands currently pending for the device.
- The NCP will send a predefined message to devices that you specify to receive this message, notifying them of the impending shutdown.
- The NCP will cancel any sessions in which the device is currently active.
- If monitor mode is currently in effect for the device, the NCP will reset the device.

Use the CSMSG and CSMSGC operands of the BUILD definition statement to specify the text of a critical-situation message that you want the NCP to send to each active SS device notifying it of an impending shutdown.

Use the CRITSIT operand of the TERMINAL definition statement to specify that you want the NCP to send a message to the SS device you are defining, notifying it of an impending shutdown. This message is the message you specify in the CSMSG and CSMSGC operands of the BUILD definition statement. The NCP does not automatically send a message to notify devices when the network is again operational; this is the responsibility of the access method.

Defining Error Recovery

GROUP	CRETRY
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Use the CRETRY operand of the GROUP definition statement to specify the maximum number of error recovery attempts you want the NCP to make if recoverable errors occur during polling and addressing operations on any data link in the group you are defining.

Defining Performance Characteristics

Several operational characteristics about the relationship of the NCP to the SS devices attached to it that, depending on how you define them, affect the performance of the network. These characteristics and the definition statements and operands you need to code to define them are discussed below. In most cases, it is difficult to determine how your network will perform until all the resources are installed and fully operational. Therefore, the values you specify on the operands discussed in this topic may need to be changed after you have a chance to observe how efficiently your network is operating.

Defining Data Transfer Specifications

LINE	CUTOFF
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Use the CUTOFF operand of the LINE definition statement to specify the maximum number of subblocks you want the NCP to accept from an SS device attached to the data link you are defining. A subblock is the sequence of message text occupying the number of buffers you specify in the TRANSFR operand of the LINE definition statement. If the NCP receives the number of subblocks you specify in the CUTOFF operand before receiving an end-of-block character from the device, it stops transmission.

Otherwise, it continues to accept data from the device until it receives an end-of-block character. If any subblock contains an error (indicated by a bit in the response header for the subblock), the application program will usually discard all of the subblocks in the block, not only the one in error. There is no provision for requesting retransmission of subblocks in error.

Defining Timing Specifications

BUILD	ITEXTTO
LINE	POLLTO, SERVPRI

Use the ITEXTTO operand of the BUILD definition statement to specify a text time-out value that will override the value you specify in the TEXTTO operand of the GROUP definition statement. This value will override the GROUP definition statement text time-out specification only if you specify in the INHIBIT operand of the TERMINAL definition statement that this value will be initially overridden for the data link to which the device you are defining is attached.

Use the POLLTO operand of the LINE definition statement to specify whether you want the NCP to treat a time-out occurring during polling as an error condition or as a negative response. If you specify that you want it to be treated as an error condition, the value you specify in the CRETRY operand of the GROUP definition statement will determine the number of subsequent attempts the NCP will make at polling the SS devices attached to the data link you are defining. If you specify that the time-out is to be treated as a negative response, the value you specify in the POLIMIT operand of the LINE definition statement for the data link you are defining will determine the number of times the NCP will repoll the devices attached to the link.

Use the SERVPRI operand of the LINE definition statement if you are defining a multipoint SS data link. Use this operand to specify whether you want the NCP to give priority to servicing current sessions on the link, or to establishing new sessions on the link.

Defining Initial Inhibition of NCP Functions

TERMINAL	INHIBIT
COMP	INHIBIT

Use the INHIBIT operand of the TERMINAL definition statement to specify which of certain NCP functions you do not want to be in effect for the SS device you are defining when the NCP first starts executing. The functions that can be initially inhibited for a SS device are:

- The text time-out value specified on the TEXTTO operand of the GROUP definition statement. If you specify that the text time-out value be initially inhibited, the NCP will use the value specified in the ITEXTTO operand of the BUILD definition statement as the time limit between receipt of successive text characters.
- The automatic insertion of idle characters following carriage return and horizontal tab characters. If you specify that this function be initially inhibited, no idle characters will be sent.
- The subblocking you specify in the TRANSFR operand of the LINE definition statement. If you specify that this subblocking be initially inhibited, when the number of buffers specified by the TRANSFR operand is filled by received text, the NCP will terminate the receive operation just as if the cutoff limit specified by the CUTOFF operand of the LINE definition statement had been reached.
- The recovery procedures for text-read errors specified by the RETRIES operand of the LINE definition statement. If you specify that these procedures be initially inhibited, the NCP will not attempt recovery for text-read errors.
- The recovery procedures for text-write errors specified by the RETRIES operand of the LINE definition statement. If you specify that these procedures be initially inhibited, the NCP will not attempt recovery for text-write errors.

Use the INHIBIT operand of the COMP definition statement to specify which of certain NCP functions you do not want to be in effect for the input or output component of the SS device you are defining when the NCP first starts executing. The functions that can be initially inhibited for a SS device are:

- The text time-out value specified on the TEXTTO operand of the GROUP definition statement. If you specify that the text time-out value be initially inhibited, the NCP will use the value specified in the ITEXTTO operand of the BUILD definition statement as the time limit between receipt of successive text characters.

- The automatic insertion of idle characters following carriage return and horizontal tab characters. If you specify that this function be initially inhibited, no idle characters will be sent.
- The subblocking you specify in the TRANSFR operand of the LINE definition statement. If you specify that this subblocking be initially inhibited, when the number of buffers specified by the TRANSFR operand is filled by received text, the NCP will terminate the receive operation just as if the cutoff limit specified by the CUTOFF operand of the LINE definition statement had been reached.
- The recovery procedures for text-read errors specified by the RETRIES operand of the LINE definition statement. If you specify that these procedures be initially inhibited, the NCP will not attempt recovery for text-read errors.
- The recovery procedures for text-write errors specified by the RETRIES operand of the LINE definition statement. If you specify that these procedures be initially inhibited, the NCP will not attempt recovery for text-write errors.

Defining Transmission Interrupts

BUILD	XBREAK
-------	--------

Use the XBREAK operand of the BUILD definition statement to specify the length, in character times, of the break signal you want the NCP to place on data links connected to it. The break signal causes transmission to be interrupted from SS devices that you specify are capable of interrupting their transmission to the NCP. You specify this using the FEATURE operand of the TERMINAL definition statement.

Defining Block Handlers

A block handler is a set of routines that perform special functions for blocks of message data received by the NCP. These functions can be performed on data the NCP receives from the access method before it sends it to the device. The functions can also be performed on data the NCP receives from the device before it sends the data to the access method. The requirements for determining how the NCP is to process message data depend on the application and may vary for different devices and different components of devices.

The definition statements and operands you need to code to define block handlers are discussed below.

Defining the Beginning of a Block Handler

STARTBH	BHEXEC
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Use the STARTBH definition statement to indicate that this is the beginning of the block handler you are defining. Use the BHEXEC operand of the STARTBH definition statement to specify at which point the block handler you are defining will be run. The points at which block handlers can be run are:

- Point 1: Block handlers at this point process data immediately upon receipt from the access method (output to the device), before the NCP has determined that a data link is available for communicating with the device.
- Point 2: Block handlers at this point:
 - Process output data just before sending data on the link after the NCP has determined that a data link is available for communicating with the device
 - Process input data just after receiving data from the link and while the link is still being held for the device.
- Point 3: Block handlers at this point process data received from a device (input from the device), after the NCP has released the data link to which the device is attached for use in communicating with another device.

Defining Time and Date Routine

DATETIME	DATE, DATEFMT, TIME, INSERT, PT2EXEC
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Use the DATE operand of the DATETIME definition statement to specify whether you want the NCP to insert the current date in a block of data. It will insert the date immediately before the first text character in the block.

Use the DATEFMT operand of the DATETIME definition statement to specify how you want the NCP to print the date. The date can be in any of four formats:

- Month/day/year; for example, 04/22/84
- Year/month/day; for example, 84/04/22
- Day/month/year; for example, 22/04/84
- Year followed by day of year; for example, 84.112, which is April 22, the 112th day of the year.

Use the TIME operand of the DATETIME definition statement to specify whether you want the NCP to insert the current time in a block of data. It will insert the time immediately preceding the first text character in the block. If you specify that you want the date to also be inserted, the time will follow the date.

Note: You must specify that either the date or the time be inserted. You cannot specify that both of them not be inserted.

Use the INSERT operand of the DATETIME definition statement to specify whether you want the NCP to insert the date and time only in the first block of each message or in all blocks.

Use the PT2EXEC operand of the DATETIME definition statement if the block handler you are defining is executable only at point 2. Use this operand to specify whether the NCP is to insert the date and time before the I/O operation on output or after the I/O operation on input.

Defining Edit Routine

EDIT	BKSP
------	------

Use the EDIT definition statement if the block handler you are defining is executable at point 2 on input or point 3. Use this definition statement to specify whether you want the NCP to include the text correction function. Use the BKSP operand of the EDIT definition statement to specify the character you want to be used as a text canceling character. A text canceling character allows the keyboard operator to signal the NCP to correct text incorrectly entered. The NCP corrects incorrectly entered text by scanning each block of received data for any text canceling characters. It then deletes from the block each such character it finds, plus one preceding text character for each canceling character. For example, the keyboard operator might enter COMMUNCIATE, and, seeing that it is misspelled, enter five text canceling characters to back-up to the first erroneous character. The keyboard operator must then re-enter the correct characters. If you specified in the BKSP operand that the text canceling character is the backspace character, the keyboard operator would enter:

```
COMMUNCIATE bks bks bks bks bks ICATE
```

The NCP will delete the five text canceling characters (backspaces) plus the five text characters before those backspaces. The remaining characters form the correctly spelled word, COMMUNICATE.

The text canceling character does not have to be a backspace character. You can use any other character (except a line control character), as long as it is not used in any other way within message text.

Defining User-Written Routines

UBHR	NAME, ENTRY, ACCESS, COMMAND, PT2EXEC
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Use the UBHR definition statement to specify that you are including user-written block-handling routines in the block handler you are defining. User-written block-handling routines permit you to add certain data-handling functions to the NCP. These routines typically examine and manipulate incoming or outgoing data contained in NCP buffers. If you have a good understanding of the NCP and your access method, you can add such routines to the NCP with little likelihood of disrupting the NCP code. However, adding routines that perform more complex functions, such as leasing and releasing buffers or scheduling I/O operations, requires that you have a thorough understanding of the internal operation of the NCP and the access method. Adding such routines must be approached with care to avoid disrupting the NCP logic.

You code a user-written block-handling routine using the communication controller assembler language and assemble it using the controller assembler. Specific rules and guidelines to be observed in coding user-written block-handling routines are as follows:

Note: In the following list, the term macro invocation refers to 3725 assembler language.

- All registers can be used in a user-written block-handling routine. Before passing control to a user-written routine, the NCP saves all registers. When receiving control from the routine, it restores all registers.
- At entry to a user-written block-handling routine, register 2 points to the queue on which the block being handled is enqueued.
- A POINT (2), (3) macro invocation causes the address of the block at the head of the queue to be returned in register 3.
- You can use a SCAN macro invocation to scan the text in chained NCP buffers containing the block being processed.

- You can use the DEQUE, ENQUE, and INSERT macro invocation to dequeue, enqueue, and insert the block whose address was returned by the POINT macro invocation.
- You can use the LEASE macro invocation to obtain NCP buffers. You must use a RELEASE macro invocation to release any buffers thus obtained.
- Use a SYSXIT macro invocation to return control from the user-written block-handling routine to the NCP.
- If a user-written block-handling routine is to be run for more than one SS device or data link, code it such that it is serially reusable.
- The *NCP Customization* manual describes the macro formats, gives details for use of supervisory macros, and describes NDF internal utilities.
- If the user-written routine changes the amount of message text accompanying a basic transmission unit (BTU), the routine must accordingly update the BCUTLEN field of the BTU and the data count fields of the buffer prefix areas.
- Ensure that user-written block-handling routines do not modify any part of the first 34 bytes (the BTU) of a header buffer or the first 4 bytes of any other buffer.
- Logic errors encountered in user-written block-handling routines can cause the NCP to abend.

Use the NAME operand of the UBHR definition statement to specify the name of the user-written module.

Use the ENTRY operand of the UBHR definition statement to specify the name of the entry point within the user-written module you specify in the NAME operand.

Use the ACCESS operand of the UBHR definition statement if the block handler you are defining is executable at point 2 or point 3. Use this operand to specify whether you want the user-written block-handling routine to process only error-free blocks of data or only blocks containing errors.

Use the COMMAND operand of the UBHR definition statement if the block handler you are defining is executable at point 2 or point 3 and processes error-free, incoming data. Use this operand to specify whether you want the user-written block-handling routine to process data received in response to a Read request, an Invite request, or both.

Use the PT2EXEC operand of the UBHR definition statement if the block handler you are defining is executable only at point 2. Use this operand to specify whether you want the user-written block-handling routine to process outgoing message data before the I/O operation or input message data after the I/O operation.

Defining Control Character Removal

REMOVCTL

Use the REMOVCTL definition statement to specify whether you want the NCP to remove the ending control characters from incoming data blocks for TWX terminals. The NCP will remove these control characters only from data blocks in which it detects an ending sequence. This definition statement has no operands.

Defining the End of a Block Handler

ENDBH

Use the ENDBH definition statement to indicate that this is the end of the block handler you are defining. This definition statement has no operands.

Defining Block Handler Sets

BHSET	EXEC, PT1, PT2, PT3
TERMINAL	BHEXEC, BHSET, PT3EXEC
COMP	BHEXEC, BHSET, PT3EXEC

Use the EXEC operand of the BHSET definition statement to specify whether the block handler set you are defining can be run when it is dynamically assigned to a device by command from the access method.

Use the PT1 operand of the BHSET definition statement to specify the name of the block handler to be run at point 1.

Use the PT2 operand of the BHSET definition statement to specify the name of the block handler to be run at point 2.

Use the PT3 operand of the BHSET definition statement to specify the name of the block handler to be run at point 3.

Use the BHSET operand of the TERMINAL definition statement to specify the name of the block handler set associated with the SS device you are defining. Use this operand to specify also whether you want the block handler set to be run without being activated by the access method. If you do, the block handler set will be activated during initialization of the NCP. If you do not, it must be activated by a request from the access method. You can also use the BHSET operand to specify that no block handler set is initially assigned to the device you are defining, but that one can be assigned dynamically by the access method.

Use the BHEXEC operand of the TERMINAL definition statement to specify which block handlers in the block handler set you specify in the BHSET operand of the TERMINAL definition statement are to be run.

Use the PT3EXEC operand of the TERMINAL definition statement to specify whether a block handler that is run at point 3 is to be associated with the device you are defining.

Use the BHSET operand of the COMP definition statement to specify the name of the block handler set associated with the input or output component of the SS device you are defining. Use this operand to specify also whether you want the block handler set to be run without being activated by the access method. If you do, the block handler set will be activated during initialization of the NCP. If you do not, it must be activated by a request from the access method. You can also use the BHSET operand to specify that no block handler set is initially assigned to the component you are defining but that one can be assigned dynamically by the access method.

Use the BHEXEC operand of the COMP definition statement to specify which block handlers in the block handler set you specify in the BHSET operand of the COMP definition statement are to be run.

Use the PT3EXEC operand of the COMP definition statement to specify whether a block handler that is run at point 3 is to be associated with the component you are defining.

Defining Multiple Terminal Access (MTA) Terminals

The multiple terminal access facility is a feature of the NCP that allows it to communicate with a variety of dissimilar SS devices over the same switched network connection, or port. These devices are:

- IBM 1050 Data Communication System terminals
- IBM 2740 Communication Terminals (basic)
- IBM 2740 Communication Terminals (with Record Checking)
- IBM 2740 Communication Terminals (with Transmit Control)

- IBM 2740 Communication Terminals (with Transmit Control and Record Checking)
- IBM 2741 Communication Terminals
- IBM 3767 Communication Terminals (supported as IBM 2741 Communication Terminals)
- Teletypewriter Exchange (TWX) terminals.

Note: In an MTA environment, the 2741 and the 3767 (in 2741 mode) are mutually exclusive.

Terminals under the control of the MTA facility of the NCP require a sign-on procedure to allow the NCP to determine the type of terminal that is calling the controller. The NCP analyzes the sign-on message and control characters received from the terminal to determine the type of terminal and the transmission code it uses, then selects the appropriate control procedures for use with that terminal. It uses the selected procedure for as long as the connection to that terminal exists. See Appendix B for information about the sign-on procedures for the various types of MTA terminals.

You must define to the NCP many physical and operational characteristics about the relationship of the NCP to MTA terminals. These characteristics and the definition statements and operands you need to code to define them are discussed below.

Defining Terminal Operation

MTALCST	GROUP, SPEED, ACR, CLOCKNG, CODE, CRRATE, DATRATE, INTPRI, (3705) LCTYPE, LINESIZ, RETRIES, TRANSFR
TERMINAL	LCST

The MTALCST definition statement defines entries in a line control selection table that is generated for the MTA data links connected to the NCP. Each entry represents a particular combination of device characteristics that define an MTA terminal that can call the NCP on an MTA data link. Code one MTALCST definition statement for each distinct combination of parameters you need to define the MTA terminals attached

to your NCP. You define MTA terminals using individual `TERMINAL` definition statements.

Use the `GROUP` operand of the `MTALCST` definition statement to specify the name of a stand-alone `GROUP` definition statement that defines device characteristics that are the same as the characteristics of the MTA terminal associated with the entry you are defining.

Use the `SPEED` operand of the `MTALCST` definition statement to specify the data rate of the MTA data link associated with the entry you are defining.

Use the `ACR` operand of the `MTALCST` definition statement to specify whether the IBM 1050 Data Communication System terminals that can call the NCP on the data link associated with the entry you are defining are equipped with the accelerated carrier return feature.

Use the `CLOCKNG` operand of the `MTALCST` definition statement to specify whether the modem or the communication scanner for the MTA data link associated with the entry you are defining is to provide clocking. A modem provides external clocking. A scanner provides internal clocking, also known as business machine clocking.

Use the `CODE` operand of the `MTALCST` definition statement to specify the type of transmission code the NCP is to use to communicate with the terminal associated with the entry you are defining. The NCP will translate outgoing data characters from the internal processing code, EBCDIC, to the code you specify in this operand, and vice versa for incoming characters. The transmission code used on a multipoint data link must be the same for all devices attached to that link. Associated with each transmission code is a translation table contained within the NCP. The contents of the translation tables are defined in the *NCP and EP Reference Summary and Data Areas* manual.

Use the `CRRATE` operand of the `MTALCST` definition statement to specify the number of print positions the carriage is to return for each idle character the NCP sends to any printers attached to the MTA data link associated with the entry you are defining.

Use the `DATRATE` operand of the `MTALCST` definition statement if the modem that attaches the MTA data link associated with the entry you are defining to the communication controller is a dual-rate modem. Use this operand to specify whether the data link connected to this modem is to operate at a high rate or a low rate, where the rate can be controlled by the NCP.

Use the `INTPRI` operand of the `MTALCST` definition statement only if you are defining your NCP for the 3705. Use this operand to specify the interrupt priority for the MTA data link associated with the entry you are defining.

Use the `LCTYPE` operand of the `MTALCST` definition statement to specify the type of terminal that will use the entry you are defining. In MTA operation, a type of terminal refers not to a particular numeric designation,

such as IBM 1050 Data Communication System device or IBM 2741 Communication Terminal, but to a unique combination of the line control and transmission code used by the terminal. For example, an IBM 1050 Data Communication System device using BCD code and an IBM 1050 Data Communication System device using EBCD code represent two different types of terminals, even though they are both IBM 1050 Data Communication System devices.

Use the `LINESIZ` operand of the `MTALCST` definition statement to specify the length of the print line for any printers attached to the MTA data link associated with the entry you are defining.

Use the `RETRIES` operand of the `MTALCST` definition statement to specify the number of attempts you want the NCP to make to recover from errors in message data sent to or received from an IBM 1050 Data Communication System terminal or IBM 2740 Communication Terminal (with Record Checking) MTA terminal.

Use the `TRANSFR` operand of the `MTALCST` definition statement to specify a limit on the number of buffers that the NCP will obtain to receive message text from the MTA terminal associated with the entry you are defining before transferring the contents of filled buffers to the access method. If the NCP receives the specified number of buffers, it transfers their contents to the access method as a sub-block but continues to receive message text from the terminal until it receives an end-of-block or end-of-transmission character.

Use the `LCST` operand of the `TERMINAL` definition statement to specify the name of the `MTALCST` definition statement that defines the set of device characteristics to be used by the NCP when it calls the MTA terminal you are defining.

Defining Terminal Type

<code>MTALIST</code>	<code>LCTYPE</code>
<code>LINE</code>	<code>MTALIST</code>

Use the `LCTYPE` operand of the `MTALIST` definition statement to specify the type of terminals that can call a particular MTA data link. The `MTALIST` definition statement must immediately follow the `MTALCST` definition statement or macros defining the terminal types.

Use the `MTALIST` operand of the `LINE` definition statement to specify the name of the `MTALIST` definition statement that defines the list that identifies the types of terminals that can call the NCP over the MTA data link you are defining.

SS Devices

Defining Polling Character

MTAPOLL	POLL
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Use the POLL operand of the MTAPOLL definition statement to specify the list of polling characters to be used by IBM 1050 Data Communication System MTA terminals that can call the controller over any call-in MTA data link.

Defining Data Links

MTATABL	CODE, LCTYPE, LCST
---------	--------------------------

You must code the MTATABL definition statement if you specify any MTA lines. Code an MTATABL definition statement for each unique combination of line control and transmission code that you define in an MTALCST definition statement.

Use the CODE operand of the MTATABL definition statement to specify the transmission code used by the type of MTA terminal you are coding this definition statement for.

Use the LCTYPE operand of the MTATABL definition statement to specify the type of line control used by the type of MTA terminal you are coding this definition statement for.

Use the LCST operand of the MTATABL definition statement to specify the names of up to ten MTALCST definition statements that define the same line control and transmission code as the MTATABL definition statement you are coding.

Defining Performance Characteristics

BUILD	MTARTO, MTARTRY
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Use the MTARTO operand of the BUILD definition statement to specify the reply timeout value you want the NCP to use when it is called by an MTA terminal.

Use the `MTARTRY` operand of the `BUILD` definition statement to specify the number of times you want the NCP to retry the MTA sign-on procedure after it identifies the type of MTA terminal that called it.

Defining Teletypewriter Exchange (TWX) Terminals

You must define to the NCP several physical and operational characteristics about the relationship of the NCP to the TWX terminals attached to it. These characteristics and the definition statements and operands you need to code to define them are discussed below.

Defining Terminals Attached to a Switched Data Link

<code>BUILD</code>	<code>TWXID</code>
<code>IDLIST</code>	<code>IDSEQ,</code> <code>MAXLEN,</code> <code>NOMATCH</code>
<code>LINE</code>	<code>SPEED,</code>
<code>TERMINAL</code>	<code>IDSEQ,</code> <code>CUIDLEN,</code>

Use the `TWXID` operand of the `BUILD` definition statement to specify the characters the NCP is to use as the answerback and prompting sequences to be sent to all TWX terminals whenever a switched connection is established between a terminal and the NCP. You specify two sets of characters: one to be used when the connection is initiated by the terminal, and one to be used when the connection is initiated by the NCP. The last character you specify (presumably an X-on or WRU) is not transmitted during the initial ID answerback or subsequent prompting sequences that are sent as part of each TWX terminal read operation. Instead, the NCP generates and sends an X-on character in place of the last character you specify. Prompting is selected by the access method through set destination mode and is always bypassed if data has been received in read-ahead mode. You must specify the length of the answerback sequence to be sent in the `CUIDLEN` operand of the `TERMINAL` definition statement for each TWX terminal. If you omit the `CUIDLEN` operand, the program does not send the answerback sequence to the TWX terminal.

Use the `IDSEQ` operand of the `IDLIST` definition statement to specify an identification sequence to be used by each TWX terminal that will call or be called by the NCP. Use this operand to specify also the name of the `TERMINAL` definition statement representing the terminal associated with the identification sequence you are defining.

Use the `MAXLEN` operand of the `IDLIST` definition statement to specify the maximum size of the list of ID sequences you specify in the `IDSEQ`

operand. Code the MAXLEN operand of the IDLIST definition statement only if the access method uses the dynamic control facility to either add entries to the list or to increase the size of one or more existing entries in the list. This operand specifies the size of the *list* (in bytes), not the number of entries in the list. It includes the number of bytes in all entries, plus the control field that precedes the list.

Use the NOMATCH operand of the IDLIST definition statement to specify the action the NCP is to perform if it does not receive an ID sequence from a calling terminal or if it receives an ID sequence that is not defined in this IDLIST definition statement. You can specify that the NCP indicate in a response to the access method that no ID sequence was received and that the NCP pass on any unrecognized ID sequences. Otherwise, you can specify that the NCP break the data link connection and not send any unrecognized ID sequences to the access method.

For NCP V4R2 Users: Use the SPEED operand of the LINE definition statement if you want to enable the *auto-speed detect* function only if you are defining an NCP V4R2. The auto-speed detect function allows the NCP to determine the speed for the data link you are defining.

NCP V4R2 can determine the speed for the data link you are defining if you specify certain parameters on the SPEED operand of the LINE definition statement. The speeds that the NCP supports depend on the hardware configuration of your 3725 or 3720. In particular it depends on the level of the installed Internal Clocking Control (ICC) card. To specify the SPEED operand correctly you need to determine if you have installed in your controller an Internal Clocking Card-1 or Internal Clocking Card-2.

Use the IDSEQ operand of the TERMINAL definition statement to specify whether you want the TWX terminal you are defining to send an ID sequence when it calls or is called by the NCP and, if so, how the NCP is to react to the sequence.

Use the CUIDLEN operand of the TERMINAL definition statement to specify the length of the ID sequence the NCP is to send to the TWX terminal you are defining when the connection is initiated by the terminal. This ID sequence is defined in the TWXID operand of the BUILD definition statement.

Defining Character Transmission

GROUP	CHAREC, FRAMING
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Use the CHAREC operand of the GROUP definition statement to specify the message-ending characters to be recognized by the NCP when it receives data from the TWX terminals attached to the data links in the group you are defining. The NCP will not recognize any characters other than WRU, XON, XOFF, or EOT unless you specify them in this operand.

Use the **FRAMING** operand of the **GROUP** definition statement to specify the number of stop bits per character you want the NCP to send and expect to receive from the TWX terminals attached to the data links in the group you are defining.

Defining Prompting Sequence

LINE	PROMPT
TERMINAL	XTWXID

Use the **PROMPT** operand of the **LINE** definition statement to specify whether you want your NCP, at **READ** time, to provide the TWX ID and/or **PROMPT** for the data link you are defining.

*Note: The TWXID sequence is referred to as an **ID** at line activation time and as a **PROMPT** at READ time.*

Use the **XTWXID** operand of the **TERMINAL** definition statement to specify whether you want your NCP, at line activation time, to transmit the TWX ID and/or **PROMPT** for the data link you are defining.

Defining Parity

GROUP	PECHAR
LINE	PARCHK, PARGEN

Use the **PECHAR** operand of the **GROUP** definition statement to specify the hexadecimal representation of the data character that you want the NCP to use to overlay a character with incorrect parity received from the TWX terminals attached to the data links in the group you are defining.

Use the **PARCHK** operand of the **LINE** definition statement to specify whether you want the NCP to check for odd, even, mark, or space parity, or not to set parity for the TWX terminals attached to the data link you are defining.

Use the **PARGEN** operand of the **LINE** definition statement to specify whether you want the NCP to generate even, odd, mark, or space parity, or not to set parity for data transmitted on the data link you are defining.

Defining Keyboard Lock Function

GROUP	KBDLOCK
-------	---------

Use the KBDLOCK operand of the GROUP definition statement to specify the hexadecimal representation of the nonprinting, nonspace character you want the NCP to send to the TWX terminals attached to the data links in the group you are defining to signal the operators to stop using the keyboard. A TWX terminal is not polled or addressed and has no control of contention for send and receive. Because the terminal keyboard is not usually locked before transmission to the terminal, it is possible for an operator to be entering data while the NCP is sending data to the terminal. This results in the loss of the entered data since the NCP cannot receive data while it is transmitting. By using the KBDLOCK operand, you can prevent an operator from entering data before the NCP is ready to receive. If you want the KBDLOCK function to be included for the TWX terminals in the group you are defining, you must also specify that you want the NCP to monitor the data link to which a particular TWX terminal is attached for an attention signal or disconnect condition using the MONITOR operand of the LINE definition statement that defines this link.

Note: The NCP also provides an internal safeguard against loss of data due to an unlocked keyboard by automatically executing a READ command when no other command is executing and it is not in monitor mode.

Defining TWX Multiple Terminal Access (MTA) Terminals

MTALCST	COMPARE, MASK
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Use the COMPARE operand of the MTALCST definition statement to specify the hexadecimal representation of the compare character you want the NCP to use during the line control selection table (LCST) entry selection process for TWX terminals that are attached to MTA data links. The mask character you specify in the MASK operand of the MTALCST definition statement is logically ANDed with the first character the NCP receives from a TWX terminal. If the result equals the compare character you specify in the COMPARE operand, the contents of the LCST entry you are defining with this MTALCST definition statement are used to initialize the operating characteristics for the terminal.

Use the MASK operand of the MTALCST operand to specify the hexadecimal representation of the mask character you want the NCP to use during the LCST entry selection process for TWX terminals attached to MTA data links.

Defining World Trade Teletypewriter (WTTY) Terminals

You must define to the NCP several physical and operational characteristics about the relationship of the NCP to the WTTY terminals attached to it. These characteristics and the definition statements and operands you need to code to define them are discussed below.

Defining Character Transmission

GROUP	PADCNT, WTTYEOB, WTTYEOT
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Use the PADCNT operand of the GROUP definition statement to specify the number of idle characters you want the NCP to send to the WTTY terminals attached to the data links in the group you are defining. These idle characters give the terminal time for its motor to reach full speed before it receives data from the NCP. You do not have to code this operand if all of the WTTY terminals attached to the data links in the group you are defining are equipped with continuously running motors.

Use the WTTYEOB operand of the GROUP definition statement to specify the hexadecimal representation of the end-of-block (EOB) sequence required for the WTTY terminals attached to the data links in the group you are defining.

Use the WTTYEOT operand of the GROUP definition statement to specify the hexadecimal representation of the end-of-transmission (EOT) required for WTTY terminals attached to the data links in the group you are defining.

Defining SS Devices That Can Operate in Emulation Mode

Devices that can operate in emulation mode are those attached to data links that you specify can operate either in emulation mode only or, alternatively, in either network control mode or emulation mode. Remember, a data link cannot operate in emulation mode unless you are using the Partitioned Emulation Programming (PEP) extension to include emulation functions in your NCP. You must define to the NCP many physical and operational characteristics about the relationship of the NCP to these devices. The definition statements and operands you need to code to define these characteristics are discussed below.

Defining the Communication Controller

CSB	WRAPLN	(3705)
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Use the WRAPLN operand of the CSB definition statement only if you are defining your NCP for the 3705. Use this operand to specify the line address the NCP will use to send test data when performing a wraparound test. The data link whose line address you specify need not be dedicated to the wraparound test operation. It can be any data link that can be conveniently closed to normal message traffic when a wraparound test is needed. Both the link you specify in this operand and the link to be tested must be closed to normal message traffic for the duration of the test. The online terminal test program selects the link to be tested.

Defining the Channel

BUILD	HICHAN, LOCHAN
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Use the HICHAN operand of the BUILD definition statement to specify the highest subchannel address on each channel adapter associated with any data link that can operate in emulation mode.

Use the LOCHAN operand of the BUILD definition statement to specify the lowest subchannel address on each channel adapter associated with any data link that can operate in emulation mode.

The address range specified by the HICHAN and LOCHAN operands applies only to emulation subchannels. The network control subchannel address may, but need not, lie within this range. The range of emulation subchannel addresses must not include any addresses associated with shared unit control words (UCWs) in the host processor. Optimum storage utilization is obtained by sequential addressing of all emulation subchannels. Each unassigned subchannel address between the values specified by the HICHAN and LOCHAN operands adds 10 bytes to the NCP storage requirements.

Specify values in the HICHAN and LOCHAN operands to correspond to the high and low subchannel addresses actually installed within the communication controller. Failure to follow this recommendation might cause the following:

- All commands (except Sense, Test I/O, and I/O No-Op) issued to unassigned subchannels within the range you specify will be rejected. Unassigned subchannels are those not specified in the ADDRESS

operand of any LINE definition statement or in the DYNADMP operand of the BUILD definition statement.

- All commands issued to subchannels outside the range you specify will result in a permanently busy (hung) subchannel. Although the channel adapter recognizes as valid any commands issued for a subchannel address outside of this range, the emulation program does not recognize the address, and therefore ignores any such commands received from the host processor channel.
- If a unit control block (UCB) exists for a device associated with a subchannel outside the range you specify but within the channel adapter's range, initial program load (IPL) of the operating system in the host processor cannot be completed because Test I/O and Sense commands—though accepted by the controller—are ignored.

Defining Data Links

LINE	DUALCOM, USE
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Use the DUALCOM operand of the LINE definition statement if the data link you are defining is emulating a data link connected to an IBM 2701 Data Adapter Unit with the dual communication interface feature. Use this operand to specify the alternative relative line number of the data link formerly attached to the 2701 dual communication interface and to specify which interface the data link you are defining corresponds to.

Use the USE operand of the LINE definition statement to specify whether you want the data link you are defining to operate initially in network control mode or in emulation mode. If you specify in the TYPE operand of the LINE definition statement that this link can operate alternatively in network control mode or emulation mode, you can switch the link from one mode to the other by command from the access method.

Defining Switched Data Links

LINE	CHECK
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Use the CHECK operand of the LINE definition statement if the data link you are defining is a duplex link. Use this operand to specify whether you want the NCP to use the data carrier detect option for the link. Use of this option prevents access to an application program's data by a SS device that dials the communication controller over this link at the moment the existing connection to a different device is lost. If you specify that this option is to be included, the NCP will continuously monitor the data

SS Devices

carrier detect signal from the modem to give positive assurance that the switched connection is still established.

Defining Modems

LINE	DISABLE, MODEM
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Use the **DISABLE** operand of the **LINE** definition statement to specify whether the modem attached to the data link you are defining requires a long disable time-out when it is disconnecting from the link. Most modems do not require a long time-out. If you specify that one does, a 25.6-second time-out will be provided.

Use the **MODEM** operand of the **LINE** definition statement to specify whether the data link you are defining (1) is enabled immediately after the communication controller has been loaded or the System Reset key has been pressed or (2) is disabled after the controller has been loaded or the System Reset key has been pressed, and must be subsequently enabled by command from the access method. Use this operand to specify also if the modems attached to this data link are from the Nippon Telegraph and Telephone Company.

Defining Devices

LINE	TERM, FEATURE
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Use the **TERM** operand of the **LINE** definition statement to specify the type of SS device attached to the data link you are defining. If different types of SS devices are attached to the link, specify only one of the types.

Use the **FEATURE** operand of the **LINE** definition statement to specify the features with which certain SS devices attached to the data link you are defining are equipped. These features are:

- Immediate end of a receive operation when an EOT is received
- Record-checking
- Support of the Society for Worldwide Interbank Financial Telecommunication (SWIFT) network (only when defining your NCP for the 3725 or 3720)
- Reaction to space characters as downshift characters (only when defining your NCP for the 3705).

Defining Control Units

LINE	CU
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Use the CU operand of the LINE definition statement to specify which transmission control unit functions the NCP is to emulate for the data link you are defining. The value you specify here is the type of transmission control unit that the data link was attached to before installation of the communication controller.

Defining Data Characteristics

BUILD	OPCSB2	(3705)
LINE	BUFETTE, BUFSIZE	(3705)

Use the OPCSB2 operand of the BUILD definition statement only if you are defining your NCP for the 3705. Use this operand to specify whether you want four 5-byte data buffers to be provided for data links that (1) can operate in emulation mode, (2) are attached to a type 2 scanner, and (3) have a high priority specified in the CHNPRI operand of the LINE definition statement. This buffer is permanently assigned to all such links and provides extra protection against overruns that can result from temporary slowdowns in channel operation or temporary peaks in data traffic in the network. If you specify that you do want four 5-byte buffers to be provided, do not code both the CHNPRI operand and the TADDR operand in the same LINE definition statement. Either operand, however, can be specified alone.

Use the BUFETTE operand of the LINE definition statement to specify the number of 4-byte buffers you want to be allocated for the data link you are defining. These buffers will be used to prevent overruns of data received from the link when the channel is in a slowdown or lockout condition.

Use the BUFSIZE operand of the LINE definition statement only if you are defining your NCP for the 3705. Use this operand if the data link you are defining is attached to a type 3 scanner. Use this operand to specify the size you want the emulation mode buffers for this data link to be. Each link has two buffers for data being sent or received over the link. The value you specify in this operand becomes the size of each buffer. This value also becomes the amount of data (up to 32 bytes) that will be transferred over the channel to the access method without interrupt. If you specify a value higher than 32 for the size of the emulation mode buffers, the amount of data transferred over the channel without interrupt will still be 32 bytes.

Specifying larger buffers offers more protection against possible overruns than does specifying smaller buffers. Overruns can result from temporary slowdowns of channel operation or from momentary peaks in data traffic through the network. Use of larger buffers also results in less interrupt-processing overhead for channel operations.

Defining Character Transmission

GROUP	CHAREC, QUIETCT
LINE	UNITXC

Use the CHAREC operand of the GROUP definition statement if you are defining your NCP for the 3705, and if 83B3 Selective Calling Stations or Western Union Plan 115A Outstations are attached to the data links in the group you are defining. Use this operand to specify the message-ending characters to be recognized by NCP when receiving data from these devices. When the NCP receives these characters, it will signal channel-end and device-end status to the emulation subchannel associated with the data link from which it received the characters.

Use the QUIETCT operand of the GROUP definition statement to specify the number of character times you want to elapse between the end of a receive operation and the beginning of a transmit operation on the SS data links in the group you are defining. This elapsed time allows the links to become electrically quiet following the receive operation.

Use the UNITXC operand of the LINE definition statement to specify whether you want the NCP to signal unit-exception status to the access method whenever it receives an end-of-transmission (EOT) character from the data link you are defining. It is usually appropriate to specify that the NCP signal the access method in this way. However, if Read and Write commands within the access method are chained, you may want to specify that the NCP not signal unit-exception status because this will break the command chain. By specifying that the NCP not signal unit-exception status in this case, you prevent the command chain from being broken.

Defining the Dynamic Dump

BUILD	DYNADMP
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Use the DYNADMP operand of the BUILD definition statement to specify whether you want the dynamic dump facility included for your NCP. The dynamic dump facility is a maintenance and debugging tool that allows you to transfer the storage contents of the communication controller to the

access method without disrupting the operation of the NCP. It also allows you, without disrupting the operation of the NCP, to display portions of controller storage on the host processor operator's console, activate an emulation program line trace, and dump an emulation program line trace table. In addition, the dynamic dump facility is used to activate the emulation program scanner interface trace and dump the emulation program scanner interface trace table. Use the DYNADMP operand to specify also the addresses of the subchannels to be used by the NCP to transfer dynamic dump data to the access method. The following rules govern which type of subchannel (native or emulation) can be used to transfer this data.

If you are defining your NCP for the 3725 or 3720.

For a type 5 channel adapter:

Only an emulation subchannel can be used for transferring dynamic dump data.

If you are defining your NCP for the 3705.

For a type 2 or type 3 channel adapter:

These types of channel adapters cannot be used for transferring dynamic dump data.

For a type 4 channel adapter:

An emulation subchannel can be used for transferring dynamic dump data regardless of whether the native subchannel is being used for network control mode operations.

The native subchannel can be used for transferring dynamic dump data as long as it is not being used for network control mode operations.

Defining the Line Trace and Scanner Interface Trace

BUILD	LINETRC
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Use the LINETRC operand of the BUILD definition statement to specify whether you want the line trace included for the data links attached to your NCP and operating in emulation mode. Use this operand to specify the maximum number of data links operating in emulation mode that you want to be able to be traced at the same time. Use this operand to specify also the number of entries to be contained in the trace table. The line trace for data links operating in emulation mode is a maintenance and debugging tool used to record the activity on all such links in the network. It is automatically included for every NCP.

Note: The NCP does not support line trace for communication lines controlled by user-written line control code that includes such products as X.25 Network Packet Switch Interface (NPSI). The request to start or stop the line trace (or scanner internal trace) is passed to the user-written I/O code. Support for the trace then becomes the responsibility of the user code.

If you are defining your NCP for the 3725 or 3720, use the LINETRC operand of the BUILD definition statement to specify also that you want the scanner interface trace included for the data links attached to your NCP operating in emulation mode. The scanner interface trace is a maintenance and debugging tool used to record the activity within the scanners installed in the communication controller. If you specify that you do want these traces included, use this operand to specify also the number of scanner interface traces you want to be able to run at the same time, and the number of 512-byte blocks (containing 63 entries each) to be contained in the trace table.

Defining Time-Outs

LINE	QUIET
------	-------

Use the QUIET operand of the LINE definition statement to specify whether you want the NCP to observe a long quiet time-out for the data link you are defining when it is receiving from the link. If you specify that you do want it to observe a long quiet time-out, it will observe a 25.6-second time-out. If you specify that you do not want it to observe a long time-out, it will observe the normal time-out of 3.0 seconds.

Defining WTTY Terminals That Can Operate in Emulation Mode

GROUP	EOB, EOT, DELAY
-------	-----------------------

Use the EOB operand of the GROUP definition statement to specify the end-of-message sequence received from the WTTY terminals attached to the data links in the group you are defining.

Use the EOT operand of the GROUP definition statement to specify the character sequence the NCP is to recognize as the end-of-transmission sequence when it is receiving from the WTTY terminals attached to the data links in the group you are defining.

Use the **DELAY** operand of the **GROUP** definition statement to specify whether the **WTTY** terminals attached to the data links in the group you are defining require a line turnaround time of 70 to 80 milliseconds.

Appendix A. Coding Sheets

The coding sheets in this appendix are designed to help you keep track of the values you specify for the definition statements and operands you need to code to define your NCP. Every definition statement and every operand is represented, but remember, you do not have to code all of these definition statements and operands, only those that you have determined you need from Chapters 2 through 5. If you want to take advantage of the NCP Model Statements to ease the task of defining an initial network configuration, see "Using NCP Model Statements to Define the NCP" on page 1-19.

The definition statements in this appendix are listed in the order that they must appear in your generation job input stream. The operands for each definition statement are listed in alphabetical order. The required definition statements that you must code, as well as the required operands for each definition statement, are shown in boldface type. Note that you may be required to code operands on a particular definition statement even though the definition statement itself may not be required. For example, if you are including user-written code or are using other IBM program products such as NTO with your NCP, you must code the NCPNAU definition statement and must code at least the NAUFVT operand. However, you are not required to code the NCPNAU definition statement unless you are including user-written code or are using other specialized IBM program products. In this case, the operand will be shown in boldface type, but the definition statement will not. For example, the NCPNAU definition statement and its operands are represented like this:

```
NCPNAU      NAUFVT =  
            NAUCB =  
            NOTIFY =  
            NUMSESS =  
            TYPE =
```

Unlike the NCPNAU definition statement, you *are* required to code the BUILD definition statement, no matter what your network characteristics are. Therefore, the BUILD definition statement and its operands are represented like this:

```
BUILD      MAXSUBA =
```

Coding Sheets

MEMSIZE = (3705)
MODEL =
SUBAREA =
TYPGEN =
BFRS =
BRANCH = (3725 and 3720)
CA =
CATRACE =
COSTAB =
CSMHDR =
CSMSG =
. . .
MAXSSCP =
MEMSIZE = (3725 and 3720)
MTARTO =
. . .

Both the **BUILD** definition statement and the required operands on the **BUILD** definition statement that you must code are shown in boldface type.

Notice in the example above that some operands are followed by either (3705), (3725 and 3720), or (VTAM). Those operands followed by (3725 and 3720) are used only when defining your NCP for the IBM 3725 or 3720 Communication Controller, while those followed by (3705) are used only when defining your NCP for the IBM 3705 Communications Controller. Those operands followed by (VTAM) are used only when defining your NCP to operate with VTAM. All other operands can be used when defining either the IBM 3705, the 3725, or the 3720 Communication Controllers. For example, the **MEMSIZE** operand, which is shown in boldface type and is followed by (3705), is required when defining your NCP for the IBM 3705 Communications Controller. The **MEMSIZE** operand is listed again in

regular type and followed by (3725 and 3720). In this case MEMSIZE can be coded when defining your NCP for the IBM 3725 or 3720 Communication Controller, but it is not required. In the case of the BRANCH operand, which is followed by (3725 and 3720), the operand can only be used when defining your NCP for the IBM 3725 or 3720 Communication Controller.

In the same way, those operands followed by the name of an operating system in parentheses, for example (VSE) or (MVS), are used only when running under that specific operating system.

Before you start using these coding sheets, you might want to make copies of them, because you might code more than one NCP, and because some of the definition statements (such as PATH, GROUP, LINE, TERMINAL, PU, LU, NETWORK, GWNAU) will probably be coded more than once in one NCP generation job input stream.

Coding Sheets

OPTIONS

FASTRUN =

NEWDEFN = (NCP V4R2)

NOTRDATA =

NOTRPARM =

NOTRPROC =

TRDATA =

TRPARM =

TRPROC =

TRSNAP =

USERGEN = (NCP V4R2)

PCCU	AUTODMP =	
	AUTOIPL =	
	AUTOSYN =	
	BACKUP =	
	CDUMPDS =	(3725 and 3720)
	CHANCON =	
	CONFGDS =	(MVS & VSE)
	CONFGPW =	(MVS & VSE)
	CUADDR =	
	DUMPDS =	
	DUMPSTA =	
	GWCTL =	
	INITEST =	
	LOADSTA =	
	MAXDATA =	
	MDUMPDS =	(3725 and 3720)
	NETID =	
	NCPLUB =	(VSE)
	OWNER =	
	RNAME =	
	SUBAREA =	
	VFYLM =	

Coding Sheets

BUILD	MAXSUBA =	
	MEMSIZE =	(3705)
	MODEL =	
	SUBAREA =	
	TYPGEN =	
	BACKUP =	
	BFRS =	
	BRANCH =	(3725 and 3720)
	CA =	
	CANETID =	
	CATRACE =	
	COSTAB =	(VTAM)
	CSMHDR =	
	CSMHDRC =	
	CSMSG =	
	CSMSGC =	
	CUID =	
	CWALL =	
	DELAY =	
	DIALTO =	
	DR3270 =	
	DSABLTO =	
	DYNADMP =	
	ENABLTO =	
	GWAEXIT =	
	HICHAN =	
	HSBPOOL =	

ITEXTTO =
LENAME = (VSE)
LINETRC =
LOADLIB = (VTAM)
LOCALTO = (NTRI)
LOCHAN =
LTRACE =
MAXSSCP =
MEMSIZE = (3725 and 3720)
MTARTO =
MTARTRY =
MXRLINE = (NTRI)
MXVLINE = (NTRI)
NCPA =
NETID =
NETLIM =
NEWNAME =
NPA =
NUMHSAS =
OLT =
OPCSB2 = (3705)
PRTGEN =
PWROFF =
QUALIFY = (VTAM)
REMLOAD = (3705)
REMOTTO = (NTRI)
RESOEXT =

Coding Sheets

SESSLIM =

SLODOWN =

TIMEOUT =

TRACE =

TRANSFR =

TWXID =

TYP SYS =

UCHAN =

VERSION =

VRACT = (NCP V3 or V4R1)

VRPOOL =

XBREAK =

XITB = (3705)

SYSCNTRL OPTIONS =

Coding Sheets

NCPNAU

NAUFVT =

NAUCB =

NOTIFY =

NUMSESS =

TYPE =

VIROWNER =

(NCP V4R2)

GWNAU

ELEMENT =

NAME =

NETID = (VTAM)

NUMADDR =

NUMSESS =

Coding Sheets

HOST

INBFRS =

MAXBFRU =

UNITSZ =

BFRPAD =

NETID =

SUBAREA =

Coding Sheets

CSB	SPEED =	(3705)
	MOD =	(3705)
	TYPE =	(3705)
	WRAPLN =	(3705)

Coding Sheets

IDLIST

IDSEQ=

MAXLEN=

NOMATCH=

LUPOOL

NUMBER =

OWNER =

(VTAM)

Coding Sheets

LUDRPOOL

NUMTYP1 =

NUMTYP2 =

PUDRPOOL NUMBER =

MAXLU =

Coding Sheets

PATH

DESTSA =

ER0 =

ER1 =

ER2 =

ER3 =

ER4 =

ER5 =

ER6 =

ER7 =

VR0 =

VRPWS00 =

VRPWS01 =

VRPWS02 =

VR1 =

VRPWS10 =

VRPWS11 =

VRPWS12 =

VR2 =

VRPWS20 =

VRPWS21 =

VRPWS22 =

VR3 =

VRPWS30 =

VRPWS31 =

VRPWS32 =

VR4 =

VRPWS40 =

VRPWS41 =

VRPWS42 =

VR5 =

VRPWS50 =

VRPWS51 =

VRPWS52 =

VR6 =

VRPWS60 =

VRPWS61 =

VRPWS62 =

VR7 =

VRPWS70 =

VRPWS71 =

VRPWS72 =

Coding Sheets

SDLCST

GROUP =

MAXOUT =

MODE =

PASSLIM =

RETRIES =

SERVLIM =

TADDR =

DIALSET

LINES =

DIALALT =

QLIMIT =

QLOAD =

RESERVE =

Coding Sheets

MTALCST

GROUP =

SPEED =

ACR =

CLOCKNG =

CODE =

COMPARE =

CRRATE =

DATRATE =

INTPRI = (3705)

LCTYPE =

LINESIZ =

MASK =

RETRIES =

TRANSFR =

MTALIST

LCTYPE=

Coding Sheets

MTAPOLL POLL=

MTATABL

LCST =

CODE =

LCTYPE =

Coding Sheets

GROUP	
ACTIVTO =	
ANSWER =	(VTAM)
AUTOGEN =	(NTRI)
BERPROC =	(3725 and 3720)
CAEXIT =	
CALL =	(VTAM)
CHANLNK =	
CHAREC =	
COMPACB =	
CRETRY =	
DELAY =	
DIAL =	
DISCNT =	(VTAM)
DLOGMOD =	(VTAM)
ECLTYPE =	(NTRI)
EOB =	
EOT =	
FEATUR2 =	(VTAM)
FRAMING =	
ISTATUS =	(VTAM)
KBDLOCK =	
LEVEL2 =	
LEVEL3 =	
LEVEL5 =	
LINEADD =	
LINEAUT =	
LNCTL =	

Coding Sheets

LNKOWNER =	(NCP V4R2)
LOGAPPL =	(VTAM)
LOGTAB =	(VTAM)
MODE =	
NPARSC =	
OWNER =	(VTAM)
PADCNT =	
PECHAR =	
PHYPORT =	(NTRI)
PU =	(VTAM)
QUIETCT =	
REPLYTO =	
RETRYTO =	
SPAN =	(VTAM)
SSCPFM =	(VTAM)
SYNDLAY =	(3705)
TEXTTO =	
TIMER =	
TTDCNT =	
TYPE =	
USERID =	
USSTAB =	(VTAM)
VIROWNER =	(NCP V4R2)
VIRTUAL =	
VPACING =	(VTAM)
WACKCNT =	
WAKDLAY =	

Coding Sheets

WTTYEOB =

WTTYEOT =

XIO =

X21SW =

Coding Sheets

LINE	ADDRESS =	(3705)
	SPEED =	(3705)
	ADDRESS =	(3725 and 3720)
	ANSTONE =	
	ANSWER =	(VTAM)
	ATTACH =	
	AUTO =	
	AUTODL =	
	AUTUACB =	
	AVGPB =	
	BUFETTE =	
	BUFSIZE =	
	CALINE =	
	CALL =	
	CHANLA =	
	CHECK =	
	CHNLZ =	
	CHNPRI =	
	CLINES =	
	CLOCKNG =	
	CODE =	
	CONFIG =	
	CORNUM =	
	CRRATE =	
	CSPMODE =	(3725 and 3720)
	CU =	
	CUTOFF =	

Coding Sheets

CUTYPE =
DATRATE =
DIALALT =
DIALSET =
DISABLE =
DUALCOM =
DUPLEX =
ETRATIO =
FEATURE =
FGSLTRS = (3705)
HDXSP =
HISPEED = (3725 and 3720)
INTPRI = (3705)
IPL =
LINECB =
LINEFVT =
LINESIZ =
LNQTCNT =
LOCADD = (NTRI)
LPDATS =
LTRUNC =
MAXPU =
MAXTSL = (NTRI)
MODEM =
MODULO = (3725 and 3720)
MONITOR =
MONLINK =

MPTALT =
MTALIST =
NEGPOLP =
NEWSYNC =
NPACOLL =
NRZI =
OWNER = (VTAM)
PAD =
PARCHK =
PARGEN =
PAUSE =
POLIMIT =
POLLED =
POLLTO =
PORTADD = (NTRI)
PROMPT =
PU = (VTAM)
QUIET =
RCVBUFC = (NTRI)
REDIAL =
RETRIES =
RING =
SCLSET = (3705)
SDLCST =
SECNET = (VTAM)
SECURE =
SERVLIM =

Coding Sheets

SERVPRI =

SESSION =

SPDSEL =

SPEED = (3725 and 3720)

SPSHIFT = (3705)

TADDR =

TAILING =

TERM =

TRANSFR =

TYPE =

UACB =

UNITXC =

USE =

YIELD =

SERVICE

MAXLIST =

ORDER =

Coding Sheets

CLUSTER	BHEXEC =	
	BHSET =	
	CUTYPE =	
	DISCNT =	(VTAM)
	DLOGMOD =	(VTAM)
	EXEC =	
	FEATURE =	
	FEATUR2 =	(VTAM)
	GPOLL =	
	INHIBIT =	
	ISTATUS =	(VTAM)
	ITBMODE =	
	LGRAPHS =	
	LOGAPPL =	(VTAM)
	LOGTAB =	(VTAM)
	MODETAB =	(VTAM)
	NPACOLL =	
	PT3EXEC =	
	USSTAB =	(VTAM)
	VPACING =	(VTAM)

TERMINAL	TERM =	
	ADDR =	
	ATTN =	
	BFRDLAY =	
	BHEXEC =	
	BHSET =	
	CONV =	
	CRDLAY =	
	CRITSIT =	
	CTERM =	
	CUIDLEN =	
	DIALNO =	
	DIALSET =	
	DLOGMOD =	(VTAM)
	ENDTRNS =	
	EXEC =	
	FANOUT =	
	FEATURE =	
	FEATUR2 =	(VTAM)
	IDSEQ =	
	INHIBIT =	
	ISTATUS =	(VTAM)
	ITBMODE =	
	LCST =	
	LGRAPHS =	
	LOGAPPL =	(VTAM)
	LOGTAB =	(VTAM)

Coding Sheets

NPACOLL =

POLL =

PT3EXEC =

SRT =

USSTAB = (VTAM)

XTWXID =

COMP

ADDR =

ATTN =

BHEXEC =

BHSET =

CONV =

ENDTRNS =

INHIBIT =

ITBMODE =

LGRAPHS =

POLL =

PT3EXEC =

SRT =

Coding Sheets

ADD

TO =

DELETE

FROM =

Coding Sheets

PU	ADDR =	
	ANS =	
	AVGPB =	
	BNNSUP =	
	DATMODE =	
	DSCNT =	(VTAM)
	DLOGMOD =	(VTAM)
	ENCR =	(VTAM)
	FEATUR2 =	(VTAM)
	IRETRY =	
	ISTATUS =	(VTAM)
	LOGAPPL =	(VTAM)
	LOGTAB =	(VTAM)
	LPDA =	(3725 and 3720)
	MAXDATA =	
	MAXLU =	
	MAXOUT =	
	MODETAB =	(VTAM)
	NETID =	
	NPACOLL =	
	PASSLIM =	
	PUCB =	
	PUDR =	
	PUFVT =	
	PUNTFY =	
	PUTYPE =	
	RETRIES =	

Coding Sheets

SECNET = (VTAM V3)

SPAN = (VTAM)

SSCPFM = (VTAM)

SRT =

SUBAREA =

TERM = (VTAM)

TGN =

USSTAB = (VTAM)

VPACING = (VTAM)

Coding Sheets

LU	LOCADDR =	
	BATCH =	
	DLOGMOD =	(VTAM)
	ENCR =	(VTAM)
	FEATUR2 =	(VTAM)
	ISTATUS =	(VTAM)
	LOGAPPL =	(VTAM)
	LOGTAB =	(VTAM)
	LUCB =	
	LUDR =	
	LUFVT =	
	LUNTFY =	
	MAXCOLL =	
	MODETAB =	(VTAM)
	NPACOLL =	
	NUMSESS =	
	PACING =	
	SPAN =	(VTAM)
	SSCPFM =	(VTAM)
	TERM =	(VTAM)
	UCCB =	
	USSTAB =	(VTAM)
	VPACING =	(VTAM)

NETWORK MAXSUBA =
 NETID =
 SUBAREA =
 ACTPU =
 COSTAB = (VTAM)
 NETLIM =
 NUMHSAS =
 SESSLIM =

Coding Sheets

STARTBH BHEXEC =

EDIT

BKSP =

Coding Sheets

DATETIME

DATE =

DATEFMT =

INSERT =

PT2EXEC =

TIME =

UBHR

NAME =

ACCESS =

COMMAND =

ENTRY =

PT2EXEC =

REMOVCTL

ENDBH

Coding Sheets

BHSET

EXEC =

PT1 =

PT2 =

PT3 =

GENEND	HSPDSEL =	(3705)
	INCHI =	
	INCINIT =	
	INCLO =	
	INCL2HI =	
	INCL2LO =	
	INIT =	
	KEY0INC =	(3725 and 3720)
	KEY0ORD =	(3725 and 3720)
	ORDHI =	
	ORDINIT =	
	ORDLO =	
	ORDL2HI =	
	ORDL2LO =	
	SCANCTL =	(3705)
	SRCHI =	
	SRCLO =	
	TMRTICK =	



Appendix B. Multiple Terminal Access Sign-On Procedures

This appendix explains the sign-on procedures to be used by Multiple Terminal Access (MTA) terminals. The procedure differs for the various types of terminals.

Overview of Procedures

In general, the procedures for signing on to MTA terminals are as follows.

For all types of MTA terminals except TWX:

1. Dial the telephone number of the MTA data link to be used for communicating with the controller.
2. After the keyboard unlocks (and the Proceed light comes on [for 1050] or the Bid message is printed [for basic 2740 and 2740 with Checking]), enter the two characters /" (slash double-quote). (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 will be intelligibly printed regardless of the code used.)
3. If more than one line control selection table (LCST) entry is defined in the MTATABL definition statement representing the terminal, enter a 2-digit index number representing the LCST entry to be used by the program when communicating with the terminal. (See the explanation of the MTALCST and MTATABL definition statements in Chapter 5, "Defining Characteristics and Functions for SS Devices" of this publication.) 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 2 digits must be identical. If the first entry is to be used, or only one entry is named in the MTATABL definition statement, the index number, 00, need not be entered. The NCP uses the first (or only) entry if no index number is entered.

MTA Sign-On Procedures

4. End the sign-on procedure as follows.

For 1050, 2740 with Checking, or 2740 with Transmit Control and Checking:

Press the Return key, then enter the EOB character. (If you enter EOT rather than EOB from a 1050, the NCP breaks the line connection; the controller must be redialed and the sign-on procedure repeated.)

For basic 2740 or 2740 with Transit Control:

Press the Return key, then enter the EOT character.

For 2741:

Press the Return key.

For TWX Terminals:

1. Dial the telephone number of the MTA data link to be used for communicating with the controller.
2. Press the WRU key within three seconds after the audible data tone begins. (Waiting longer than three seconds will cause a time-out to occur and the connection to be broken.)

These two steps are the entire sign-on procedure. Multiple LCST entries cannot be defined for TWX terminals, and there is consequently no index number to enter.

Errors in Sign-On Procedure

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

If, however, you make an error in entering the sign-on message, or if the NCP cannot identify the type of terminal, the program sends a character sequence that “wiggles” the typing mechanism to signal you to re-enter the sign-on message. (If the terminal is a basic 2740, you must press the Bid key before re-entering the message.)

If you delay too long in completing the sign-on message, or if you enter it erroneously enough times to cause the retry limit to be reached, the NCP breaks the line connection. You then must redial the controller and begin again. The time allowed for completing the sign-on message is determined by the MTARTO operand of the BUILD definition statement, and the retry limit is specified by the MTARTRY operand of that definition statement.

Specific Procedures for Each Type of Terminal

At each terminal, ensure that you post the appropriate procedure from among those given below, modified as necessary to suit local conditions.

MTA Sign-On Procedure for IBM 2741

1. Dial the computer, using the following telephone number(s):

list numbers here

2. When the keyboard unlocks, enter /".

(2a. [optional] Enter the MTA index number [11,22,etc.]

3. Press the Return key.

If the type element does not move within a few seconds, you have signed on successfully and can begin entering message data. If the type element "wiggles," sign-on is unsuccessful. Repeat steps 2, (2a), and 3.

MTA Sign-On Procedure for IBM 2740 without Transmit Control or Checking

1. Dial the computer, using the following telephone number(s):

list numbers here

The Bid message is now printed.

2. After the Bid message is completed, press the Bid key, then enter /".

(2a. [optional] Enter the MTA index number [11,22,etc.]

3. Press the Return key.

4. Enter EOT.

If the type element does not move within a few seconds, you have signed on successfully and can begin entering message data. If the type element "wiggles," sign-on is unsuccessful. Press the Bid key and then repeat steps 2, (2a), 3, and 4.

MTA Sign-On Procedure for IBM 2740 with Checking

1. Dial the computer, using the following telephone number(s):

list numbers here

The Bid message is now printed.

2. After the Bid message is completed, press the Bid key, then enter /".

MTA Sign-On Procedures

(2a. [optional] Enter the MTA index number [11,22,etc.]

3. Press the Return key.
4. Enter EOB. (If you enter EOT by mistake, you must repeat the entire procedure, beginning with step 1 on page B-3.)

If the type element does not move within a few seconds, you have signed on successfully and can begin entering message data. If the type element "wiggles," sign-on is unsuccessful. Repeat steps 2 on page B-3, (2a), 3, and 4.

MTA Sign-On Procedure for IBM 2740 with Transmit Control

1. Dial the computer, using the following telephone number(s):

list numbers here

2. When the keyboard unlocks, enter /".

(2a. [optional] Enter the MTA index number [11,22,etc.]

3. Press the Return key.
4. Enter EOT.

If the type element does not move within a few seconds, you have signed on successfully and can begin entering message data. If the type element "wiggles," sign-on is unsuccessful. Press the Bid key and then repeat steps 2, (2a), 3, and 4.

MTA Sign-On Procedure for IBM 2740 with Transmit Control and Checking

1. Dial the computer, using the following telephone number(s):

list numbers here

2. When the keyboard unlocks, enter /".

(2a. [optional] Enter the MTA index number [11,22,etc.]

3. Press the Return key.
4. Enter EOB. (If you enter EOT by mistake, you must repeat the entire procedure beginning with step 1.)

If the type element does not move within a few seconds, you have signed on successfully and can begin entering message data. If the type element "wiggles," sign-on is unsuccessful. Repeat steps 2, (2a), 3, and 4.

MTA Sign-On Procedure for IBM 1050

1. Dial the computer, using the following telephone number(s):

list numbers here

2. When Proceed light comes on, enter /".

(2a. [optional] Enter the MTA index number [11,22,etc.]

3. Press the Return key.

4. Enter EOB.

If the type element does not move within a few seconds, you have signed on successfully and can begin entering message data. If the type element "wiggles," sign-on is unsuccessful. Repeat steps 2, (2a), 3, and 4.

MTA Sign-On Procedure for TWX Terminals

1. Dial the computer, using the following telephone number(s):

list numbers here

2. Press the WRU key within three seconds after the audible dial tone begins.

If the typing mechanism does not "jump" within a few seconds, you have signed on successfully and can begin entering message data. If the mechanism does "jump," sign-on is unsuccessful. Press the WRU key again or repeat both steps.

Appendix C. Dynamically Modifying Selected NCP Parameter Values

If you expect network growth, specify and generate the anticipated lines and stations initially, rather than perform another NCP generation when you add the lines and stations.

You can physically attach, at any time, the lines and stations that you initially generated. As you gain data-traffic experience, you can modify the parameters listed in Figure C-1 on page C-2 to obtain a more efficient network. For more detailed information on each parameter for the IBM 3705, 3725, and 3720 Communication Controllers, see the *NCP and SSP Resource Definition Reference*. For those lines and stations that are already operational, modifying the parameter values in Figure C-1 can sometimes be beneficial; for example, a station's use may change from batch mode to interactive mode and require a longer DELAY value.

You can change the selected values of the parameters by:

- Using the control panel procedure, which changes the values dynamically until the next load of the NCP. (See the dynamic store procedure in the publication *Guide to Using the IBM 3705 Communications Controller Control Panel*, GA27-3087. For 3725 controllers, use the MOSS facility to change the parameters, as described in the *IBM 3725 Communications Controller Operating Guide*, GA33-0014.
- Using the SPZAP utility for MVS, the ZAP utility for VM/SP, or the TDZAP utility for VSE/Advanced Function to change the NCP load module residing in host auxiliary storage. The documents discussing the procedure for altering the NCP load module permanently for each operating system are:

Document Name	Utility Name
<i>MVS Service Aids</i> , GC28-0674	SPZAP
<i>Field Engineering Handbook</i> , SY33-8571	TDZAP
<i>VM/SP Operator's Guide</i> , SC19-6202	ZAP

You can find the fields listed in Figure C-1 on page C-2 in a link-edit map or in a formatted dump (the CPT is not shown in a formatted dump). If, for example, you want to change the attention (DELAY) value, locate the CAB for the station to be changed and add the offset of hex 5E to the address of the CAB in question. The sum of the CAB address and hex 5E is the address of the delay value to be changed. Choose the method to be used

Dynamically Modifying Selected NCP Parameter Values

and use the address as instructed in the appropriate manual to obtain the desired results.

NCP Parameter	Generation Macro	NCP CSECT	Hex Offset	Field Name
DELAY	HOST BUILD	CPT* CAB	6 5E	CPTDELAY CABATDT
PAUSE	LINE	ACB	5B	CCBPOLLI
NEGPOLLP	LINE	ACB	57	CCBNEGP
MAXOUT	PU	SCB CUB	3E 3E	SCBOCL CUBOCL
MAXDATA	PU	CUB	47	CUBOCLS
PASSLIM	PU	SCB CUB	34 34	SCBPCNT CUBPCNT
NRZI	LINE	ACB	68	CCBTYPEC (bit 5)
RETRIES	LINE	ACB LCB	4E 4A 4A	CCBERTRY LCBERPL LCBERPC
RETRIES	PU	SCB CUB	45 40 45 40	SCBERPT SCBSRTL CUBERPT CUBSRTL
NEWSYNC	LINE	ACB	53	CCBTYPE (bit3)
SERVLIM	LINE	ACB LCB	45 6D	CCBCPRAT LCBESERL

*Not formatted in dump

Figure C-1. NCP Parameters That Can Be Changed Dynamically

Appendix D. Applying Maintenance to SSP Utilities Under MVS

The SSPGEN macro allows you to install and maintain updates to SSP under the MVS operating system.

Note: The VM/SP and the VSE operating systems do not use the SSPGEN macro. The SSPGEN macro is valid only in the MVS environment.

It creates the job control and link-edit statements needed by the system to link-edit specified portions of the SSP utilities into the system. You use the SSPGEN macro when maintenance procedures require a definition of the link-edit job.

Note: The SSPGEN macro is not a resource definition statement like BUILD or GROUP.

SSPGEN Macro Format

The format of the SSPGEN macro is:

Symbol	Macro	Operands
[symbol]	SSPGEN	[ASM= {YES }] {NO } [,CRP= {YES }] {NO } [,DUMP= {YES }] {NO } [,DYN= {YES }] {NO } [,LOAD= {YES }] {NO } [,NDF= {YES }] {NO } [,TAP= {YES }] {NO }

ASM specifies whether you want to include the link-edit statements for the assembler utility. Use the assembler only if you intend to develop

SSP Utilities

user-written code to be run in the controller. If you omit this operand, ASM = NO is assumed.

TAP specifies whether you want to include the link-edit statements for the trace analysis program. If you omit this operand, TAP = NO is assumed.

DUMP specifies whether you want to include the link-edit statements for the independent dump utility. If you omit this operand, DUMP = NO is assumed.

DYN specifies whether you want to include the link-edit statements for the dynamic dump utility. If you omit this operand, DYN = NO is assumed.

LOAD specifies whether you want to include the link-edit statements for the loader utility. If you omit this operand, LOAD = NO is assumed.

CRP specifies whether you want to include the link-edit statements for the configuration report program. If you omit this operand, CRP = NO is assumed.

NDF specifies whether you want to include the link-edit statements for the NCP/EP Definition Facility. If you omit this operand, NDF = NO is assumed.

Input to the SSPGEN Macro

The SSPGEN macro can be called with any of the system assemblers. Below is an example of the job control statements needed to call the SSPGEN macro to generate link-edit control statements for the assembler utility, trace analysis program, independent dump utility, and dynamic dump utility.

```
//SSPGEN      JOB          MSGLEVEL=1
//STP1        EXEC        PGM=IFOX00,PARM='DECK'
.
.
.
(JCL statements for assembler)
.
.
.
//SYSIN      DD          *
INPUT        SSPGEN      ASM=YES,TAP=YES,DUMP=YES,DYN=YES
              END
/*
```

Output from the SSPGEN Macro

The output from running the SSPGEN macro consists of the job control and link-edit statements needed for linking the particular utilities specified. You can produce this output as a job or as data for the maintenance process. Below is an example of the output from the SSPGEN macro:

```
//SSPLINK      JOB          SSPINST,MSGLEVEL=1
//LINK         EXEC        PGM=IEWL,
//             PARM='XREF,LET,NCAL,LIST,DC,
//             SIZE=(200K,24K) '
.
.
.
(JCL in this job stream may require modification
to meet individual installation requirements)
.
.
.
//SYSPRINT    DD          SYSOUT=A
//SYSUT1      DD          UNIT=SYSDA,SPACE=(1024,(200,20))
//SSPOBJ      DD          DSN=SYS1.OBJ3725,DISP=SHR
//SYSLMOD     DD          DSN=SYS1.SSPLIB,DISP=SHR
//SYSLIN      DD          *
               INCLUDE    SSPOBJ(CWAX0A,CWAX0B)
               ENTRY     CWAX0A01
               NAME      CWAX00(R)
.
.
.
(Additional link-edit control statements for
all modules as required.)
.
.
.
/*
```




Glossary

This glossary defines important CCP, NCP, NetView, SSP, and VTAM abbreviations and terms. It includes information from the *IBM Vocabulary for Data Processing, Telecommunications, and Office Systems*, GC20-1699. Definitions from the *American National Dictionary for Information Processing* are identified by an asterisk (*). Definitions from draft proposals and working papers under development by the International Standards Organization, Technical Committee 97, Subcommittee 1 are identified by the symbol (TC97). Definitions from the *CCIT Sixth Plenary Assembly Orange Book, Terms and Definitions* and working documents published by the Consultative Committee on International Telegraph and Telephone of the International Telecommunication Union, Geneva, 1980 are preceded by the symbol (CCITT/ITU). Definitions from published sections of the *ISO Vocabulary of Data Processing*, developed by the International Standards Organization, Technical Committee 97, Subcommittee 1 and from published sections of the *ISO Vocabulary of Office Machines*, developed by subcommittees of ISO Technical Committee 95, are preceded by the symbol (ISO).

For abbreviations, the definition usually consists only of the words represented by the letters; for complete definitions, see the entries for the words.

Reference Words Used in the Entries

The following reference words are used in this glossary:

Contrast with. Refers to a term that has an opposed or substantively different meaning.

Deprecated term for. Indicates that the term should not be used. It refers to a preferred term, which is defined.

See. Refers to multiple-word terms that have the same last word.

See also. Refers to related terms that have similar (but not synonymous) meanings.

Synonym for. Appears in the commentary of a less desirable or less specific term and identifies the preferred term that has the same meaning.

Synonymous with. Appears in the commentary of a preferred term and identifies less desirable or less specific terms that have the same meaning.

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.

ACB name. (1) The name of an ACB macro instruction. (2) A name specified in the ACBNAME parameter of a VTAM APPL statement. Contrast with *network name*.

accept. For a VTAM application program, to establish a session with a logical unit (LU) in response to a CINIT request from a system services control point (SSCP). The session-initiation request may begin when a terminal user logs on, a VTAM application program issues a macro instruction, or a VTAM operator issues a command. See also *acquire (1)*.

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

accounting exit routine. In VTAM, an optional installation exit routine that collects statistics about session initiation and termination.

ACF. Advanced Communications Function.

acquire. (1) For a VTAM application program, to initiate and establish a session with another logical unit (LU). The acquire process begins when the application program issues a macro instruction. See also *accept*. (2) To take over resources that were formerly controlled by an access method in another domain, or to resume control of resources that were controlled by this domain but released. Contrast with *release*. See also *resource takeover*.

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

active. (1) The state a resource is in when it has been activated and is operational. Contrast with *inactive*, *pending*, and *inoperative*. (2) Pertaining to a major or minor node that has been activated by VTAM. Most resources are activated as part of VTAM start processing or as the result of a VARY ACT command.

adapter control block (ACB). In NCP, a control block that contains line control information and the states of I/O operations for BSC lines, start-stop lines, or SDLC links.

adjacent NCPs. Network control programs (NCPs) that are connected by subarea links with no intervening NCPs.

adjacent networks. Two SNA networks joined by a common gateway NCP.

adjacent subareas. Two subareas connected by one or more links with no intervening subareas. See also *subarea*.

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

alias address. An address used by a gateway NCP and a gateway system services control point (SSCP) in one network to represent a logical unit (LU) or SSCP in another network.

application program. (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.

authorization exit routine. In VTAM, an optional installation exit routine that approves or disapproves requests for session initiation.

automatic activation. In VTAM, the activation of links and link stations in adjacent subarea nodes as a result of channel device name or RNAME specifications related to an activation command that names a subarea node. See *direct activation*.

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

back-level. Pertaining to an earlier release of an IBM product, which may not support a particular, current function.

basic transmission unit (BTU). In SNA, the unit of data and control information passed between path control components. A BTU can consist of one or more path information units (PIUs). See also *blocking of PIUs*.

bidder. In SNA, the LU-LU half-session defined at session activation as having to request and receive permission from the other LU-LU half-session to begin a bracket. Contrast with *first speaker*. See also *bracket protocol*.

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). See also *session activation request*. Contrast with *UNBIND*.

BIU segment. In SNA, the portion of a basic information unit (BIU) that is contained within a path information unit (PIU). It consists of either a request/response header (RH) followed by all or a portion of a request/response unit (RU), or only a portion of an RU.

blocking of PIUs. In SNA, an optional function of path control that combines multiple path information units (PIUs) into a single basic transmission unit (BTU).

boundary function. In SNA: (1) A capability of a subarea node to provide protocol support for adjacent peripheral nodes, such as: (a) transforming network addresses to local addresses, and vice versa; (b) performing session sequence numbering for low-function peripheral nodes; and (c) providing session-level pacing support. (2) The component that provides these capabilities. See also *path control (PC) network* and *network addressable unit (NAU)*.

bracket protocol. In SNA, a data flow control protocol in which exchanges between the two LU-LU half-sessions are achieved through the use of brackets, with one LU designated at session activation as the first speaker and the other as the bidder. The bracket protocol involves bracket initiation and termination rules. See also *bidder* and *first speaker*.

BSC. Binary synchronous communication.

BTU. Basic transmission unit.

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

CCP. Configuration control program facility.

CDRM. Cross-domain resource manager.

chain. See *RU chain*.

channel adapter. A communication controller hardware unit used to attach the controller to a System/360 or a System/370 channel.

channel-attached. Pertaining to the attachment of devices directly by data channels (I/O channels) to a host processor. Contrast with *link-attached*. Synonymous with *local-attached*.

character times. In CCP, the maximum number of times the temporary text delay character can be sent to a terminal before the operation stops or that can be sent between the end of a receive and the beginning of a transmit operation.

CICS. Customer Information Control System.

class of service (COS). In SNA, a designation of the path control network characteristics, such as path security, transmission priority, and bandwidth, that apply to a particular session. The end user designates class of service at session initiation by using a symbolic name that is mapped into a list of virtual routes, any one of which can be selected for the session to provide the requested level of service.

clocking. In CCP, the use of clock pulses to synchronize data and control characters sent on a line.

cluster controller. A device that can control the input/output operations of more than one device connected to it. A cluster controller may be controlled by a program stored and executed in the unit; for example, the IBM 3601 Finance Communication Controller. Or it may be controlled entirely by hardware; for example, the IBM 3272 Control Unit.

CMS. Conversational Monitor System.

CNM. Communication network management.

command. (1) A request from a terminal for the performance of an operation or the execution of a particular program. (2) In SNA, any field set in the

transmission header (TH), request header (RH), and sometimes portions of a request unit (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. See also *VTAM operator command*.

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.

communication line. Deprecated term for *telecommunication line* and *transmission line*.

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

communication network management (CNM) application program. A VTAM application program that issues and receives formatted management services request units for physical units. For example, NetView.

communication network management (CNM) interface. The interface that the access method provides to an application program for handling data and commands associated with communication system management. CNM data and commands are handled across this interface.

communication network management (CNM) processor. A program that manages one of the functions of a communications system. A CNM processor is executed under control of NetView.

configuration. (1) (TC97) 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. (3) In CCP, the arrangement of controllers, lines, and terminals attached to an IBM 3710 Network Controller. Also, the collective set of item definitions that describe such a configuration.

Configuration control program (CCP) facility. An SSP interactive application program facility by which configuration definitions for the IBM 3710

Network Controller can be created, modified, and maintained.

configuration report program (CRP). An SSP utility program that creates a configuration report listing network resources and resource attributes for networks with NCP, EP, PEP, or VTAM.

configuration services. In SNA, one of the types of network services in the system services control point (SSCP) and in the physical unit (PU); configuration services activate, deactivate, and maintain the status of physical units, links, and link stations. Configuration services also shut down and restart network elements and modify path control routing tables and address-translation tables. See also *maintenance services, management services, network services, session services, and system services control point.*

connected. In VTAM, pertaining to a physical unit (PU) or logical unit (LU) that has an active physical path to the host processor containing the system services control point (SSCP) that controls the PU or LU.

connection. Synonym for *physical connection.*

control block. (ISO) A storage area used by a computer program to hold control information.

control program (CP). The VM operating system that manages the real processor's resources and is responsible for simulating System/370s for individual users.

Conversational Monitor System (CMS). A VM application program for general interactive time sharing, problem solving, and program development.

coupler. A hardware device that connects a modem to a public phone system in much the same way that a telephone does.

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

cross-domain resource manager (CDRM). In VTAM, the function in the system services control point (SSCP) that controls initiation and termination of cross-domain sessions.

cross-network. In SNA, pertaining to control or resources involving more than one SNA network.

cross-network session. An LU-LU or SSCP-SSCP session whose path traverses more than one SNA network.

CRP. Configuration report program.

Customer Information Control System (CICS). A program product 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 data bases.

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

data check. An indication that a transmission is faulty. For example, in SDLC a frame check sequence (FCS) error.

data flow control (DFC). In SNA, a request/response unit (RU) category used for requests and responses exchanged between the data flow control layer in one half-session and the data flow control layer in the session partner.

data flow control (DFC) layer. In SNA, the layer within a half-session that (1) controls whether the half-session can send, receive, or concurrently send and receive request units (RUs); (2) groups related RUs into RU chains; (3) delimits transactions via the bracket protocol; (4) controls the interlocking of requests and responses in accordance with control modes specified at session activation; (5) generates sequence numbers; and (6) correlates requests and responses.

data link. In SNA, synonym for *link.*

data link control (DLC) layer. In SNA, the layer that consists of the link stations that schedule data transfer over a link between two nodes and perform error control for the link. Examples of data link control are SDLC for serial-by-bit link connection and data link control for the System/370 channel.

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

data terminal equipment (DTE). (TC97) That part of a data station that serves as a data source, data link, or both, and provides for the data communication control function according to protocols.

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.*

definite response (DR). In SNA, a value in the form-of-response-requested field of the request header. The value directs the receiver of the request to return a response unconditionally, whether positive or negative, to that request. Contrast with *exception response* and *no response*.

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 also *macro instruction*.

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.

direct activation. In VTAM, the activation of a resource as a result of an activation command specifically naming the resource. See *automatic activation*. Contrast with *indirect activation*.

directory. In VM, a control program (CP) disk that defines each virtual machine's normal configuration.

disabled. In VTAM, pertaining to a logical unit (LU) that has indicated to its system services control point (SSCP) that it is temporarily not ready to establish LU-LU sessions. An initiate request for a session with a disabled logical unit (LU) can specify that the session be queued by the SSCP until the LU becomes enabled. The LU can separately indicate whether this applies to its ability to act as a primary logical unit (PLU) or a secondary logical unit (SLU). See also *enabled* and *inhibited*.

display. (1) To present information for viewing, usually on a terminal screen or a hard-copy device. (2) A device or medium on which information is presented, such as a terminal screen. (3) Deprecated term for *panel*.

domain. (1) An access method, its application programs, communication controllers, connecting lines, modems, and attached terminals. (2) In SNA, a system services control point (SSCP) and the physical units (PUs), logical units (LUs), links, link stations, and all the associated resources that the SSCP has the ability to control by means of activation requests and deactivation requests. See also *single-domain network* and *multiple-domain network*.

domain operator. In a multiple-domain network, the person or program that controls the operation of the resources controlled by one system services control point. Contrast with *network operator* (2).

DRDS. Dynamic reconfiguration data set.

dump. (1) Computer printout of storage. (2) To write the contents of all or part of storage to an external medium as a safeguard against errors or in connection with debugging. (3) (ISO) Data that have been dumped.

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

dynamic reconfiguration (DR). The process of changing the network configuration (peripheral PUs and LUs) without regenerating complete configuration tables.

dynamic reconfiguration data set (DRDS). In VTAM, a data set used for storing definition data that can be applied to a generated communication controller configuration at the operator's request. See also *dynamic reconfiguration*.

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

ED. Enciphered data.

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

emulation mode. The function of a network control program that enables it to perform activities equivalent to those performed by a transmission control unit. Contrast with *network control mode*.

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*.

enabled. In VTAM, pertaining to a logical unit (LU) that has indicated to its system services control point (SSCP) that it is now ready to establish LU-LU sessions. The LU can separately indicate whether this prevents it from acting as a primary logical unit (PLU) or as a secondary logical unit (SLU). See also *disabled* and *inhibited*.

enciphered data (ED). Data whose meaning is concealed from unauthorized users.

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.

end user. In SNA, the ultimate source or destination of application data flowing through an SNA network. An end user may be an application program or a terminal operator.

EOT. End-of-transmission.

EP. Emulation Program.

ER. (1) Explicit route. (2) Exception response.

event. (1) In NetView, a record indicating irregularities of operation in physical elements of a network. (2) An occurrence of significance to a task; typically, the completion of an asynchronous operation, such as an input/output operation.

exception response (ER). In SNA, a negative response shown as a value in the form-of-response-requested field of a request header (RH). An exception response is sent only if a request is unacceptable as received or cannot be processed. Contrast with *definite response* and *no response*. See also *negative response*.

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

EXLST exit routine. In VTAM, a routine whose address has been placed in an exit list (EXLST) control block. The addresses are placed there with the EXLST macro instruction, and the routines are named according to their corresponding operand; hence DFASY exit routine, TPEND exit routine, RELREQ exit routine, and so forth. All exit list routines are coded by the VTAM application programmer. Contrast with *RPL exit routine*.

explicit route (ER). In SNA, the path control network elements, including a specific set of one or more transmission groups, that connect two subarea nodes. An explicit route is identified by an origin

subarea address, a destination subarea address, an explicit route number, and a reverse explicit route number. Contrast with *virtual route (VR)*. See also *path* and *route extension*.

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 recovery facility (XRF). Software designed to minimize the effect of failures in MVS, VTAM, the host processor, or IMS/VS on sessions between IMS/VS and designated terminals. It provides an alternate subsystem to take over failing sessions.

fanout. A modem feature that permits up to four controllers to be attached to one modem. See also *tailoring*.

FASTRUN. One of several options available with the NCP/EP Definition Facility (NDF) that indicates only the syntax is to be checked in generation definition statements.

feature. A particular part of an IBM product that a customer can order separately.

first speaker. In SNA, the LU-LU half-session defined at session activation as: (1) able to begin a bracket without requesting permission from the other LU-LU half-session to do so, and (2) winning contention if both half-sessions attempt to begin a bracket simultaneously. Contrast with *bidder*. See also *bracket protocol*.

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

frame. (1) The unit of transmission in some local area networks, including the IBM Token-Ring Network. It includes delimiters, control characters, information, and checking characters. (2) In SDLC, the vehicle for every command, every response, and all information that is transmitted using SDLC procedures.

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

gateway. The combination of machines and programs that provide address translation, name translation, and system services control point (SSCP) rerouting between independent SNA networks to allow those networks to communicate. A gateway consists of one gateway NCP and at least one gateway SSCP.

gateway NCP. An NCP that performs address translation to allow cross-network session traffic. The gateway NCP connects two or more independent SNA networks.

gateway SSCP. An SSCP that is capable of cross-network session initiation, termination, takedown, and session outage notification. A gateway SSCP is in session with the gateway NCP; it provides network name translation and assists the gateway NCP in setting up alias network addresses for cross-network sessions.

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.

generic bind. Synonym for *session activation request*.

generic unbind. Synonym for *session deactivation request*.

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

half-session. In SNA, a component that provides FMD services, data flow control, and transmission control for one of the sessions of a network addressable unit (NAU). See also *primary half-session* and *secondary half-session*.

help panel. An online display that tells you how to use a command or another aspect of a product. See *task panel*.

host processor. (1) (TC97) 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. (3) In an SNA network, the processing unit that contains a system services control point (SSCP).

idle character. (1) (CCITT/ITU) A control character that is sent when there is no information

to be sent. (2) A character transmitted on a communication line that does not print or punch to the output component of the accepting terminal.

IMS. Information Management System/Virtual Storage.

inactive. In VTAM, describes the state of a resource that has not been activated or for which the VARY INACT command has been issued. Contrast with *active*. See also *inoperative*.

indirect activation. In VTAM, the activation of a lower-level resource of the resource hierarchy as a result of SCOPE or ISTATUS specifications related to an activation command naming a higher-level resource. Contrast with *direct activation*.

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.

inhibited. In VTAM, pertaining to a logical unit (LU) that has indicated to its system services control point (SSCP) that it is not ready to establish LU-LU sessions. An initiate request for a session with an inhibited LU will be rejected by the SSCP. The LU can separately indicate whether this applies to its ability to act as a primary logical unit (PLU) or as a secondary logical unit (SLU). See also *enabled* and *disabled*.

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.

INN. Deprecated term for *intermediate routing node (IRN)*.

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. See also *inactive*.

interconnected networks. SNA networks connected by gateways.

interconnection. See *SNA network interconnection*.

interface. * 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.

intermediate routing node (IRN). In SNA, a subarea node with intermediate routing function. A subarea node may be a boundary node, an intermediate routing node, both, or neither, depending on how it is used in the network.

IRN. Intermediate routing node.

ISTATUS. In VTAM and NCP, a definition specification method for indicating the initial status of resources. See also *indirect activation*.

JCL. Job control language.

job control language (JCL). * 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.

keyword. (1) * One of the predefined words of an artificial language. (2) One of the significant and informative words in a title or document that describes the content of that document. (3) A symbol that identifies a parameter. (4) A part of a command operand that consists of a specific character string (such as *DSNAME=*).

line. See *communication line*.

line control. Synonym for *data link control protocol*.

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. In SNA, the combination of the link connection and the link stations joining network nodes; for example: (1) a System/370 channel and its associated protocols, (2) a serial-by-bit connection under the control of Synchronous Data Link Control (SDLC). A link connection is the physical medium of transmission. A link, however, is both logical and physical. Synonymous with *data link*.

link connection. In SNA, the physical equipment providing two-way communication between one link station and one or more other link stations; for example, a telecommunication line and data circuit terminating equipment (DCE).

Link Problem Determination Aid (LPDA). A series of testing procedures initiated by NCP that provide modem status, attached device status, and the overall quality of a communications link.

link station. (1) In SNA, the combination of hardware and software that allows a node to attach to and provide control for a link. (2) In VTAM, a named resource within a subarea node that represents another subarea node that is attached by a cross-subarea link. In the resource hierarchy, the link station is subordinate to the cross-subarea link.

link status (LS). Information maintained by local and remote modems.

link-attached. In VTAM, pertaining to devices that are physically connected by a telecommunication line. Synonymous with *remote*. Contrast with *channel-attached*.

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

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.

local-attached. Deprecated term for *channel-attached*.

logical unit (LU). In SNA, a port through which an end user accesses the SNA network in order to communicate with another end user and through which the end user accesses the functions provided by system services control points (SSCPs). An LU can support at least two sessions—one with an SSCP and one with another LU—and may be capable of supporting many sessions with other logical units. See also *network addressable unit (NAU)*, *peripheral LU*, *physical unit (PU)*, *system services control point (SSCP)*, *primary logical unit (PLU)*, and *secondary logical unit (SLU)*. Contrast with *physical unit (PU)*.

logical unit (LU) services. In SNA, capabilities in a logical unit to: (1) receive requests from an end user and, in turn, issue requests to the system services control point (SSCP) in order to perform the requested functions, typically for session initiation; (2) receive requests from the SSCP, for example to activate LU-LU sessions via Bind Session requests; and (3) provide session presentation and other services for LU-LU sessions. See also *physical unit (PU) services*.

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-interpret routine. In VTAM, an installation exit routine, associated with an interpret table entry, that translates logon information. It may also verify the logon.

LPDA. Link Problem Determination Aid.

LU. Logical unit.

LU-LU session. In SNA, 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.

LU-LU session type. In SNA, the classification of an LU-LU session in terms of the specific subset of SNA protocols and options supported by the logical units (LUs) for that session, namely:

The mandatory and optional values allowed in the session activation request.

The usage of data stream controls, FM headers, request unit (RU) parameters, and sense codes.

Presentation services protocols such as those associated with FM header usage.

LU-LU session types 0, 1, 2, 3, 4, 6, and 7 are defined.

macro instruction. (1) * (ISO) An instruction in a source language that is to be replaced by a defined sequence of instructions in the same source language. The macro instruction may also specify values for parameters in the instructions that are to replace it. (2) In assembler programming, an assembler language statement that causes the assembler to process a predefined set of statements called a macro definition. The statements normally produced from the macro definition replace the macro instruction in the program. See also *definition statement*.

maintenance and operator subsystem (MOSS). A subsystem of the 3725 Communication Controller that contains a processor and operates independently of the rest of the controller. It loads and supervises the 3725, runs problem determination procedures, and assists in maintaining both hardware and software.

maintenance services. In SNA, one of the types of network services in system services control points (SSCPs) and physical units (PUs). Maintenance services provide facilities for testing links and nodes and for collecting and recording error information. See also *configuration services*,

management services, network services, and session services.

major node. In VTAM, a set of resources that can be activated and deactivated as a group. See *node* and *minor node*.

management services. In SNA, one of the types of network services in system services control points (SSCPs) and logical units (LUs). Management services forward requests for network data, such as error statistics, and deliver the data in reply. See also *configuration services, maintenance services, network services, and session services*.

message. In VTAM, the amount of FM data transferred to VTAM by the application program with one SEND request.

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

minor node. In VTAM, a uniquely-defined resource within a major node. See *node* and *major node*.

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

MOSS. Maintenance and operator subsystem.

multiple-domain network. In SNA, a network with more than one system services control point (SSCP). Contrast with *single-domain network*.

Multiple Virtual Storage (MVS). An IBM program product 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.

multipoint link. A link or circuit interconnecting several link stations. Synonymous with *multidrop line*. Contrast with *point-to-point link*.

multi-tailed. When a communication controller with an NCP is attached to more than one host processor. See *twin-tailed*. See also *fanout* and *tailing*.

MVS. Multiple Virtual Storage operating system.

native network. The network in which a gateway NCP's resources reside.

NAU. Network addressable unit.

NCP. (1) Network Control Program (IBM program product). Its full name is Advanced Communications Function for the Network Control Program. (2) Network control program (general term).

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

NCP Subset. Advanced Communications Function for Network Control Program (NCP) V4 Subset. An IBM licensed program that is a subset of NCP. It operates only on IBM 3720 Communication Controllers with certain capacity limitations such as number of scanners, lines, and channel adapters supported.

NCP/Token-Ring interconnection (NTRI). An NCP function that allows a communication controller to attach to the IBM Token-Ring Network by providing a basic boundary network node interface.

NDF. NCP/EP definition facility.

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

network. (1) (TC97) An interconnected group of nodes. (2) In data processing, a user application network. See *path control network*, *public network*, *SNA network*, and *user application network*.

network address. In SNA, an address, consisting of subarea and element fields, that identifies a link, a link station, or a network addressable unit. Subarea nodes use network addresses; peripheral nodes use local addresses. The boundary function in the subarea node to which a peripheral node is attached transforms local addresses to network addresses and vice versa. See *local address*. See also *network name*.

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

network control (NC). In SNA, an RU category used for requests and responses exchanged between physical units (PUs) for such purposes as activating and deactivating explicit and virtual routes and sending load modules to adjacent peripheral nodes. See also *data flow control layer* and *session control*.

network control mode. The functions of a network control program that enable it to direct a communication controller to perform activities such as polling, device addressing, dialing, and answering. Contrast with *emulation mode*.

Network Control Program (NCP). An IBM program product 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.

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 identifier (network ID). The network name defined to NCPs and hosts to indicate the name of the network in which they reside. It is unique across all communicating SNA networks.

networking. In a multiple-domain network, communication among domains.

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

network node. Synonym for *node*.

network operator. (1) A person or program responsible for controlling the operation of all or part of a network. (2) The person or program that controls all the domains in a multiple-domain network. Contrast with *domain operator*.

network performance analyzer (NPA). An option of NCP that collects performance data about devices. The data is recorded by NPM.

Network Performance Monitor (NPM). An IBM program product that uses VTAM to record performance data collected for various devices in a network.

Network Problem Determination Application (NPDA). (1) The hardware monitor of NetView that helps identify network hardware problems from a central control point using interactive display techniques. (2) A back-level IBM program product that performs part of this function. It runs as an NCCF communication network management (CNM) application program.

Network Routing Facility (NRF). An IBM program product 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 services (NS). In SNA, the services within network addressable units (NAUs) that control network operation through SSCP-SSCP, SSCP-PU, and SSCP-LU sessions. See *configuration services, maintenance services, management services, and session services*.

network services (NS) header. In SNA, a 3-byte field in an FMD request/response unit (RU) flowing in an SSCP-LU, SSCP-PU, or SSCP-SSCP session. The network services header is used primarily to identify the network services category of the request unit (RU) (for example, configuration services, session services) and the particular request code within a category.

Network Terminal Option (NTO). An IBM program product 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.

node. (1) In SNA, an endpoint of a link or junction common to two or more links in a network. Nodes can be distributed to host 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. Synonymous with *network node*. See *major node* and *minor node*.

non-native network. Any network attached to a gateway NCP that does not contain that NCP's resources.

Non-SNA Interconnection (NSI). An IBM program product that provides format identification (FID1/4) support for selected non-SNA facilities. Thus, it allows SNA and non-SNA facilities to share SDLC links. It also allows the remote concentration of selected non-SNA devices along with SNA devices.

nonswitched data link. A connection between a link-attached device and a communication controller that does not have to be established by dialing. Contrast with *switched data link*. See also *point-to-point data link* and *multipoint data link*.

nonswitched line. A telecommunication line on which connections do not have to be established by dialing. Contrast with *switched line*.

no response (NR). In SNA, a value in the form-of-response-requested field of the request header (RH) indicating that no response is to be returned to the request, whether or not the request is received and processed successfully. Contrast with *definite response* and *exception response*.

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.

NPDA. Network Problem Determination Application.

NPM. Network Performance Monitor.

NPSI. X.25 NCP Packet Switching Interface.

NR. No response.

NRF. Network Routing Facility.

NS. Network services.

NSI. Non-SNA Interconnection.

NTO. Network Terminal Option.

NTRI. NCP/Token-Ring interconnection.

online. Stored in a computer and accessible from a terminal.

operator. A person who operates a machine. See *network operator*.

padding. In SNA, a technique by which a receiving component controls the rate of transmission of a sending component to prevent overrun or congestion. See *session-level padding, send padding, and virtual route (VR) padding*. See also *flow control*.

padding group. In SNA, (1) The path information units (PIUs) that can be transmitted on a virtual route before a virtual-route padding response is received, indicating that the virtual route receiver is ready to receive more PIUs on the route. Synonymous with *window*. (2) The requests that

can be transmitted on the normal flow in one direction on a session before a session-level pacing response is received, indicating that the receiver is ready to accept the next group of requests.

pacing response. In SNA, an indicator that signifies a receiving component's readiness to accept another pacing group; the indicator is carried in a response header (RH) for session-level pacing, and in a transmission header (TH) for virtual route pacing.

page. (1) The portion of a panel that is shown on a display surface at one time. (2) To move back and forth among the pages of a multiple-page panel. See also *scroll*. (3) (ISO) In a virtual storage system, a fixed-length block that has a virtual address and that can be transferred between real storage and auxiliary storage. (4) To transfer instructions, data, or both between real storage and external page or auxiliary storage.

panel. (1) A formatted display of information that appears on a terminal screen. See also *help panel* and *task panel*. Contrast with *screen*. (2) In computer graphics, a display image that defines the locations and characteristics of display fields on a display surface.

partitioned emulation programming (PEP) extension. A function of a network control program that enables a communication controller to operate some telecommunication lines in network control mode while simultaneously operating others in emulation mode.

path. (1) In SNA, the series of path control network components (path control and data link control) that are traversed by the information exchanged between two network addressable units (NAUs). A path consists of a virtual route and its route extension, if any. See also *explicit route*. (2) In defining a switched major node, a potential dial-out port that can be used to reach a physical unit.

path control (PC) layer. In SNA, the layer that manages the sharing of link resources of the SNA network and routes basic information units (BIUs) through it. Path control routes message units between network addressable units (NAUs) in the network and provides the paths between them. It converts the BIUs from transmission control (possibly segmenting them) into path information units (PIUs) and exchanges basic transmission units (BTUs) and one or more PIUs with data link control. See also *BIU segment*, *blocking of PIUs*, *data link control layer*, and *transmission control layer*.

path control (PC) network. In SNA, the part of the SNA network that includes the data link control and path control layers. See *SNA network* and *user application network*. See also *boundary function*.

path information unit (PIU). In SNA, a message unit consisting of a transmission header (TH) alone, or of a TH followed by a basic information unit (BIU) or a BIU segment. See also *transmission header*.

PC. Path control.

PEP. Partitioned emulation programming.

performance error. Synonym for *temporary error*.

peripheral LU. In SNA, a logical unit representing a peripheral node.

peripheral PU. In SNA, a physical unit representing a peripheral node.

permanent error. A resource error that cannot be resolved by error recovery programs. Contrast with *temporary error*.

physical connection. In VTAM, a point-to-point connection or multipoint connection.

physical unit (PU). In SNA, one of three types of network addressable units (NAUs). Each node of an SNA network contains a physical unit (PU) that manages and monitors the resources (such as attached links) of a node, as requested by a system services control point (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. See also *peripheral PU*, *physical unit (PU) type*, and *subarea 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. See also *logical unit (LU) services*.

physical unit (PU) type. In SNA, the classification of a physical unit (PU) according to the type of node in which it resides. The PU type is the same as its node type; that is, a type 1 PU resides in a type 1 node, and so forth.

PIU. Path information unit.

PLU. Primary logical unit.

point-to-point link. A link that connects a single remote link station to a node; it may be either switched or nonswitched. Contrast with *multipoint link*.

polling. (1) * Interrogation of devices for purposes such as to avoid contention, to determine operational status, or to determine readiness to send or receive data. (2) (TC97) The process whereby stations are invited, one at a time, to transmit.

positive response. A response indicating that a request was received and processed. Contrast with *negative response*.

primary half-session. In SNA, the half-session that sends the session activation request. See also *primary logical unit*. Contrast with *secondary half-session*.

primary logical unit (PLU). In SNA, the logical unit (LU) that contains the primary half-session for a particular LU-LU session. Each session must have a PLU and secondary logical unit (SLU). The PLU is the unit responsible for the bind and is the controlling LU for the session. A particular LU may contain both primary and secondary half-sessions for different active LU-LU sessions. Contrast with *secondary logical unit (SLU)*.

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

protocol. (1) (CCITT/ITU) A specification for the format and relative timing of information exchanged between communicating parties. (2) (TC97) The set of rules governing the operation of functional units of a communication system that must be followed if communication is to be achieved. (3) 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. See also *bracket protocol*. Synonymous with *line control discipline* and *line discipline*. See also *link protocol*.

PU. Physical unit.

PU type. Physical unit type.

public network. A network established and operated by communication common carriers or telecommunication Administrations for the specific purpose of providing circuit-switched,

packet-switched, and leased-circuit services to the public. Contrast with *user-application network*.

PU-PU flow. In SNA, the exchange between physical units (PUs) of network control requests and responses.

receive pacing. In SNA, the pacing of message units that the component is receiving. See also *send pacing*.

RECMS. Record maintenance statistics.

Recommendation X.21 (Geneva 1980). A Consultative Committee on International Telegraph and Telephone (CCITT) recommendation for a general purpose interface between data terminal equipment and data circuit equipment for synchronous operations on a public data network.

Recommendation X.25 (Geneva 1980). A Consultative Committee on International Telegraph and Telephone (CCITT) recommendation for the interface between data terminal equipment and packet-switched data networks. See also *packet switching*.

record maintenance statistics (RECMS). In NetView, an SNA error event record built from an NCP or line error and sent unsolicited to the host.

release. For VTAM to relinquish control of resources (communication controllers or physical units). See also *resource takeover*. Contrast with *acquire (2)*.

remote. Synonym for *link-attached*.

request unit (RU). In SNA, a message unit that contains control information such as a request code or FM headers, end-user data, or both.

request/response header (RH). In SNA, control information, preceding a request/response unit (RU), that specifies the type of RU (request unit or response unit) and contains control information associated with that RU.

request/response unit (RU). In SNA, a generic term for a request unit or a response unit. See also *request unit (RU)* and *response unit*.

resource. (1) Any facility of the computing system or operating system required by a job or task, and including main storage, input/output devices, the processing unit, data sets, and control or processing programs. (2) In NetView, any hardware or software that provides function to the network.

resource takeover. In VTAM, action initiated by a network operator to transfer control of resources from one domain to another. See also *acquire (2)* and *release*. See *takeover*.

response header (RH). In SNA, a header, optionally followed by a response unit (RU), that indicates whether the response is positive or negative and that may contain a pacing response. See also *negative response*, *pacing response*, and *positive response*.

response time. (1) The amount of time it takes after a user presses the enter key at the terminal until the reply appears at the terminal. (2) For response time monitoring, the time from the activation of a transaction until a response is received, according to the response time definition coded in the performance class.

response unit (RU). In SNA, a message unit that acknowledges a request unit; it may contain prefix information received in a request unit. If positive, the response unit may contain additional information (such as session parameters in response to Bind Session), or if negative, contains sense data defining the exception condition.

ring. A network configuration where a series of attaching devices are connected by unidirectional transmission links to form a closed path.

route. See *explicit route* and *virtual route*.

route extension (REX). In SNA, the path control network components, including a peripheral link, that make up the portion of a path between a subarea node and a network addressable unit (NAU) in an adjacent peripheral node. See also *path*, *explicit route (ER)*, *virtual route (VR)*.

Route Table Generator (RTG). An IBM-supplied field developed program that assists the user in generating path tables for SNA networks.

RPL exit routine. In VTAM, an application program exit routine whose address has been placed in the EXIT field of a request parameter list (RPL). VTAM invokes the routine to indicate that an asynchronous request has been completed. See *EXLST exit routine*.

RTG. Route Table Generator.

RU. Request/response unit.

RU chain. In SNA, a set of related request/response units (RUs) that are consecutively transmitted on a particular normal or expedited

data flow. The request RU chain is the unit of recovery: if one of the RUs in the chain cannot be processed, the entire chain is discarded. Each RU belongs to only one chain, which has a beginning and an end indicated via control bits in request/response headers within the RU chain. Each RU can be designated as first-in-chain (FIC), last-in-chain (LIC), middle-in-chain (MIC), or only-in-chain (OIC). Response units and expedited-flow request units are always sent as only-in-chain.

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.

screen. An illuminated display surface; for example, the display surface of a CRT or plasma panel. Contrast with *panel*.

scroll. To move all or part of the display image vertically to display data that cannot be observed within a single display image. See also *page (2)*.

SDLC. Synchronous Data Link Control.

secondary half-session. In SNA, the half-session that receives the session-activation request. See also *secondary logical unit (SLU)*. Contrast with *primary half-session*.

secondary logical unit (SLU). In SNA, the logical unit (LU) that contains the secondary half-session for a particular LU-LU session. An LU may contain secondary and primary half-sessions for different active LU-LU sessions. Contrast with *primary logical unit (PLU)*.

secondary logical unit (SLU) key. A key-encrypting key used to protect a session cryptography key during its transmission to the secondary half-session.

send pacing. In SNA, pacing of message units that a component is sending. See also *receive pacing*.

session. In SNA, a logical connection between two network addressable 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) by a pair of network addresses, identifying the origin and destination NAUs of any transmissions exchanged during the session. See *half-session*, *LU-LU session*, *SSCP-LU session*, *SSCP-PU session*, and *SSCP-SSCP session*. See also *LU-LU session type* and *PU-PU flow*.

session activation request. In SNA, a request that activates a session between two network addressable units (NAUs) and specifies session parameters that control various protocols during session activity; for example, BIND and ACTPU. Synonymous with *generic BIND*. Contrast with *session deactivation request*.

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.

session deactivation request. In SNA, a request that deactivates a session between two network addressable units (NAUs); for example, UNBIND and DACTPU. Synonymous with *generic unbind*. Contrast with *session activation request*.

session limit. (1) In SNA, the maximum number of concurrently active LU-LU sessions a particular logical unit can support. (2) In the network control program, the maximum number of concurrent line-scheduling sessions on a non-SDLC, multipoint line.

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

session partner. In SNA, one of the two network addressable units (NAUs) having an active session.

session services. In SNA, one of the types of network services in the system services control point (SSCP) and in the logical unit (LU). These services provide facilities for an LU or a network operator to request that the SSCP initiate or terminate sessions between logical units. See *configuration services* and *maintenance services*.

session-level pacing. In SNA, a flow control technique that permits a receiving connection point manager to control the data transfer rate (the rate at which it receives request units) on the normal flow. It is used to prevent overloading a receiver with unprocessed requests when the sender can generate requests faster than the receiver can process them. See also *pacing* and *virtual route pacing*.

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

single-domain network. In SNA, a network with one system services control point (SSCP). Contrast with *multiple-domain network*.

SLU. Secondary logical unit.

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 addressable units (NAUs), boundary function components, and the path control network.

SNA network interconnection. The connection, by gateways, of two or more independent SNA networks to allow communication between logical units in those networks. The individual SNA networks retain their independence.

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

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

SSCP. System services control point.

SSCP-LU session. In SNA, a session between a system services control point (SSCP) and a logical unit (LU); the session enables the LU to request the SSCP to help initiate LU-LU sessions.

SSCP-PU session. In SNA, a session between a system services control point (SSCP) and a physical unit (PU); SSCP-PU sessions allow SSCPs to send requests to and receive status information from individual nodes in order to control the network configuration.

SSCP-SSCP session. In SNA, a session between the system services control point (SSCP) in one domain and the SSCP in another domain. An SSCP-SSCP session is used to initiate and terminate cross-domain LU-LU sessions.

SSP. System Support Programs (IBM program product). Its full name is Advanced

Communications Function for System Support Programs.

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.

subarea (SA). A portion of the SNA network consisting of a subarea node, any attached peripheral nodes, and their associated resources. Within a subarea node, all network addressable units, links, and 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.

subarea address. In SNA, a value in the subarea field of the network address that identifies a particular subarea. See also *element address*.

subarea link. In SNA, a link that connects two subarea nodes.

subarea PU. In SNA, a physical unit (PU) in a subarea node.

subsystem. A secondary or subordinate system, usually capable of operating independent of, or asynchronously with, a controlling system.

supervisor. The part of a control program that coordinates the use of resources and maintains the flow of processing unit operations.

switched line. A communication line in which the connection between the communication controller and a remote link station is established by dialing.

switched network backup (SNBU). In VTAM, an optional facility that allows a user to specify, for certain types of PUs, a switched line to be used as an alternate path if the primary line becomes unavailable or unusable.

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 services control point (SSCP). In SNA, a focal point within an SNA network for managing the configuration, coordinating network operator and problem determination requests, and providing directory support and other session services for end users of the network. Multiple SSCPs, cooperating as peers, 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 domain.

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.

System Support Programs (SSP). An IBM program product, made up of a collection of utilities and small programs, that supports the operation of the NCP.

tailoring. A feature on a multi-channel modem that allows another modem link to be attached to one of the channels. See *multi-tailed* and *twin-tailed*. See also *fanout*.

takeover. The process by which the failing active subsystem is released from its extended recovery facility (XRF) sessions with terminal users and replaced by an alternate subsystem. See *resource takeover*.

TAP. Trace analysis program.

task. A basic unit of work to be accomplished by a computer. The task is usually specified to a control program in a multiprogramming or multiprocessing environment.

task panel. Online display from which you communicate with the program in order to accomplish the program's function, either by selecting an option provided on the panel or by entering an explicit command. See *help panel*.

TCAM. (1) Telecommunications Access Method. (2) The IBM program product 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. Synonymous with *transmission line*.

temporary error. A resource failure that can be resolved by error recovery programs. Synonymous with *performance error*. Contrast with *permanent error*.

terminal. A device that is capable of sending and receiving information over a link; it is usually equipped with a keyboard and some kind of display, such as a screen or a printer.

terminal access facility (TAF). In NetView, a facility that allows a network operator to control a number of subsystems. In a full-screen or operator control session, operators can control any combination of such subsystems simultaneously.

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.

threshold. In NetView, refers to a percentage value set for a resource and compared to a calculated error-to-traffic ratio.

TIC. Token-ring interface coupler.

time sharing option (TSO). An optional configuration of the operating system that provides conversational time sharing from remote stations.

token. A sequence of bits passed from one device to another along the network. When the token has data appended to it, it becomes a frame.

token ring. A network, having a ring topology, that passes tokens from one attaching device to another. For example, the IBM Token-Ring Network.

token-ring interface coupler (TIC). An adapter that can connect a 3725 Communication Controller to an IBM Token-Ring Network.

trace analysis program (TAP). An SSP program service aid that assists in analyzing trace data produced by VTAM, TCAM, and NCP and provides network data traffic and network error reports.

transmission control (TC) layer. In SNA, the layer within a half-session that synchronizes and paces session-level data traffic, checks session sequence numbers of requests, and enciphers and deciphers end-user data. Transmission control has two components: the connection point manager and session control. See also *half-session*.

transmission control unit (TCU). A communication control unit whose operations are controlled solely by programmed instructions from the computing system to which the unit is attached; no program is stored or executed in the unit. Examples are the IBM 2702 and 2703 Transmission Controls. Contrast with *communication controller*.

transmission group (TG). In SNA, a group of links between adjacent subarea nodes, appearing as a single logical link for routing of messages. A transmission group may consist of one or more SDLC links (parallel links) or of a single System/370 channel.

transmission header (TH). In SNA, control information, optionally followed by a basic information unit (BIU) or a BIU segment, that is created and used by path control to route message units and to control their flow within the network. See also *path information unit*.

transmission line. Synonym for *telecommunication line*.

transmission priority. In SNA, a rank assigned to a path information unit (PIU) that determines its precedence for being selected by the transmission group control component of path control for forwarding to the next subarea node of the route used by the PIU.

TSO. Time sharing option.

twin-tailed. When a communication controller with an NCP is attached to two host processors. See *multi-tailed*. See also *fanout* and *tailing*.

TWX. Teletypewriter exchange service.

unbind. In SNA, a request to deactivate a session between two logical units (LUs). See also *session deactivation request*. Contrast with *BIND*.

uninterpreted name. In SNA, a character string that a system services control point (SSCP) is able to convert into the network name of a logical unit (LU). Typically, an uninterpreted name is used in a logon or Initiate request from a secondary logical unit (SLU) to identify the primary logical unit (PLU) with which the session is requested.

user. Anyone who requires the services of a computing system.

user-application network. A configuration of data processing products, such as processors, controllers, and terminals, established and operated

by users for the purpose of data processing or information exchange, which may use services offered by communication common carriers or telecommunication Administrations. Contrast with *public network*.

user-written generation application. A user-written program that runs with the NCP/EP definition facility (NDF) during NCP generation. It processes definition statements and operands.

variable. In NetView, a character string beginning with & that is coded in a command list and is assigned a value during execution of the command list.

Virtual Machine (VM). A program product 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 route (VR). In SNA, a logical connection (1) between two subarea nodes that is physically realized as a particular explicit route, or (2) that is contained wholly within a subarea node for intra-node sessions. A virtual route between distinct subarea nodes imposes a transmission priority on the underlying explicit route, provides flow control through virtual-route pacing, and provides data integrity through sequence numbering of path information units (PIUs). See also *explicit route (ER)*, *path*, and *route extension*.

virtual route (VR) pacing. In SNA, a flow control technique used by the virtual route control component of path control at each end of a virtual route to control the rate at which path information units (PIUs) flow over the virtual route. VR pacing can be adjusted according to traffic congestion in any of the nodes along the route. See also *pacing* and *session-level pacing*.

virtual route selection exit routine. In VTAM, an optional installation exit routine that modifies the list of virtual routes associated with a particular class of service before a route is selected for a requested LU-LU session.

Virtual Storage Extended (VSE). An IBM program product 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 program product 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 operating system. Its full name is Virtual Machine/System Product.

VM/SP. Virtual Machine/System Product operating system. Synonym for *VM*.

VR. Virtual route.

VSE. Virtual Storage Extended operating system.

VTAM. Virtual Telecommunications Access Method (IBM program product). Its full name is Advanced Communications Function for the Virtual Telecommunications Access Method.

VTAM operator command. A command used to monitor or control a VTAM domain.

window. (1) In SNA, synonym for *pacing group*. (2) A small amount of information in a framed-in area on a panel that overlays part of the panel.

XID. A data link control command and response passed between adjacent nodes that allows the two nodes to exchange identification and other information necessary for operation over the data link.

XRF. Extended recovery facility.

X.21. See *Recommendation X.21 (Geneva 1980)*.

X.25. See *Recommendation X.25 (Geneva 1980)*.

X.25 NCP Packet Switching Interface (NPSI). The X.25 Network Control Program Packet Switching Interface, which is an IBM program product that allows SNA users to communicate over packet-switched data networks that have interfaces complying with Recommendation X.25 (Geneva 1980) of the International Telegraph and Telephone Consultative Committee (CCITT). It allows SNA programs to communicate with SNA equipment or with non-SNA equipment over such networks. In addition, this product may be used to attach native X.25 equipment to SNA host systems without a packet network. See also *Recommendation X.25 (Geneva 1980)*.

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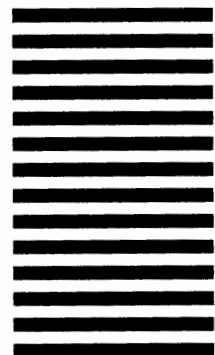
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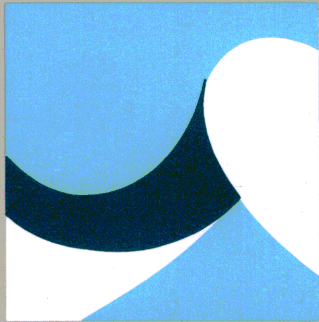
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