SC30-3163-1
File No. S370/4300-30

X.25 NCP Packet Switching Interface for IBM 3705 Installation and Operation

Program Product

Program Number 5668-981
Releases 2, 3, and 3.1

IBM

Second Edition (July 1983)

This is a major revision of and obsoletes SC30-3163-0 and Technical Newsletter SN30-3244. A change to the text or to an illustration is indicated by a vertical line to the left of the change. This edition applies to Releases 2, 3, and 3.1 of X.25 NCP Packet Switching Interface Program Product 5668-981, and to all subsequent releases and modifications unless 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 and 4300 Processors Bibliography, GC20-0001, for the editions that are applicable and current.

PREFACE

This manual tells how to define, generate, and operate the IBM X.25 NCP Packet Switching Interface program product. The publication is directed to system analysts and system programmers who prepare the X.25 NCP Packet Switching Interface for use in conjunction with Advanced Communications Function for Network Control Program (ACF/NCP).

An easel binder is available for this manual. This binder may be purchased through your IBM representative (form number SR30-0327).

Note: In this publication, generic terms are used for brevity. Network control program (or NCP) refers to ACF/NCP. Access method refers to the access method being used, when there is no need to distinguish between TCAM and VTAM. Where necessary, the text refers to VTAM -- meaning ACF/VTAM or VTAM -- and TCAM -- meaning ACF/TCAM or TCAM.

PREREQUISITE MANUALS

Before using this manual, you should review the information in the publications:

- X.25 NCP Packet Switching Interface for IBM 3705 General Information (GC30-3189)
- The X.25 Interface for Attaching IBM SNA Nodes to Packet-Switched Data Networks--General Information (GA27-3345)

To use this publication you need a basic understanding of data communications and related access methods. You should also have a general knowledge of the the IBM 3705 Communications Controllers, as described in:

- Introduction to the IBM 3704 and 3705 Communications Controllers (GA27-3057)
- IBM 3704 and 3705 Communications Controllers Principles of operation (GA27-3004)
- ACF/VTAM Planning and Installation Reference (SC27-0610)
- ACF/TCAM Installation (SC30-3132 and SC30-3153)

COREQUISITE MANUAL

This manual should be used in conjunction with Advanced Communications Function for Network Control Program and System Support Programs for the IBM 3705: Installation (order number SC30-3142 for Release 2, order number SC30-3154 for Release 3, order number SC30-3167 for Release 3.1).

IF ANYTHING GOES WRONG...

To aid you in problem determination, you will want to have on hand a copy of:

- X.25 NCP Packet Switching Interface: Diagnosis Guide (SC30-3164).
- X.25 NCP Packet Switching Interface: Diagnosis Reference (LY30-3054).

OTHER USEFUL MANUALS

An understanding of IBM's Systems Network Architecture (SNA) will assist you in your understanding of the operation of X.25 and the X.25 NCP Packet Switching Interface. The following manuals will aid you in this understanding.

- SNA Concepts and Products (GC30-3072)
- SNA Sessions Between Logical Units (GC20-1868)
- SNA Technical Overview (GC30-3073)
- ACF/NCP/VS Program Reference Summary Release 2.1 (LY30-3043)
- ACF/NCP/VS Program Reference Summary Release 3 (LY30-3058)
- ACF/NCP for the IBM 3705 Reference Summary and Data Areas Version 2 (LY30-3062)

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FIGURES

SUMMARY OF AMENDMENTS

This second addition includes the new functions of Release 3.1 of the X.25 NCP Packet Switching Interface. Boundary Network Node Qualified Logical Link Control (BNN QLLC) offers a new method of communication between SNA hosts and SNA peripheral nodes. BNN QLLC is an extension of Logical Link Control level 3. The COMMIT/DECOMMIT function manages buffers.

Chapter 3 has been rewritten to include two sections. The first section contains all the steps for generating the X.25 NCP Packet Switching Interface under the OS/VS operating system. The second sections contains the corresponding instructions for the VSE operation system.

Other minor changes, corrections, and clarifications appear throughout this edition.

A change to the text or to an illustration is indicated by a vertical line to the left of the change.

CHAPTER 1. INSTALLATION AND OPERATION OVERVIEW

INTRODUCTION

This chapter gives information with which the system programmer should be familiar before installing the X.25 NCP Packet Switching Interface.

The publication X.25 NCP Packet Switching Interface General Information (order number GC30-3189) explains the X.25 NCP Packet Switching Interface program product as well as Packet-Switched Data Networks (PSDNs). You will find this manual useful as you install X.25 NCP Packet Switching Interface.

CONCEPTS

For definitions of terms, refer to the Glossary at the rear of this publication.

The remainder of this manual assumes the reader is familiar with the concepts and procedures needed to install an IBM program product such as IBM's ACF/NCP. This knowledge will help you perform the tasks necessary to install and operate the X.25 NCP Packet Switching Interface.

Purpose of X.25 NCP Packet Switching Interface

The X.25 NCP Packet Switching Interface is an interface that allows users of IBM's Systems Network Architecture (SNA) to use packet-switched data network services in conjunction with their SNA networks. It causes the PSDN to appear to the NCP and its associated host or hosts as a series of one or more switched or nonswitched SDLC links.

Location of X.25 NCP Packet Switching Interface

The X.25 NCP Packet Switching Interface is located in the NCP of a communication controller. To install the X.25 NCP Packet Switching Interface, X.25 NCP Packet Switching Interface operands are specified, the program is assembled, the generated output is included in the NCP input for the NCP generation, and then the NCP is assembled and link-edited.

USING THIS BOOK

The remainder of this book is organized to help you perform certain tasks. The information is grouped as follows:

Network Definition

Chapter 2 tells how to code X.25 NCP Packet Switching Interface generation macros to define your network.[1] With this information, you can determine the macros and operands that are needed to perform this network definition.

X.25 NCP Packet Switching Interface Generation

Chapter 3 describes how to generate the X.25 NCP Packet Switching Interface, take the results from this generation, and begin an NCP generation. This chapter covers from library installation to NCP system generation.

Access Method Considerations

Chapter 4 describes the changes you must make to NCP and access method (VTAM and TCAM) macros. It also contains information on naming conventions.

Application Programming Information

Chapter 5 contains information for the application programmer. SNA considerations are described. Also, there is a detailed discussion of GATE and DATE interfaces that assist the application programmer in writing his application programs. The application programmer writing the Communication and Transmission Control Program (CTCP) will also find required information here.

Operating and Typical Exchanges

Chapter 6 describes how to activate the X.25 NCP Packet Switching Interface and presents some typical command exchanges. Also covered

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[1] The term network has at least two meanings. A public network is a network established and operated by common carriers or telecommunication administrations for the specific purpose of providing circuit-switched, packet-switched, and lease-circuit services to the public. A user application network is a configuration of data processing products, such as processors, controllers, and terminals, established and operated by users for the purpose of data processing of information exchange, which may use transport services offered by common carriers or telecommunication administrations.

Unless otherwise indicated, network as used in this publication, refers to a user application network.

briefly are operator recovery considerations. More detailed recovery information is contained in the X.25 NCP Packet Switching Interface Diagnosis Guide (SC30-3164).

Sample Programs

Chapter 7 contains a sample program for the X.25 NCP Packet Switching Interface. Included with this sample are comments that explain the purpose of the code. The system programmer can use this sample to create his own program for system generation.

Macro Instructions

Using the detailed layouts and descriptions of X.25 NCP Packet Switching Interface macros in in Chapter 8, the system programmer can perform the network definition and generation described earlier. These macro instructions are listed alphabetically for quick reference.

CHAPTER 2. DEFINING YOUR NETWORK TO THE X.25 NCP PACKET SWITCHING INTERFACE

This chapter tells how to code the X.25 NCP Packet Switching Interface generation macros so that they will reflect your network configuration. In this chapter, the task of defining an interface between the X.25 NCP Packet Switching Interface program product and a packet-switched data network consists of a series of subtasks. Among these subtasks are:

- Defining input for the SSP Generation Facility
- Defining the type of PSDN
- Defining physical circuits
- Defining virtual circuits

The discussion of each subtask tells what options you have in performing that subtask and what macros and operands you must code to perform it.

Use the information in this chapter to determine the macros and operands you will need to define your network configuration. When you begin to code the macros, go to Chapter 8, which presents the X.25 NCP Packet Switching Interface macros in alphabetic sequence. After you have finished coding the macros, go to Chapter 3, which tells you how to perform an X.25 NCP Packet Switching Interface generation using these macros.

Figure 2-1 presents an X.25 NCP Packet Switching Interface generation deck divided into three sections.

General Parameters:

X25BUILD
X25NET

Table Definition:

X25VCCPT
X25VCCPT
.
.
X25OUFT
X25OUFT
.
.

Physical and Virtual Circuit Definition:

X25MCH
X25LCG
X25LINE
X25PU
X25LU
.
.
X25VC
X25END

Figure 2-1. Sections of an X.25 NCP Packet Switching Interface Generation Deck

In the remainder of this chapter, these sections are related to the subtasks listed above. This figure is repeated in each section below to show where the macros involved in each subtask are located in the X.25 NCP Packet Switching Interface generation deck.

DEFINING INPUT FOR THE SSP GENERATION FACILITY

Chapter 3 tells how the X.25 NCP Packet Switching Interface is generated using the ACF/NCP generation procedure. At the time the NCP is generated, certain information must be provided to the assembler in the host processor with respect to desired JCL, the names of output libraries, the number and location of certain control blocks, and other such generation-time information. When coding an NCP, you supply such information via the BUILD and GENEND macros.

The X.25 NCP Packet Switching Interface requires similar generation-time information. You specify such information by means of the X25BUILD and X25END macros. Figure 2-2 shows where these macros are located in an X.25 NCP Packet Switching Interface generation deck.

```
General Parameters:
       X25BUILD
       X25NET

Table Definition:
       X25VCCPT
       X25VCCPT
          .
          .
       X25OUFT
       X25OUFT
          .
          .

Physical and Virtual Circuit Definition:
       X25MCH
       X25LCG
       X25LINE
       X25PU
       X25LU
          .
          .
       X25VC
       X25END
```

Figure 2-2. Macros for Specifying SSP Generation and Network-Wide Parameters

Most of the operands of the X25BUILD and X25END macros are identical to operands of the ACF/NCP BUILD and GENEND macros.

DEFINING THE TYPE OF PACKET-SWITCHED DATA NETWORK

Use the X25NET macro to specify parameters that apply to the packet-switched data network with which the X.25 NCP Packet Switching Interface is to interface. Figure 2-2 shows where you should put the X25NET macro in a generation deck.

Specify the type of network you are interfacing to with the NETTYPE and DM operands of the X25NET macro, and with the LCN0 operand of the X25MCH macro. The X.25 NCP Packet Switching Interface performs different types of processing depending upon the type of network you specify. See the X25NET and X25MCH macro descriptions in Chapter 8 for additional details on:

- the NETTYPE operand, which specifies the format of Clear and Reset packets
- the DM operand, which specifies whether the LAPB protocol uses the X.25 level 2 DM command
- the LCNO operand, which specifies whether logical channel number 0 of logical channel group 0 is to be used as a virtual circuit

DEFINING PHYSICAL AND VIRTUAL CIRCUITS

Define physical and virtual circuits as a group. Place the macros defining permanent and switched virtual circuits (and associated resources) immediately after the macro defining the physical circuit used by the virtual circuits.

Circuit Definition Overview

You must define the following entities to the X.25 NCP Packet Switching Interface:

- physical circuits
- logical channels
- virtual circuits
- virtual circuit connection parameters
- optional user facilities associated with virtual circuits

A physical circuit is a hardware connection between two devices. The physical circuits defined to the X.25 NCP Packet Switching Interface are those between the communications controller containing the X.25 NCP Packet Switching Interface (a DTE in the X.25 network) and the DCE that serves as the DTE's port into the network.

Associated with each physical circuit are one or more virtual circuits. Whereas a physical circuit links the DTE containing the X.25 NCP Packet Switching Interface to the X.25 network, virtual circuits link the DTE containing the X.25 NCP Packet Switching Interface to another DTE located elsewhere in the network. The other DTE might be an SNA peripheral node, a non-SNA processor or terminal compatible with X.25, or an SNA subarea node which contains an X.25 NCP Packet Switching Interface.

Unlike the physical link between an X.25 NCP Packet Switching Interface DTE and the network, a virtual circuit linking an X.25 NCP Packet Switching Interface DTE to another DTE is a logical (rather than a physical) connection. The network determines what physical components support the virtual circuit; the DTEs communicating over the circuit know only the type of DTE at the other end, and the protocols to be used in communicating with that type of DTE.

A virtual circuit may be permanent (existing whenever the X.25 NCP Packet Switching Interface is active) or it may be switched (set up when needed and taken down when no longer needed, via an exchange of X.25 commands between the DTEs that will use the circuit and the DCEs that serve as ports into the X.25 network).[1]

A logical channel represents the path that data travels between its origin DTE and the network, or between the network and its destination DTE. Many logical channels may be assigned to the same physical circuit. When it sends a packet to the DCE, a DTE places a logical channel identifier in the header of the packet. The X.25 network uses this logical channel identifier to route the packet through the network to its destination DTE. Therefore, a logical channel identifier is the means used by an X.25 network to associate a packet with a virtual circuit.

The logical channel identifier consists of three digits. The first of these is called the logical channel group number, while the last two are together called the logical channel number.

If you are defining a permanent virtual circuit between the X.25 NCP Packet Switching Interface and an SNA subarea node or peripheral node, you must define to the X.25 NCP Packet Switching Interface the PU and any LUs associated with that node.

Figure 2-3 highlights the macros used to define circuits and associated resources and shows where you should put these macros in a generation deck.

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[1] In the CCITT X.25 Interface document, a switched virtual circuit is called a virtual call facility or virtual call.

```
General Parameters:
      X25BUILD
      X25NET

Table Definition:
      X25VCCPT
      X25VCCPT
         .
         .
      X25OUFT
      X25OUFT
         .
         .

Physical and Virtual Circuit Definition:
      X25MCH
      X25LCG
      X25LINE
      X25PU
      X25LU
         .
         .
      X25VC
      X25END
```

Figure 2-3. Macros Involved in Defining Circuits

Defining Physical Circuits

Use the MCHCNT operand of the X25BUILD macro to specify the number of physical circuits that a particular X.25 NCP Packet Switching Interface can have. Define the characteristics of each physical circuit with an X25MCH macro.

The X25MCH macro has two kinds of operands; those that relate to the characteristics of the physical circuit, and those that relate to the virtual circuits associated with the physical circuit.

The following are examples of parameters specified via X25MCH operands that characterize the physical circuit:

- type of communications controller scanner to which the physical circuit is attached

- link station addresses for the link representing the physical circuit

- number of retries to be performed in the event of a line error

- line speed for the physical circuit

Among the parameters specified via X25MCH that characterize the virtual circuits associated with the physical circuit are:

- highest logical channel number to be used for each logical channel group

- types of virtual circuits to be associated with this physical circuit

- whether the GATE or DATE facility is to be used for virtual circuits associated with this physical circuit

Defining Logical Channels

When a virtual circuit has been established, the X.25 network and X.25 NCP Packet Switching Interface use a logical channel group number and logical channel number to uniquely identify the virtual circuit; together these two numbers make up the logical channel identifier for that virtual circuit.

Packets being sent between the X.25 NCP Packet Switching Interface and the X.25 network contain the logical channel identifier for the appropriate virtual circuit in their packet headers. A virtual circuit between two DTEs may be known to the DTEs by different logical channel identifiers; the X.25 network transforms the logical channel identifiers in packet headers as necessary so that each of the DTEs will see the logical channel identifier it associates with the virtual circuit when processing packets received over that circuit.

The following macros and operands are used to define logical channels to the X.25 NCP Packet Switching Interface:

X25MCH	LCGDEF=
X25LCG	LCGN=
X25VC	LCN=
X25LINE	LCN=

The LCGDEF operand of the X25MCH macro specifies the number of logical channel groups associated with the physical circuit being defined by the macro.

Under each X25MCH macro, code one or more X25LCG macros to define the logical channel groups associated with the physical circuit.

Under each X25LCG macro, code X25VC and X25LINE macros defining the virtual circuits that are members of the logical channel group defined by the X25LCG macro. Use the LCN operand of the X25LINE and X25VC macros to assign a logical channel number to each virtual circuit. Arrange the X25LINE and X25VC macros in ascending order of logical channel numbers.

Defining Virtual Circuits

You must define each virtual circuit in your network to the X.25 NCP Packet Switching Interface by coding either an X25VC or an X25LINE macro. Use the X25VC macro to define switched virtual circuits, as well as permanent virtual circuits associated with non-SNA DTEs. Use the X25LINE macro to define permanent virtual circuits associated with SNA resources.

In addition to X25VC and X25LINE, use the following macros to define virtual circuits.

The X25MCH macro has several operands that specify parameters associated with virtual circuits using the physical circuit defined by X25MCH:

- LCGDEF specifies which logical channel groups and logical channel numbers are to be used
- FRMLGTH specifies maximum frame length for all virtual circuits using the physical circuit
- PKTMODL specifies the modulus value to be used by the packet protocol for all virtual circuits using the physical circuit
- LLCLIST specifies the types of switched virtual circuit to be associated with this physical circuit
- GATE specifies whether the GATE or DATE facility is to be used
- PAD specifies whether the PAD facility is to be used
- DBIT specifies whether the delivery confirmation bit is to be used to confirm whether packets sent to a non-SNA DTE have reached their destination

The X25PU and X25LU macros are used to define SNA resources associated with virtual circuits defined by X25LINE macros. The X25VCCPT and X25OUFT macros are used to define tables associated with virtual circuits. These macros are also discussed below.

Defining Permanent Virtual Circuits

Define permanent virtual circuits with the X25VC or X25LINE macro.

Use X25VC to define permanent virtual circuits to non-SNA DTEs. You may also use X25VC to define permanent virtual circuits to SNA terminals if they are of node type 1 and LU type 1 (such as the IBM 3767 Communication Terminal). The X25VC macro produces an NCP PU macro for a type 1 node and an NCP LU macro for a type 1 LU, and assigns specific values to the operands.

Use the X25LINE macro to define permanent virtual circuits to SNA peripheral nodes and subarea nodes. If you are defining a subarea node, code a single X25PU macro after the X25LINE macro to define the PU in the subarea node at the other end of the virtual circuit. If you are defining a peripheral node:

- code a single X25PU macro after the X25LINE macro to define the PU in the peripheral node
- code one X25LU macro for each LU that can have a session with a host LU over the permanent virtual circuit

Arrange your X25LINE macros in ascending order of logical channel numbers within the same logical channel group, as shown in the sample program in Chapter 7. For each permanent virtual circuit you must specify an entry in the virtual circuit connection parameter table, which is described later in this chapter. Use the VCCINDX operand of the X25VC or X25LINE macro for this purpose.

Defining Switched Virtual Circuits

Use the X25VC macro to define switched virtual circuits.

Arrange your X25VC macros in ascending order of logical channel numbers within the same logical channel group, as illustrated in the sample program in Chapter 7.

For a switched virtual circuit capable of making outgoing calls, you must code certain parameters in the DIALNO operand of the VTAM PATH macro or TCAM TERMINAL macro associated with the virtual circuit. See the description of these macros in Chapter 4 for details.

In addition, you must specify entries in the virtual circuit connection parameter table and the optional user facility table to be used for the virtual circuit. Use the VCCINDX and OUFINDX operands of the X25VC or X25LINE macro for this purpose.

Defining X.25 NCP Packet Switching Interface Virtual Circuit Types

This section describes various types of X.25 NCP Packet Switching Interface virtual circuits and tells how to define them.

The X.25 NCP Packet Switching Interface supports several types of virtual circuits, classified with respect to the type of DTE at the remote end of the circuit:

- virtual circuits to non-SNA DTEs are type 0 virtual circuits
- virtual circuits to SNA peripheral nodes are type 2 or type 3 virtual circuits
- virtual circuits to SNA subarea nodes are type 3 virtual circuits
- virtual circuits to DTEs using GATE support are type 4 virtual circuits
- virtual circuits to DTEs using transparent or integrated PAD support are type 5 virtual circuits

GATE support is an extension of the support provided to type 0 or type 5 virtual circuits that affects the way in which data is routed between the host and the X.25 NCP Packet Switching Interface, as explained below.

Virtual circuits of types 0, 2, 3 and 5 may use the X.25 NCP Packet Switching Interface DATE extension.

Virtual circuit types 0 and 2 are supported by Release 1 of the X.25 NCP Packet Switching Interface. Virtual circuit types 4 and 5 and the DATE extension are supported by Release 2 of the X.25 NCP Packet Switching Interface. Virtual circuit type 3 for subarea nodes is supported by Release 3 of the X.25 NCP Packet Switching Interface. Virtual circuit type 3 for peripheral nodes is supported by Release 3.1 of the X.25 NCP Packet Switching Interface.

DEFINING TYPE 0 VIRTUAL CIRCUITS: As shown in Figure 2-4 for type 0 virtual circuits the host access method communicates with the X.25 NCP Packet Switching Interface over an SSCP-PU session between the SSCP located in the access method (called SSCP-A in Figure 2-4) and a PU located in the NCP and associated with the virtual circuit (called PU B in Figure 2-4) (This PU is defined by an NCP PU macro generated as the result of your coding an X25VC macro). Code within the X.25 NCP Packet Switching Interface known as the Protocol Converter for Non-SNA Equipment (PCNE) converts outgoing SNA commands to X.25 packets and incoming X.25 packets to SNA commands for virtual circuit setup and take-down.

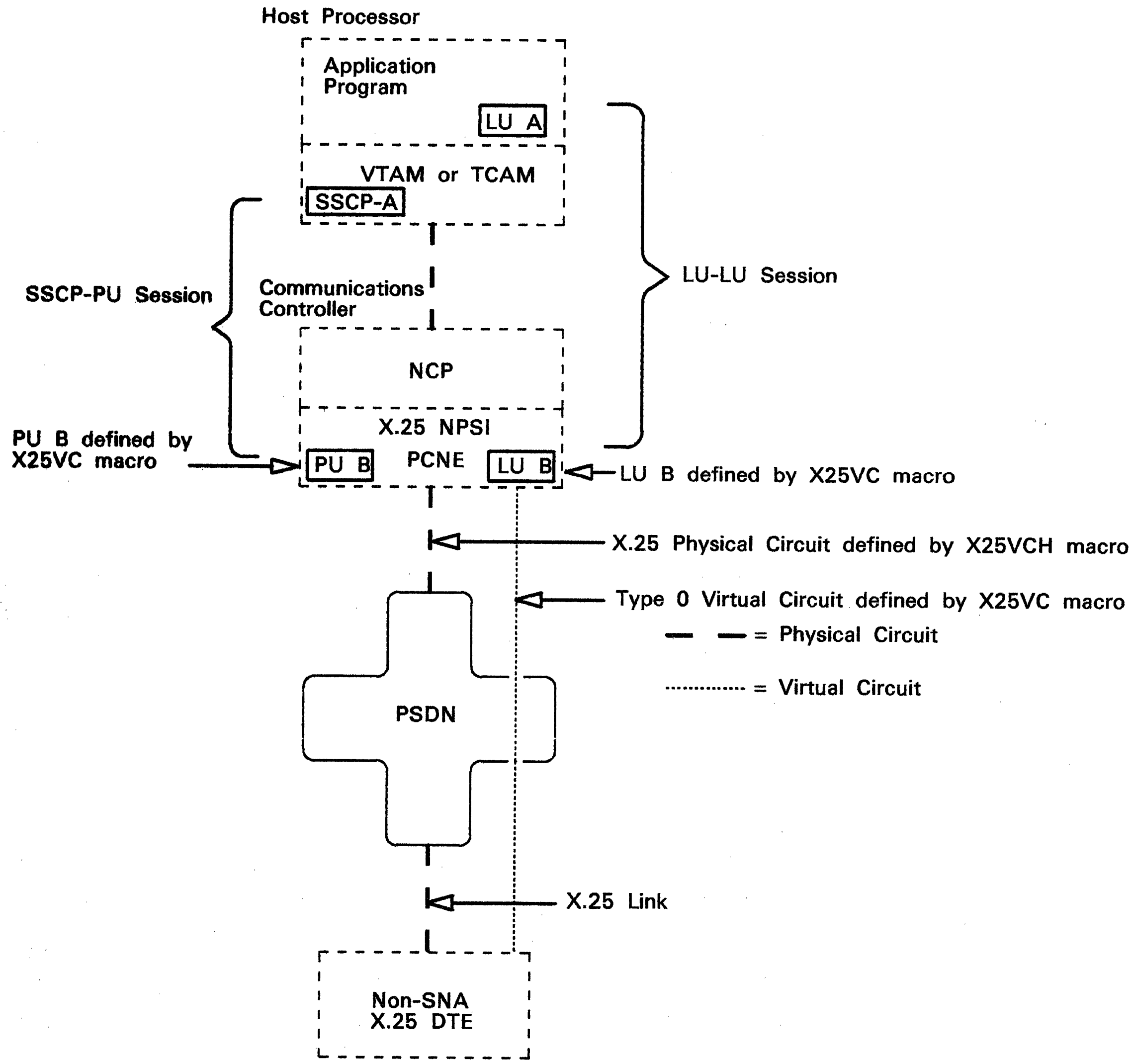


Figure 2-4. Type 0 Virtual Circuit and Associated SNA Resource

After the virtual circuit is established, data flows between the host application program and the X.25 NCP Packet Switching Interface over an LU-LU session between the LU associated with the host application program (LU A) and an LU associated with the virtual circuit (LU B). (The virtual circuit LU is defined by an NCP LU macro generated as the result of your coding an X25VC macro). The PCNE converts outgoing SNA PIUs into X.25 data packets and sends them to the remote DTE. It converts incoming X.25 data packets into SNA PIUs and sends them to the application program over the LU-LU session. Each data packet consists of a three-byte X.25 packet header plus an RU.

For type 0 virtual circuits, use the X25VC macro to define the circuit; this macro generates NCP macros defining the type 1 PU and LU associated with the circuit.

DEFINING TYPE 2 VIRTUAL CIRCUITS: As shown in Figure 2-5, two types of SNA sessions are associated with a type 2 virtual circuit. One of these is an SSCP-PU session between an SSCP in the host access method (SSCP A) and a PU in the peripheral node at the remote end of the virtual circuit (PU B). The other is between an LU in the host (LU A) and an LU in the peripheral node (LU B). You define the PU in the peripheral node to the X.25 NCP Packet Switching Interface via an X25VC or X25PU macro; you define the LU via an X25VC or X25LU macro.

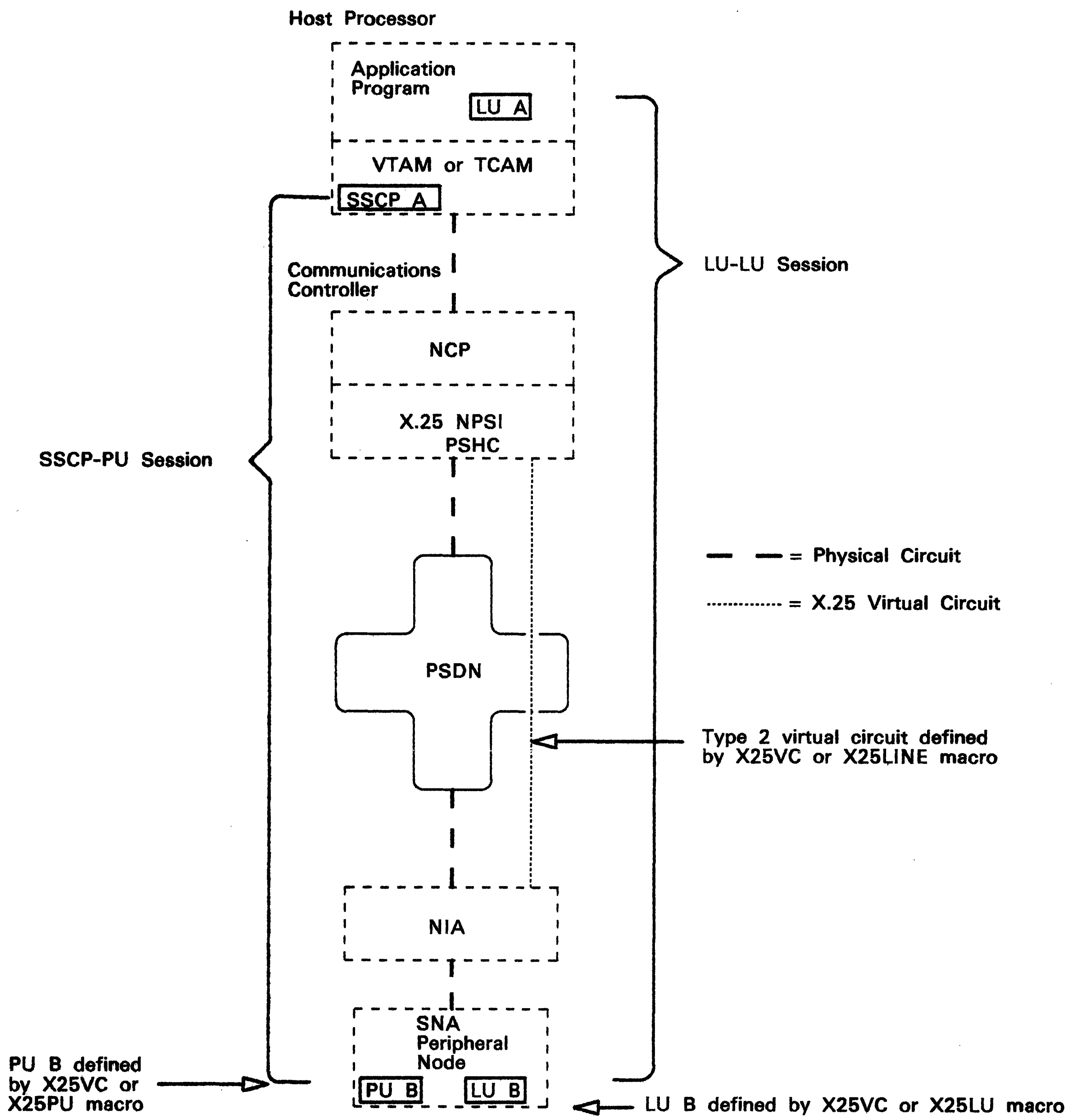


Figure 2-5. Type 2 Virtual Circuit and Associated SNA Resources

For permanent type 2 virtual circuits, use an X25LINE macro to define the virtual circuit, an X25PU macro to define the PU associated with the peripheral node, and X25LU macros to define LUs associated with the peripheral node. For switched type 2 virtual circuits, use an X25VC macro to define the virtual circuit and associated SNA resources.

A switched virtual circuit is defined to the access method as a switched SDLC link. When the PU in the NCP containing the X.25 NCP Packet Switching Interface receives an SNA command dealing with the status of this link (such as Connect Out or Abandon Connection), the PU passes the command to the X.25 NCP Packet Switching Interface, which converts it into the appropriate X.25 command for the virtual circuit. (For example, the SNA Connect Out command is converted into a Call Request packet, while the SNA Abandon Connection command is converted into a Clear Request packet).

When the virtual circuit is active, code within the X.25 NCP Packet Switching Interface called the physical services header code (PSHC) intercepts and processes PIUs and SDLC commands flowing between the host and the peripheral node over sessions assigned to the virtual circuit. The PSHC places PIUs going out to the peripheral node in an X.25 packet, and removes PIUs coming in from the peripheral node from the packets in which they are contained, before sending them on to the host.

The PSHC converts outgoing SDLC commands into X.25 packets, and converts incoming X.25 packets from the peripheral node into SDLC commands.

When placing outgoing PIUs in packets, the PSHC adds a three-byte or four-byte packet header followed by a two-byte logical link control (LLC) header to the front of the PIU or command. When converting outgoing SDLC commands, the PSHC builds a five- or six-byte packet containing a three- or four-byte packet header followed by two byte LLC containing the converted SDLC command. The two-byte LLC header carries SNA-related information to the Network Interface Adapter (NIA) attaching the remote peripheral node to the network. This information consists of link-level commands for the link between the NIA and the peripheral node. For incoming packets, the PSHC removes the packet header and LLC header before transferring the PIUs to the host SSCP or LU (or in the case of SDLC commands to the appropriate link station in the NCP).

The packet sizes at the X.25 NCP Packet Switching Interface/PSDN interface and the NIA/PSDN interface must be the same.

DEFINING TYPE 3 VIRTUAL CIRCUITS TO SNA PERIPHERAL NODE: As shown in Figure 2-6 and Figure 2-7, two types of SNA sessions are associated with a type 3 virtual circuit to SNA peripheral node. One of these is an SSCP-PU session between an SSCP in the host access method (SSCP A) and a PU peripheral node at the remote end of the virtual circuit (PU B). The other is a session between an LU in the host (LU A) and an LU in the peripheral node (LU B). You define the PU in the peripheral node to the X.25 NCP Packet Switching Interface via an X25VC or X25PU macro; you define the LU via an X25VC or X25LU macro.

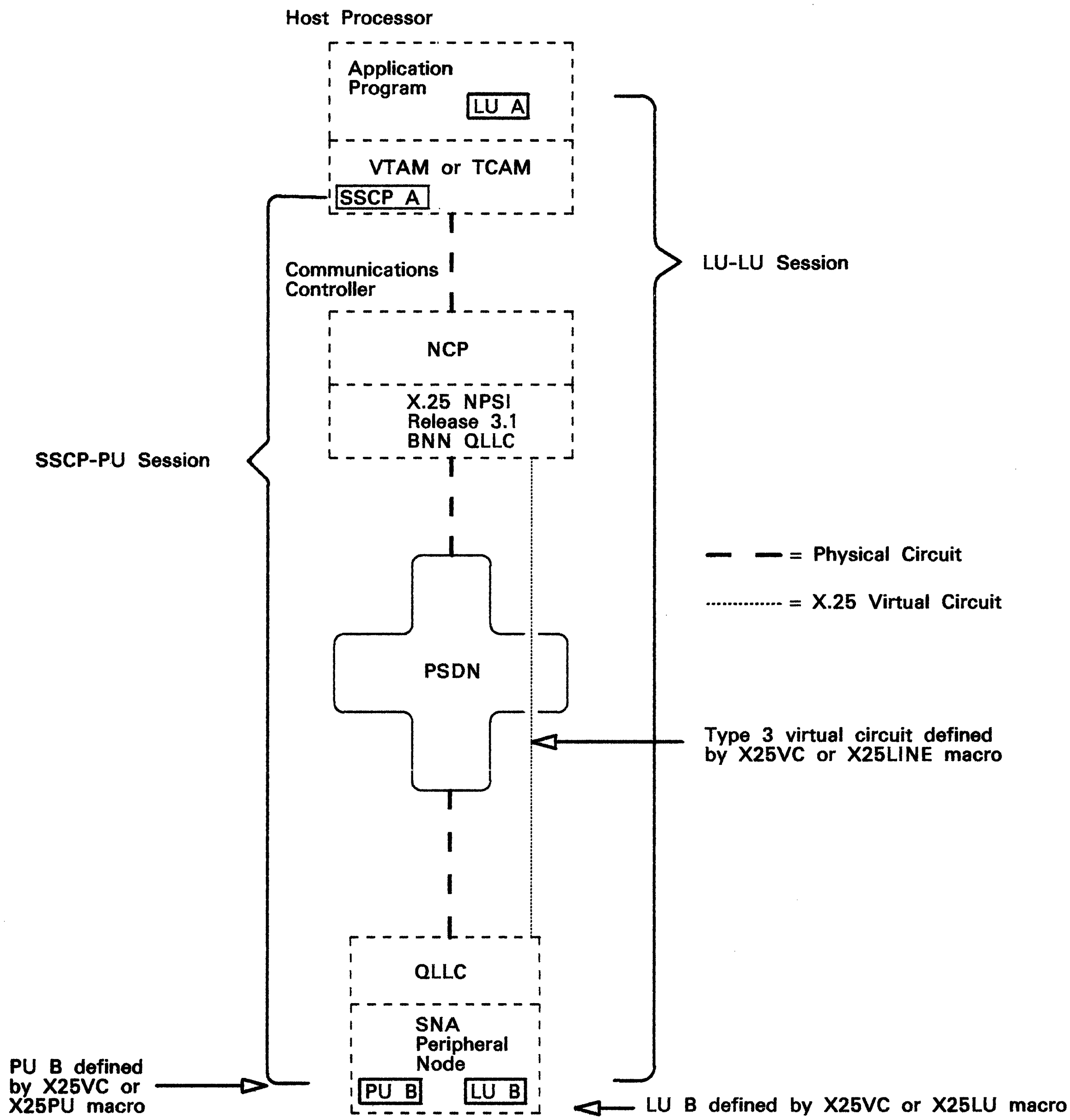


Figure 2-6. Type 3 Virtual Circuit to Peripheral Node and Associated SNA Resources with Integrated QLLC (Release 3.1 only)

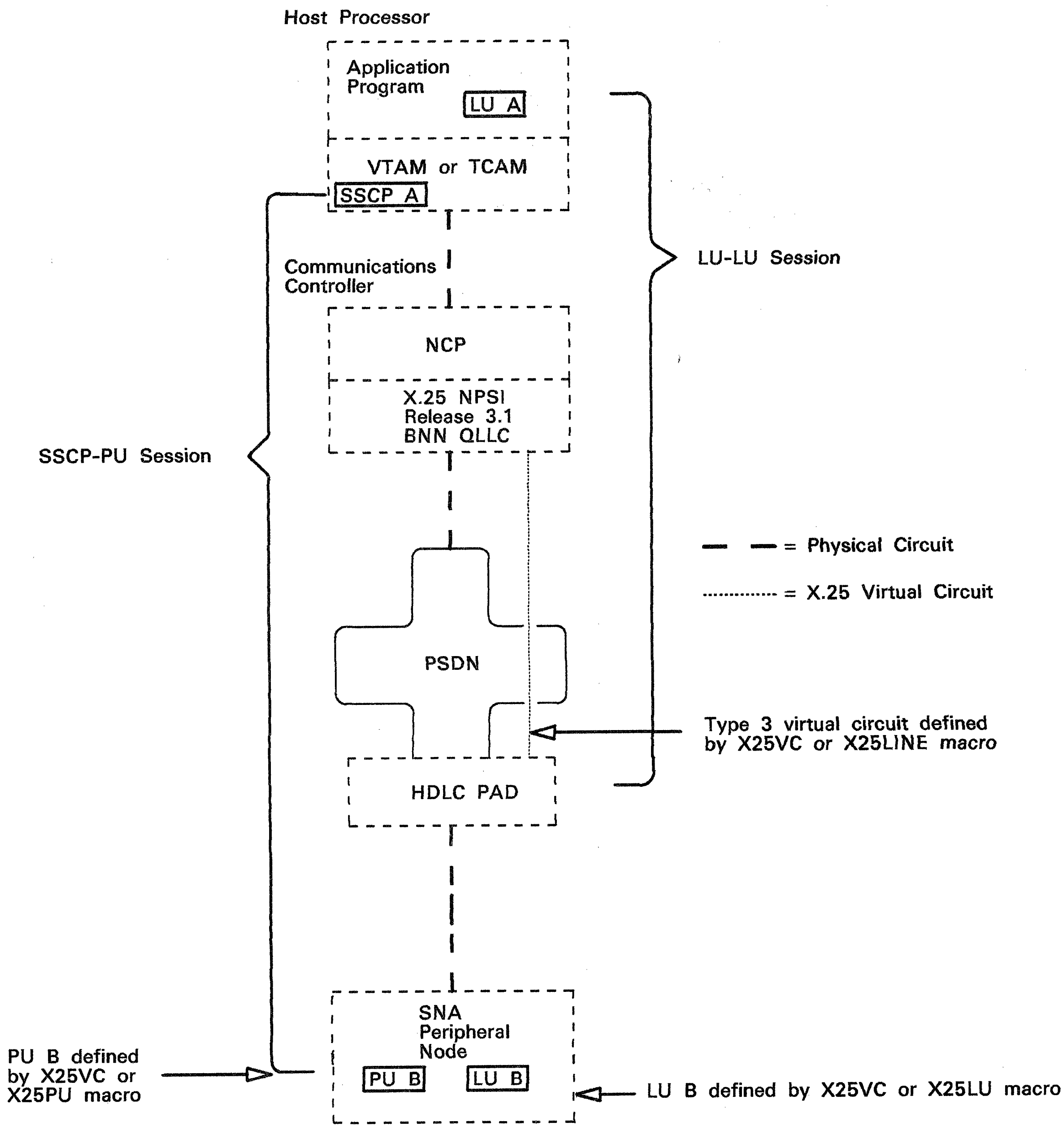


Figure 2-7. Type 3 Virtual Circuit to Peripheral Node and Associated SNA Resources with HDLC PAD (Release 3.1 only)

For permanent type 3 virtual circuit to SNA peripheral node, use an X25LINE macro to define the virtual circuit, an X25PU macro to define the PU associated with the peripheral node, and X25LU macros to define LUs associated with the peripheral node. For switched type 3 virtual circuits to SNA peripheral node, use an X25VC macro to define the virtual circuit and associated resources.

A switched virtual circuit is defined to the access method as a switched SDLC link. When the PU in the NCP containing the X.25 NCP Packet

Switching Interface receives an SNA command dealing with the status of this link (such as Connect Out or Abandon Connection), the PU passes the command to the X.25 NCP Packet Switching Interface, which converts it into the appropriate X.25 command for the virtual circuit.

When the virtual circuit is active, code within the X.25 NCP Packet Switching Interface called Boundary Network Node Qualified Logical Link Control (BNN QLLC) intercepts and processes PIUs flowing between the host and the peripheral node over sessions assigned to the virtual circuit. The BNN QLLC places PIUs going to the peripheral node in an X.25 packet. The BNN QLLC removes PIUs coming in from the peripheral node from the packets in which they are contained, and sends them to the host.

When placing outgoing PIUs in packets, the BNN QLLC adds a 3-byte or 4-byte packet header to the front of the PIU. Unlike the PSHC, the BNN QLLC does not add a 2-byte LLC header to the packet.

The BNN QLLC also intercepts and converts outgoing SDLC commands originating at the link station associated with the local end of the physical circuit and destined for the link station associated with the remote end of the virtual circuit in the adjacent NCP. Rather than encoding the SDLC information in a 2-byte LLC header as the PSHC does, the BNN QLLC turns on the "Qualified" or Q bit in the packet header. When the BNN QLLC in the adjacent NCP receives a packet with the Q bit on in its header, it directs the SDLC command to the appropriate link station in its NCP. It does not send the SDLC command to another node.

The BNN QLLC removes incoming PIUs from their packets before sending them to the host.

For the SNA peripheral node, the BNN QLLC is provided in one of two ways:

- either by an integrated protocol converter in the SNA peripheral node itself, as shown on Figure 2-6,
- or by an HDLC-PAD that converts qualified packets to SDLC control commands and non-qualified data packets to SDLC information frames as shown on Figure 2-7.

DEFINING TYPE 3 VIRTUAL CIRCUITS TO SNA SUBAREA NODE: As shown in Figure 2-8, two types of SNA sessions are associated with a type 3 virtual circuit to SNA subarea node. One of these is an SSCP-SSCP session between the SSCP in the local host node (SSCP A) and an SSCP in a host node reached via the virtual circuit (SSCP B). The other is an LU-LU session between an LU in a local host node or peripheral node (LU A) and an LU in a host node or peripheral node at the other end of the virtual circuit (LU B).

There is no migration path facility over an INN (Intermediate Network Node) link between two adjacent communication controllers when this link goes through an X.25 PSDN.

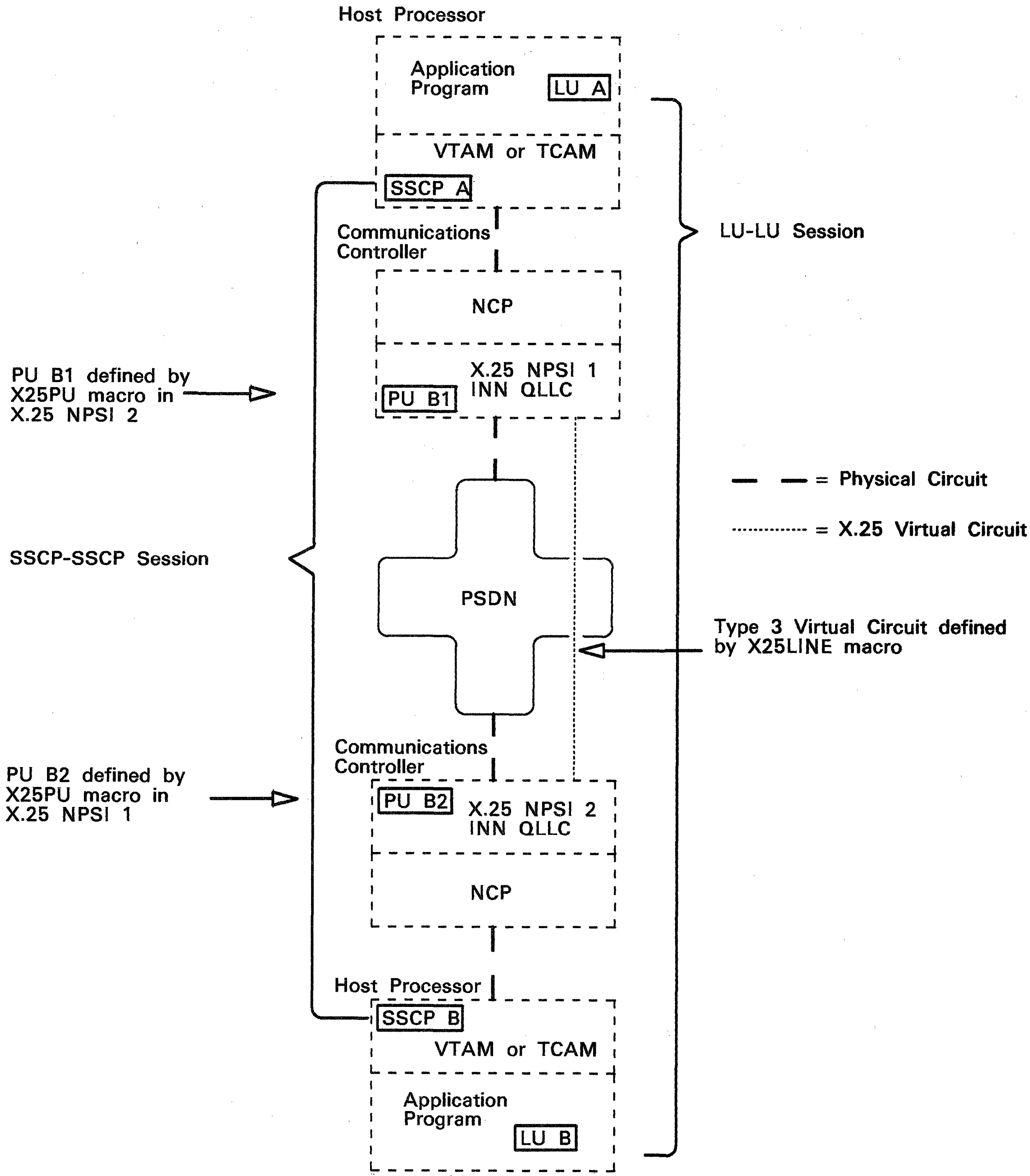


Figure 2-8. Type 3 Virtual Circuit to Subarea Node and Associated SNA Resources

A type 3 virtual circuit to SNA subarea node must be permanent. You should define it to the X.25 NCP Packet Switching Interface with an X25LINE macro. You define the PU in the adjacent NCP at the other end of the virtual circuit via an X25PU macro. Remote SSCPs and LUs reached via the virtual circuit are not defined to the X.25 NCP Packet Switching Interface; instead they are defined to the local access method.

When the virtual circuit is active, code within the X.25 NCP Packet Switching Interface called Intermediate Network Node Qualified Logical

Link Control (INN QLLC) intercepts and processes PIUs flowing between the host and the adjacent NCP over sessions assigned to this virtual circuit. The INN QLLC places PIUs going to the adjacent NCP in an X.25 packet, and sends them to the adjacent NCP. The INN QLLC removes PIUs coming in from the adjacent NCP from the packet in which they are contained, and sends them to the host.

When placing outgoing PIUs in packets, the INN QLLC adds a 3-byte or 4-byte packet header to the front of the PIU. Unlike the PSHC, the INN QLLC does not add a 2-byte LLC header to the packet.

In addition to processing outgoing PIUs, the INN QLLC also intercepts and converts outgoing SDLC commands originating at the link station associated with the local end of the physical circuit and destined for the link station associated with the remote end of the virtual circuit in the adjacent NCP. Rather than encoding the SDLC information in a 2-byte LLC header as the PSHC does, the INN QLLC turns on the "Qualified" or Q bit in the packet header. When the INN QLLC in the adjacent NCP receives a packet with the Q bit on in its header, it directs the SDLC command to the appropriate link station in its NCP. The INN QLLC does not send the SDLC command to another node.

The INN QLLC removes incoming PIUs from their packets before sending them to the host.

DEFINING TYPE 4 VIRTUAL CIRCUITS: Like type 0 virtual circuits, type 4 virtual circuits are used to communicate with non-SNA X.25 DTEs. They use the PCNE code in the X.25 NCP Packet Switching Interface to convert between SNA PIUs and X.25 packets. However, with type 4 virtual circuits, a special application program in the host, called the Communication and Transmission Control Program (CTCP) assumes control of the X.25 DTE/DCE interface protocols. The CTCP, rather than X.25 NCP Packet Switching Interface code, controls the setup and take-down for the virtual circuit by exchanging commands with code within the X.25 NCP Packet Switching Interface called General Access to X.25 Transport Extension (GATE). Commands are contained in the first byte of each RU exchanged between the CTCP and the GATE code in the X.25 NCP Packet Switching Interface. All data flowing on sessions associated with the type 4 virtual circuit are sent to or received from the CTCP.

In addition to converting outgoing PIUs into packets and incoming packets into PIUs (as PCNE does for type 0 virtual circuits) the GATE code in X.25 NCP Packet Switching Interface interprets and acts upon the one-byte command code in the first byte of RUs received from the CTCP. When converting packets into PIUs, the GATE code adds the appropriate one-byte command code to the RU before sending the PIU to the CTCP. The CTCP interprets and acts upon the code when it receives the RU.

As is illustrated in Figure 2-9, the CTCP communicates with the X.25 NCP Packet Switching Interface over two LU-LU sessions; one between the LU associated with the CTCP (LU A) and the LU associated with the physical circuit to which the type 4 virtual circuit is assigned (PC LU) and one between the LU associated with the CTCP and the LU associated with the type 4 virtual circuit (LU B). In addition, the host access method communicates with the X.25 NCP Packet Switching Interface over an SSCP-PU session with the SNA type 1 PU (PU B) associated with the type 4 virtual circuit.

You define the LU for the physical circuit with which the type 4 virtual circuit is associated via the X25MCH macro. You define the PU and LU associated with the type 4 virtual circuit via an X25VC macro.

The CTCP sends PIUs containing commands for virtual circuit setup and takedown over the LU-LU session between the CTCP LU and the LU associated with the physical circuit. GATE converts these commands into appropriate X.25 packets and sends them to the DCE. As part of virtual circuit setup and takedown, SNA PIUs also flow on the SSCP-PU session between the SSCP in the host and the PU associated with the virtual circuit.

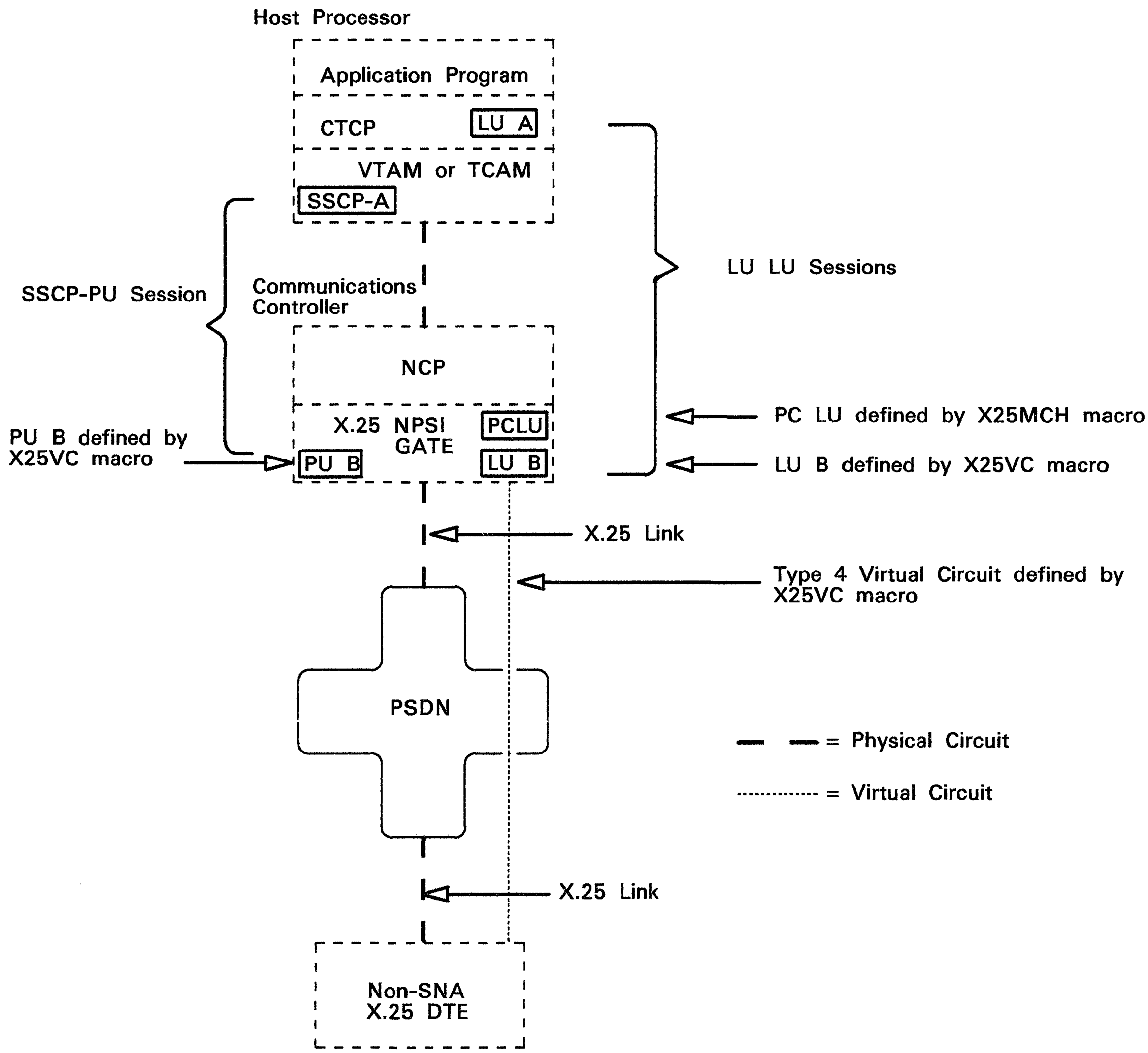


Figure 2-9. Type 4 Virtual Circuit and Associated Resources

Once the virtual circuit has been established, data flows between the CTCP in the host and the X.25 NCP Packet Switching Interface over an LU-LU session between the LU associated with the CTCP and the LU associated with the virtual circuit. Like the PCNE, the GATE code converts outgoing SNA PIUs into X.25 data packets and sends them to the remote DTE, and converts incoming X.25 data packets into SNA PIUs and sends them to the CTCP over the appropriate LU-LU session.

X.25 NCP Packet Switching Interface processing for type 4 virtual circuits differs from that for type 0 virtual circuits in two major ways:

1. With type 4 virtual circuits, the CTCP in the host controls virtual circuit setup and takedown, whereas with type 0 virtual circuits a virtual circuit manager within the X.25 NCP Packet Switching Interface controls these functions;

2. With type 4 virtual circuits, data always flows between the CTCP and a remote DTE, whereas with type 0 virtual circuits data may flow between any application program in the host and the remote DTE.

DEFINING TYPE 5 VIRTUAL CIRCUITS: As shown in Figure 2-10, X.25 NCP Packet Switching Interface support for type 5 virtual circuits is an extension of the support provided for type 0 virtual circuits. In both cases, the X.25 NCP Packet Switching Interface looks like an SNA type 1 PU and LU to the host application program, and looks like an X.25 DTE to the DTE at the other end of the virtual circuit. In both cases, the X.25 NCP Packet Switching Interface converts outgoing SNA PIUs into X.25 packets and converts incoming X.25 packets into SNA PIUs. The SNA sessions associated with type 5 virtual circuits and the way in which these circuits are brought up and taken down are identical to the sessions and bring-up mechanism associated with type 0 virtual circuits.

To define a type 5 virtual circuit and associated resources, use the same X.25 NCP Packet Switching Interface macros you would use for a type 0 virtual circuit. Define PAD support as described below.

Type 5 virtual circuits differ from type 0 virtual circuits in that whereas type 0 virtual circuits link the X.25 NCP Packet Switching Interface DTE with a remote X.25 DTE, type 5 virtual circuits link the X.25 NCP Packet Switching Interface DTE with a remote packet assembly and disassembly (PAD) facility.

The PAD facility may be provided by the packet-switched data network or it may be provided by the user. The purpose of the PAD in either case is to allow a non-SNA non-X.25 DTE to communicate over the X.25 network by converting between the DTE's communications protocol and the standard X.25 protocol.

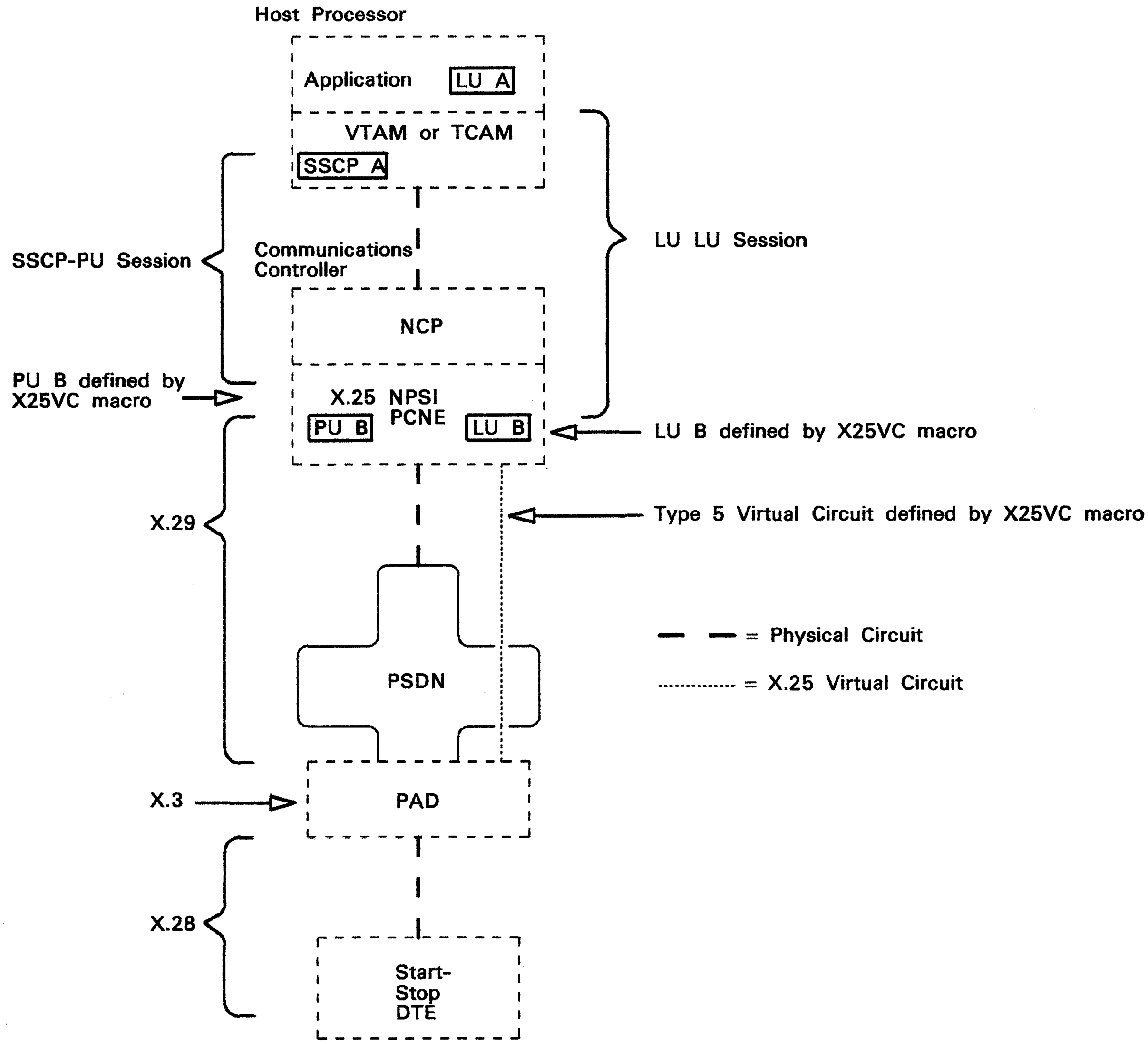


Figure 2-10. Type 5 Virtual Circuit Using Integrated PAD Support

The X.25 NCP Packet Switching Interface provides two types of PAD support for type 5 virtual circuits. The first of these (shown in Figure 2-10) called integrated PAD support, is located within the X.25 NCP Packet Switching Interface, and supports a PAD provided by the packet-switched data network. The integrated PAD support provided by X.25 NCP Packet Switching Interface conforms to a subset of CCITT Recommendation X.29 for communications with TTY 33/35 and other start-stop DTEs that conform to CCITT Recommendation X.28. Integrated PAD support is completely transparent to the host application program that is communicating with the start-stop terminal via the type 5 virtual circuit.

The other type of PAD support provided by the X.25 NCP Packet Switching Interface is called transparent PAD support. Transparent PAD support allows a user application program in the host to control a remote PAD that is associated with a non-SNA DTE. This support is provided for users of PAD facilities that do not conform to CCITT Recommendations X.28 and X.29 (for example, binary synchronous terminals).

The application program communicates with the X.25 NCP Packet Switching Interface via commands located in the first byte of each outgoing PIU, in a manner similar to that described above for type 4 virtual circuits. The X.25 NCP Packet Switching Interface converts between PIUs containing commands and X.25 packets in the same way that it does for type 4 virtual circuits. Note, however, that whereas for type 4 virtual circuits these commands control virtual circuit setup and takedown, in the case of type 5 virtual circuits the commands control the remote PAD itself. Virtual circuit setup and takedown is controlled by the virtual circuit manager of the X.25 NCP Packet Switching Interface, in the same way as for type 0 virtual circuits.

With a type 5 virtual circuit, packets containing commands to or responses from the PAD are distinguished from data packets to or from the terminal itself by means of the Qualified data bit (Q bit) in the packet header. When this bit is on, the packet contains a command for the PAD or a response to such a command; when this bit is off, the packet contains data being sent to or from the remote terminal. The Q bit is turned on for outgoing packets if the X.25 NCP Packet Switching Interface PAD code (for integrated PAD support) or the command from the host application program (for transparent PAD support) indicates that it should be.

You specify the type of PAD support you want (integrated or transparent) via the PAD operand of the X25MCH macro. For both types of PAD support, you may specify conversion of the data stream between ASCII and EBCDIC via the TRAN operand of X25MCH.

DEFINING VIRTUAL CIRCUITS USING DATE SUPPORT: The X.25 NCP Packet Switching Interface provides support called Dedicated Access to X.25 Transport Extension (DATE) as an extension to the support provided for virtual circuit types 0, 2, 3 and 5. (For virtual circuit type 5 only transparent PAD support is provided.) This support is illustrated in Figure 2-11.

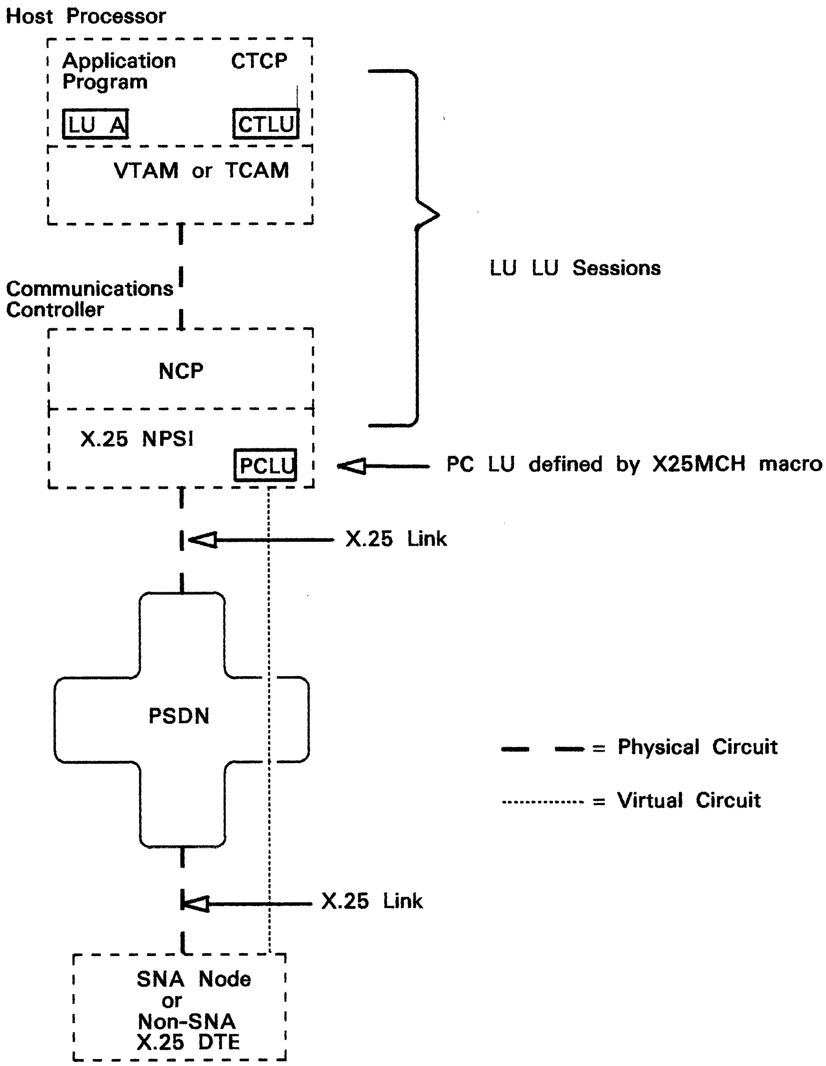


Figure 2-11. The Date Extension to Virtual Circuit Support

With DATE support, virtual circuits are set up and taken down by means of commands passed between a CTCP in the host and the X.25 NCP Packet Switching Interface in a manner identical to that described above for type 4 virtual circuits. However, once the virtual circuit is active, another protocol is used to control data flow on the circuit. This other protocol may be one of those described above for virtual circuit types 0, 2, 3 and 5.

DATE support is an extension of these four virtual circuit types. It differs from the support described above for these virtual circuit types in that the support described above depends upon the virtual circuit manager in the X.25 NCP Packet Switching Interface to control the setup and takedown of virtual circuits; when DATE is used the CTCP in the host controls virtual circuit setup and takedown.

When the virtual circuit is active, one of the protocols described above for virtual circuit types 0, 2, 3, and 5 is selected and used to control data flow on the virtual circuit. The way in which the protocol is selected is described in the next section of this chapter. When the virtual circuit is active, there is no command byte in PIUs flowing between the host access method and the X.25 NCP Packet Switching Interface (except in the case of type 5 virtual circuits).

In Figure 2-11, commands for setting up and taking down a virtual circuit are passed between the LU associated with the CTCP (CTLU) and the LU associated with the physical circuit (PCLU) in the X.25 NCP Packet Switching Interface. Once the virtual circuit is established, the protocol associated with the virtual circuit is used to control the flow of data between LU A in the application program and the remote SNA node or non-SNA X.25 DTE.

The DATE extension to virtual circuit types 0, 2, 3 and 5 is similar to the support described above for virtual circuit type 4 in that both use commands flowing from the CTCP in the host to control virtual circuit setup and takedown. The DATE extension differs from that described above for virtual circuit type 4 in that with DATE, once the virtual circuit is active, the circuit uses one of the protocols described above for virtual circuit types 0, 2, 3 and 5 and data goes to or comes from some host application program other than the CTCP. With virtual circuit type 4 support, once the virtual circuit is active data continues to flow to and from the CTCP in the host and command codes continue to be used by the CTCP to control data flow.

The DATE extension support is set up by coding GATE=DEDICAT in the X25MCH macro. All the switched virtual circuits belonging to this physical circuit must be defined with CALL=IN in the X25VC or X25LINE macros.

A type 4 virtual circuit cannot coexist on the same physical circuit with a virtual circuit using the DATE extension. A type 5 virtual circuit using integrated PAD support may not use the DATE extension.

Specifying the Type of Virtual Circuit to the X.25 NCP Packet Switching Interface

The way in which you define the type of virtual circuit to the X.25 NCP Packet Switching Interface depends upon whether the virtual circuit is permanent or switched.

For permanent virtual circuits, you specify the type of virtual circuit via the LLC operand of the X25VC or X25LINE macro. In addition, if the permanent virtual circuit is to be a type 4 virtual circuit, specify GATE=GENERAL in the X25MCH macro. Bear in mind that type 3 virtual circuits must be permanent; they cannot be switched.

There are several ways of specifying the type of virtual circuit for switched virtual circuits.

If the virtual circuit is to be established by a call-out from the X.25 NCP Packet Switching Interface to the remote DTE, you have the following options:

- For type 0, type 2, type 3, and type 5 virtual circuits not using the DATE extension, you specify the type of virtual circuit via the DIALNO operand of the VTAM PATH macro or TCAM TERMINAL macro for the PU associated with the virtual circuit (in the case of a type 0 or 5 virtual circuit) or with the remote peripheral node (in the case of a type 2 or type 3 virtual circuit). See Chapter 4 for details.

- For type 4 virtual circuits, you specify the virtual circuit type by sending the X.25 NCP Packet Switching Interface Call command from the CTCP to the X.25 NCP Packet Switching Interface. (Remember, you must code GATE=GENERAL on the X25MCH macro to get a type 4 circuit).

- For type 0, type 2, type 3, and type 5 virtual circuits using the DATE extension, you specify the type of virtual circuit in the Call command sent from the CTCP to the X.25 NCP Packet Switching Interface. (Remember, you must code GATE=DEDICAT on the X25MCH macro to get the DATE extension. Remember also that you cannot use integrated PAD support with the DATE extension).

If the virtual connection is to be established by a call-in from the remote DTE, you have the following options:

- For type 0, type 2, type 3, type 4, and type 5 virtual circuits not using the DATE extension, you can specify the type of virtual circuit in the first byte of the call user data field of the Incoming Call packet.

- For type 0, type 2, type 3, type 4, and type 5 virtual circuits not using the DATE extension, you can specify the type of virtual circuit in the subaddress field of the Incoming Call packet. In order to do so, you must code GATE=GENERAL, SUBADDR=YES, and the LLC0, LLC2, LLC3, LLC4, and LLC5 operands on the X25MCH macro.

- For type 0, type 2, type 3, and type 5 virtual circuits using the DATE extension, you specify the type of virtual circuit in the Call Confirm command sent from the CTCP to the LU associated with the physical circuit in response to the Incoming Call packet. (Remember, you must code GATE=DEDICAT on the X25MCH macro to get the DATE extension. Remember also that you may not use integrated PAD support for a virtual circuit using the DATE extension.)

Defining Tables Associated with Virtual Circuits

In addition to defining virtual circuits, you must define various parameters associated with virtual circuits. There are two classes of such parameters:

- virtual circuit connection parameters
- optional user facilities

The first set of parameters applies to all virtual circuits; it includes:

- maximum packet length for packets to be sent or received over the virtual circuit
- value for the transmit/receive window used by the packet protocol for this virtual circuit
- NCP slowdown parameters that apply to this virtual circuit

The second set of parameters applies to facilities and data that are to be copied into the Call Request packet when the X.25 NCP Packet Switching Interface makes an outgoing call in order to establish a switched virtual circuit. Among these parameters are:

- optional user facilities
- data to be copied into the call user data field of the Call Request packet

You specify these two types of parameters to the X.25 NCP Packet Switching Interface by defining tables containing this data. To create a virtual circuit connection parameter table, you need one X25VCCPT macro for each desired entry in the table. You point to the desired entry for a particular virtual circuit via the VCCINDX operand of the X25VC or X25LINE macro defining the virtual circuit.

The entry used on a particular virtual circuit must contain the packet length and window size supported by the network on this virtual circuit.

To create an optional user facilities table, you code an X25OUFT macro for each entry in the table. You point to the desired entry for a particular switched virtual circuit via the OUFINDX operand of the X25VC or X25LINE macro defining the virtual circuit.

For outgoing calls on switched virtual circuits, the values specified via the VCCINDX and OUFINDX operands of the X25VC or X25LINE macro may be overridden by values in the DIALNO operand of the VTAM PATH macro or TCAM TERMINAL macro used to specify the switched circuit to the access method. See the descriptions of these macros in Chapter 4 for details.

Figure 2-12 shows where to place the X25VCCPT and X25OUFT macros in an X.25 NCP Packet Switching Interface generation deck.

```
General Parameters:
       X25BUILD
       X25NET

Table Definition:
       X25VCCPT     INDEX=1
       X25VCCPT     INDEX=2
          .
          .
       X25OUFT      INDEX=1
       X25OUFT      INDEX=2
          .
          .

Physical and Virtual Circuit Definition:
       X25MCH
       X25LCG
       X25LINE      OUFINDX=1,VCCINDX=2
       X25PU
       X25LU
          .
          .
       X25VC        OUFINDX=2,VCCINDX=1
       X25END
```

Figure 2-12. Macros Involved in Defining Tables

ARRANGING X.25 NCP PACKET SWITCHING INTERFACE NETWORK DEFINITION MACROS IN A SOURCE PROGRAM

Figure 2-13 shows you how to arrange your network definition macros in a source program. Chapter 3 shows how to generate an X.25 NCP Packet Switching Interface using this source program as input.

```
General Parameters:
       X25BUILD        Code one macro per NPSI
       X25NET          Code one macro per network

Table Definition:
       X25VCCPT        Repeat for each entry in table
       X25VCCPT
          .
          .
       X25OUFT         Repeat for each entry in table
       X25OUFT
          .
          .

Physical and Virtual Circuit Definition:
       X25MCH          Repeat for each physical circuit
         X25LCG        Repeat for each LCG
           X25LINE     Repeat for each PVC
             X25PU     Repeat for each PU
             X25LU     Repeat for each LU
               .
               .
           X25VC       Repeat for each SVC
       X25END          One per NPSI
```

Figure 2-13. Arranging Network Definition Macros

In Figure 2-13, the X25NET macro, the table definition macros, and all of the physical and virtual circuit definition macros except X25END may be repeated within the same assembly deck if you want to define attachments to several networks within the same assembly deck.

SPECIFYING A HOST-TO-HOST CONNECTION THROUGH THE PCNE

In addition to using a type 3 virtual circuit to SNA subarea node, an application program can converse with another program in another host node via a type 0 virtual circuit between the PCNE components of two X.25 NCP Packet Switching Interface programs in different communications controllers. This section tells how to define such a virtual circuit, while Chapter 5 contains a section on how to use it.

Consider the configuration illustrated in Figure 2-14. The two NCP nodes are connected to the X.25 network via physical circuits. Associated with each physical circuit are one type 0 permanent virtual circuit and two type 0 switched virtual circuits. Data is to be transferred between the APPL 1 application program in Host 1 and the APPL 2 application program in Host 2.

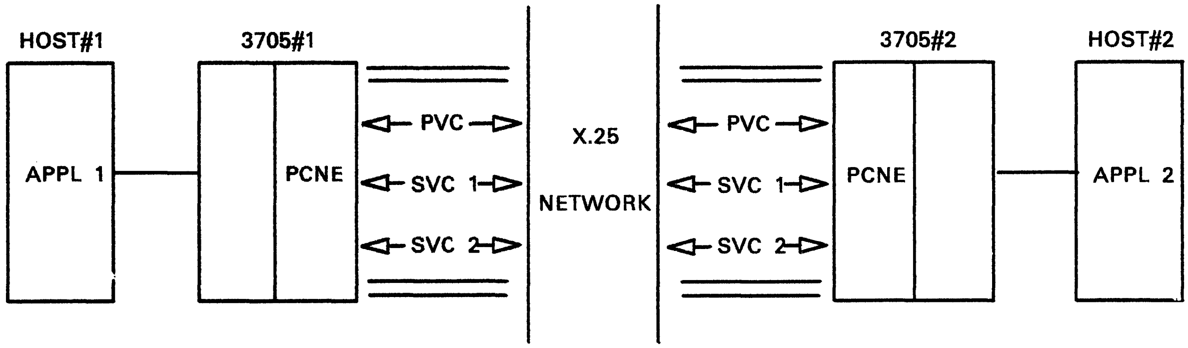


Figure 2-14. Sample Configuration for PCNE-PCNE Connection

Connection via a Switched Type 0 Virtual Circuit

The configuration shows two distinct SNA domains:

- SNA domain 1 consisting of Host 1 and 3705 1.
- SNA domain 2 consisting of Host 2 and 3705 2.

The only relationship between the two SNA domains is made by the remote identification number specified in the Call Request and Incoming Call packets. This identification number is used by the called SNA domain to identify the corresponding PU and LU in its own domain.

In the VTAM environment, the "remote identification number" is one greater than the "SSCP identification number" of the calling SNA domain; therefore, you have to choose the values of the "IDNUM=" parameter of the NCP PU macro in both domains carefully. You should code your macros as illustrated in Figure 2-15.

In Figure 2-15, the first digit in PUxx, PATHxx, and LUxx indicates the SNA domain. The second digit in PUxx, PATHxx, and LUxx indicates the LU number.

SNA Domain 1			SNA Domain 2		
PU11	PU	... IDBLK= 003 IDNUM= 00001 ...	PU21	PU	... IDBLK= 003 IDNUM= 00001 ...
PATH11	PATH	... DIALNO= ...00001 ...	PATH21	PATH	... DIALNO= ...00001 ...
LU11	LU	...	LU21	LU	...
PU12	PU	... IDBLK= 003 IDNUM= 00002 ...	PU22	PU	... IDBLK= 003 IDNUM= 00002 ...
LU12	LU	...	LU22	LU	...
PU13	PU	... IDBLK= 003 IDNUM= 00003 ...	PU23	PU	... IDBLK= 003 IDNUM= 00003 ...
PATH13	PATH	... DIALNO= ...00003 ...	PATH23	PATH	... DIALNO= ...00003 ...
LU13	LU	...	LU23	LU	...
PU14	PU	... IDBLK= 003 IDNUM= 00004 ...	PU24	PU	... IDBLK= 003 IDNUM= 00004 ...
LU14	LU	...	LU24	LU	...

The first digit in PUxx, PATHxx, and LUxx indicates the SNA domain.
The second digit in PUxx, PATHxx, and LUxx indicates the LU number.

Figure 2-15. VTAM Macro Operands for PCNE-PCNE Connection

You have to define a number of LUs equal to twice the number of switched virtual circuits. The odd-numbered LUs are used for the outgoing calls. The even-numbered LUs are used for the incoming calls. No PATH macro instruction is defined in such an entry.

For example, a connection from APPL1 to APPL2 will use:

- Either LU11 connected to LU22, or
- LU13 connected to LU24.

Note: The first digit, which indicates the SNA domain, can be suppressed, because the two SNA domains are completely distinct. It was specified for explanation purposes only.

Connection Through Permanent Virtual Circuits

The above discussion of connection to switched virtual circuits applies in general to permanent virtual circuits as well.

CHAPTER 3. GENERATING THE X.25 NCP PACKET SWITCHING INTERFACE

GENERATING THE X.25 NCP PACKET SWITCHING INTERFACE UNDER OS/VS

Installing the X.25 NCP Packet Switching Interface can be thought of as an extra step in an otherwise typical NCP installation. For a full explanation of the NCP installation procedure, see the ACF/NCP and SSP Installation and Resource Definition Manual.

To begin, after you have installed your basic NCP library with the standard ACF/NCP and SSP package, install X.25 NCP Packet Switching Interface using SMP.

Refer to the instructions given in the "Program Directory For Use" of the X.25 NCP Packet Switching Interface in order to select the correct files on the tape.

Installing OS/VS X.25 NCP Packet Switching Interface Libraries

Restore from the X.25 NCP Packet Switching Interface tape, the following libraries:

- SYS1.GEN3705X:

  SYS1.GEN3705X is used for X.25 stage 1. It should be concatenated to the NCP SYS1.GEN3705.

  JOB CARD MODIFICATION: You can supply your own JOB card for X.25 Stage 2 by replacing the JOBXCARD library member of the SYS1.GEN3705X library. An example of JCL you could use to make this replacement is:

```
//S1 EXEC PGM=IEBUPDTE,PARM=NEW
//SYSPRINT DD SYSOUT=A
//SYSUT1 DD DSN=SYS1.GEN3705X,DISP=SHR
//SYSUT2 DD DSN=SYS1.GEN3705X,DISP=SHR
//SYSIN DD DATA,DLM=ZZ
./ ADD NAME=JOBXCARD,LIST=ALL
//&JOBNAMC JOB (xxx,yyy),
// progname,MSGLEVEL=(1,1),CLASS=A
ZZ
```

The JOB name (variable &JOBNAMC) is prepared by the generation processor. You can code a user name instead. However, if you do and then code JOBCARD=MULTI in the X25BUILD macro, all the X.25 NCP Packet Switching Interface's stage 2 jobs will have the same name. To prevent this, add &SNDA to the name, for example:

//USER&SNDA JOB (xxx,yyy),

The jobnames will be USER1, USER2, USER3. &SNDA is incremented by 1 for each job.

- SYS1.MAC3705X:

  The SYS1.MAC3705X library contains X.25 NCP Packet Switching Interface macros to assemble, during the first assembly of the NCP's stage 2, the code produced by X.25 Stage 1. It must be defined as one of the MACLIB suboperands of the NCP BUILD macro.

- SYS1.OBJ3705X:

  The SYS1.OBJ3705X library contains the X.25 NCP Packet Switching Interface load modules and corresponds to the library specified by the "QUALIFY=" and "USERLIB=" operands of the NCP BUILD macro.

  When several programs use the Customization Facility (for example the X.25 NCP Packet Switching Interface and Network Terminal option), the object modules of the different programs have to be in the file corresponding to the USERLIB operand of the NCP BUILD macro instruction.

  If you want to use different files for the object modules, you have to modify the link-edit job by concatenating these files in the ULIB DD statement.

Defining OS/VS Working Libraries For NCP Generation

The following working libraries are required for stage 2 of the NCP generation:

- A library defined in the first MACLIB suboperand of the NCP BUILD macro. Optionally, it can be the same as the SYS1.MAC3705X described above, but this is not recommended. This library will contain the result of the X.25 generation and will be used as input for stage 2 of the NCP generation.

- The library defined in the OBJLIB operand of the NCP BUILD macro, which contains the output from all assemblies during stage 2 of the NCP generation procedure.

- The library defined in the LOADLIB operand of the NCP BUILD macro, which contains the NCP load module and resource resolution table module.

After you install the libraries from the X.25 NCP Packet Switching Interface tape, as explained in the Program Directory that is shipped with the tape, and define the preceding working libraries, proceed as follows.

Describing X.25 NCP Packet Switching Interface Network

Using the X.25 NCP Packet Switching Interface macros described in Chapter 8, define your attachment to the X.25 packet switched data network. These macros produce the input required for the X.25 NCP Packet Switching Interface part of the NCP generation. In particular, they prepare descriptions of the X.25 NCP Packet Switching Interface control blocks to be assembled in the first assembly of NCP stage 2, together with the NCP control blocks.

Generating the X.25 NCP Packet Switching Interface Input for NCP Generation

The X.25 NCP Packet Switching Interface generation under OS/VS is run in two steps:

X.25 NCP Packet Switching Interface Stage 1:

X.25 NCP Packet Switching Interface stage 1 is an assembly step and produces code and job control language for the X.25 stage 2 (see box 1 in Figure 3-1). The OS/VS Assembler must be used as follows:

```
//STEP1 EXEC PGM=IFOX00,PARM=DECK

//SYSLIB DD DSN=SYS1.GEN3705X,DISP=SHR      X.25  MACROS
//       DD DSN=SYS1.GEN3705,DISP=SHR       ACF/SSP MACROS

//SYSIN DD *
         [COPY XGENEND    IF THERE IS OTHER USER CODE THAN X25 IN NCP]
         X25BUILD
         (X.25 Network definition)
         [GENEND        INSERT OPERANDS FOR OTHER USER CODE THAN X25]
         X25END
         END
/*
```

At least a 1536K partition is required. You may require more, depending on your OS/VS configuration.

Note: You can also use the IBM Assembler H.

```
//STEP1 EXEC PGM=IEV90,

//SYSLIB DD DSN=SYS1.GEN3705X,DISP=SHR      X.25  MACROS
//       DD DSN=SYS1.GEN3705,DISP=SHR       ACF/SSP MACROS
```

X.25 NCP Packet Switching Interface Stage 2:

X.25 NCP Packet Switching Interface Stage 2 uses the IEBUPDATE OS/VS utility (box 2 in Figure 3-1) to convert the X.25 Stage 1 output into nine members in the user library defined in the MACLIB operand of the X25BUILD macro. This user library must also be defined in the first or only suboperand of the MACLIB operand of the NCP BUILD macro.

The nine members in the user library described above are the input for the X.25 NCP Packet Switching Interface part of the NCP generation.

1. The member named by the SRCLO operand of the X25BUILD macro, which contains the X.25 control blocks.

2. The member named by the SRCHI operand of the X25BUILD macro, which contains the X.25 tables. These two members are copied by the first assembly of the NCP stage 2 to create the X.25 NCP Packet Switching Interface blocks in two CSECTs:

   - $SRCLO, which contains the UACBs.

- $SRCHI, which contains all other X.25 NCP Packet Switching Interface blocks and tables.

3. The member named by the INCL2LO operand of the X25END macro, which contains the INCLUDE card for the pre-assembled X.25 NCP Packet Switching Interface module located in low core (below 64K).

4. The member named by the INCL2HI operand of the X25END macro, which contains the INCLUDE cards for the pre-assembled X.25 NCP Packet Switching Interface modules located in high core.

5. The member named by the INCINIT operand of the X25END macro, which contains the INCLUDE card for the pre-assembled X.25 NCP Packet Switching Interface module used during initialization.

6. The member named by the ORDL2LO operand of the X25END macro, which contains the ORDER card for the pre-assembled X.25 NCP Packet Switching Interface CSECT located in low core (below 64K).

7. The member named by the ORDL2HI operand of the X25END macro, which contains the ORDER cards for the pre-assembled X.25 NCP Packet Switching Interface CSECTs located in high core.

8. The member named by the ORDINIT operand of the X25END macro, which contains the ORDER card for the pre-assembled X.25 NCP Packet Switching Interface CSECT used during initialization.

9. The member named by the NCPSTG1 operand of the X25END macro, which contains the NCP stage 1 macros for the X.25 NCP Packet Switching Interface attachment: GROUP, LINE, SERVICE, PU, LU and GENEND macros. You must insert these macros in your NCP stage 1 input deck.

Inserting X.25 NCP Packet Switching Interface Generation Output in NCP

Get the source code contained in the last library member prepared by X.25 NCP Packet Switching Interface generation and insert it in your NCP deck as if you were defining SDLC lines. You can modify this code to fit your special requirement as far as the operands required by the access method are concerned. You must not modify the sequence of the NCP macros provided by X.25 NCP Packet Switching Interface.

Generating under OS/VS

Generating NCP under OS/VS

The NCP generation under OS/VS is run in 2 steps:

NCP Stage 1:

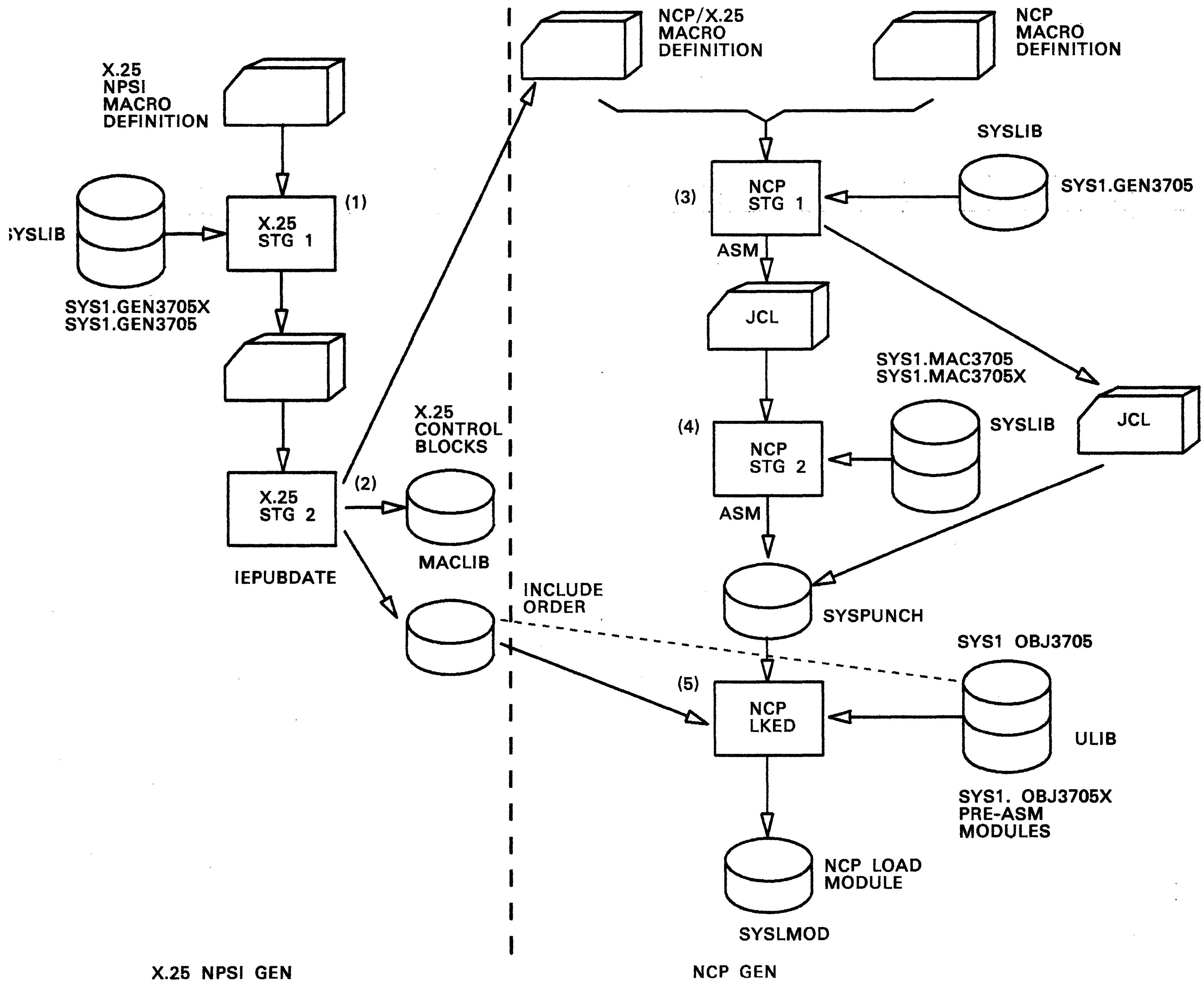
Stage 1 of the NCP is an assembly (box 3 in Figure 3-1). It is done with the NCP library and with the IBM 3705 assembler.

Use the JCL described in Chapter 4 of the ACF/NCP Installation manual, that is:

```
//STEP1 EXEC PGM=CWAX00

//SYSLIB DD DSN=SYS1.GEN3705,DISP=SHR

//SYSIN DD *
          BUILD

          (Definition of resources other than X.25 ones)

          (Source code punched in the library member of the MACLIB
          defined in the NCPSTG1 operand of the X25END macro)
          END
/*
```

NCP Stage 2:

Then perform stage 2 of the NCP's assembly (see box 4 in Figure 3-1), and the final link-edit (see box 5 in Figure 3-1).



| Figure 3-1. Summary of Generation Processing for OS/VS

GENERATING THE X.25 NCP PACKET SWITCHING INTERFACE UNDER VSE

Installing the X.25 NCP Packet Switching Interface can be thought of as an extra step in an otherwise typical NCP installation. For a full explanation of the NCP installation procedure, see the ACF/NCP and SSP Installation and Resource Definition Manual.

After you have installed your basic NCP libraries with the standard ACF/NCP and SSP package, install X.25 NCP Packet Switching Interface using MSHP.

Refer to the instructions given in the "Program Directory For Use" that is provided with the tape.

Installing VSE X.25 NCP Packet Switching Interface Libraries

Restore from the X.25 NCP Packet Switching Interface tape, the following libraries:

- The source library (F sublibrary) for the X.25 Stage 1 run and for the NCP stage 2 assembly run.
- The relocatable library containing the X.25 NCP Packet Switching Interface object modules.

These libraries are the same as the libraries used by ACF/NCP.

Describing X.25 NCP Packet Switching Interface Network

Using the X.25 NCP Packet Switching Interface macros described in Chapter 8, define your attachment to the X.25 packet switching data network. These macros produce the input required for the X.25 NCP Packet Switching Interface part of the NCP generation. In particular, they prepare descriptions of the X.25 NCP Packet Switching Interface control blocks to be assembled in the NCP stage 2, together with the NCP control blocks.

Generating the X.25 NCP Packet Switching Interface Input for NCP Generation

The X.25 NCP Packet Switching Interface generation under VSE is run in two steps:

X.25 NCP Packet Switching Interface Stage 1:

X.25 NCP Packet Switching Interface stage 1 is an assembly step and produces code and job control language for the X.25 stage 2 (see box 1 in Figure 3-2). The VSE Assembler must be used as follows:

```
// OPTION DECK,NOEDECK,SUBLIB=DF
// EXEC ASSEMBLY
        [COPY XGENEND    IF THERE IS OTHER USER CODE THAN X25 IN NCP]
        X25BUILD
        (X.25 Network definition)
        [GENEND        INSERT OPERANDS FOR OTHER USER CODE THAN X25]
        X25END
        END
/&
```

At least a 1224K partition is required. You may require more, depending on your VSE configuration.

X.25 NCP Packet Switching Interface Stage 2:

The X.25 NCP Packet Switching Interface stage 1 output is placed by the X.25 NCP Packet Switching Interface stage 2 in the source and relocatable libraries. X.25 NCP Packet Switching Interface stage 2 uses the MAINT VSE utility (box 2 in Figure 3-2) to convert X.25 stage 1 output into six members of the libraries named above, to be the input for the X.25 NCP Packet Switching Interface part of the NCP generation.

1. The member named by the SRCLO operand of the X25BUILD macro, which contains the X.25 control blocks.

2. The member named by the SRCHI operand of the X25BUILD macro, which contains the X.25 tables. These two members are copied by the NCP stage 2 to create the X.25 NCP Packet Switching Interface blocks in two CSECTs:

   - $SRCLO, which contains the UACBs.

   - $SRCHI, which contains all other X.25 NCP Packet Switching Interface blocks and tables.

3. The member named by the INCL2LO operand of the X25END macro, which contains the INCLUDE card for the pre-assembled X.25 NCP Packet Switching Interface module located in low core (below 64K). This member is stored in the relocatable library.

4. The member named by the INCL2HI operand of the X25END macro, which contains the INCLUDE cards for the pre-assembled X.25 NCP Packet Switching Interface modules located in high core. This member is stored in the relocatable library.

5. The member named by the INCINIT operand of the X25END macro, which contains the INCLUDE card for the pre-assembled X.25 NCP Packet Switching Interface module used during initialization. This member is stored in the relocatable library.

6. The member named by the NCPSTG1 operand of the X25END macro, which contains the NCP stage 1 macros for the X.25 NCP Packet Switching Interface attachment: GROUP, LINE, SERVICE, PU, LU and GENEND macros. This member is stored in the source A sublibrary. You must insert these macros in your NCP stage 1 input deck.

Inserting X.25 NCP Packet Switching Interface Generation Output in NCP

Get the source code contained in the last library member prepared by X.25 NCP Packet Switching Interface generation in the source A sublibrary. Insert the code in your NCP deck as if you were defining SDLC lines. You can modify this code to fit your special requirement as far as the operands required by the access method are concerned. You must not modify the sequence of the NCP macros provided by X.25 NCP Packet Switching Interface.

Generating NCP under VSE

OVERVIEW: The control program with X.25 NCP Packet Switching Interface generation under DOS/VSE is a five-stage process. The procedure creates a load module that is run in the 3705 according to your particular configuration needs.

The installation of X.25 NCP Packet Switching Interface requires the code to be aligned on 2K boundaries. This alignment is done in NCP stages 3 and 4. X.25 NCP Packet Switching Interface program product provides the 'IFQALIGN' macro to make the process of the NCP stages 3 and 4 easier. You must code this macro without any operands just before the END statement in the NCP Stage 1 input deck.

STEPS: The NCP generation under VSE is run in five steps:

NCP Stage 1:

Stage 1 of the NCP is an assembly (box 3 in Figure 3-2). It is done with the NCP library and with the IBM 3705 assembler (IFZASM). The output file can be placed on cards, tape, or a direct-access device.

Use the JCL described in Chapter 4 of the ACF/NCP and SSP Installation and Resource Definition manual, that is:

```
// OPTION DECK
// EXEC IFZASM
         BUILD
         (Definition of resources other than X.25 ones)
         (Source code punched in the library member of the A sublibrary
         defined in the NCPSTG1 operand of the X25END macro)
         GENEND          PROVIDED BY X25NPSI GENERATION
         IFQALIGN
         END
/*
```

NCP Stage 2:

The Stage 2 assembles the control tables and those program modules that require conditional assembly (see box 4 in Figure 3-2). It then punches Job Control and Link Edit control statements.

NCP Stage 3:

The Stage 3 catalogs the tables and modules assembled in stage 2 and link edits them into a temporary load module. It then punches Job Control statements for stage 4.

During the execution of this job, there is the following Job Control statement:

```
// PAUSE  ENTER // OPTION SYSPARM='XXXX'  (HEXADECIMAL)
```

The requested hexadecimal value represents the module length indicated under HICORE of the preceding linkedit. If this value is '134C8', for example, you will enter:

```
// OPTION SYSPARM='134C8'
```

NCP Stage 4:

The stage 4 catalogs a module for alignment (next 2K boundary) and link edits a new temporary load module. It then punches Job Control statements for stage 5. During the execution of this job, the following Job Control statement is encountered:

```
// PAUSE  ENTER // OPTION SYSPARM='XXXX'  (HEXADECIMAL)
```

The requested hexadecimal value represents the module length indicated under HICORE of the preceding linkedit. If this value is '144C4', for example, you will enter:

```
// OPTION SYSPARM='144C4'
```

NCP Stage 5:

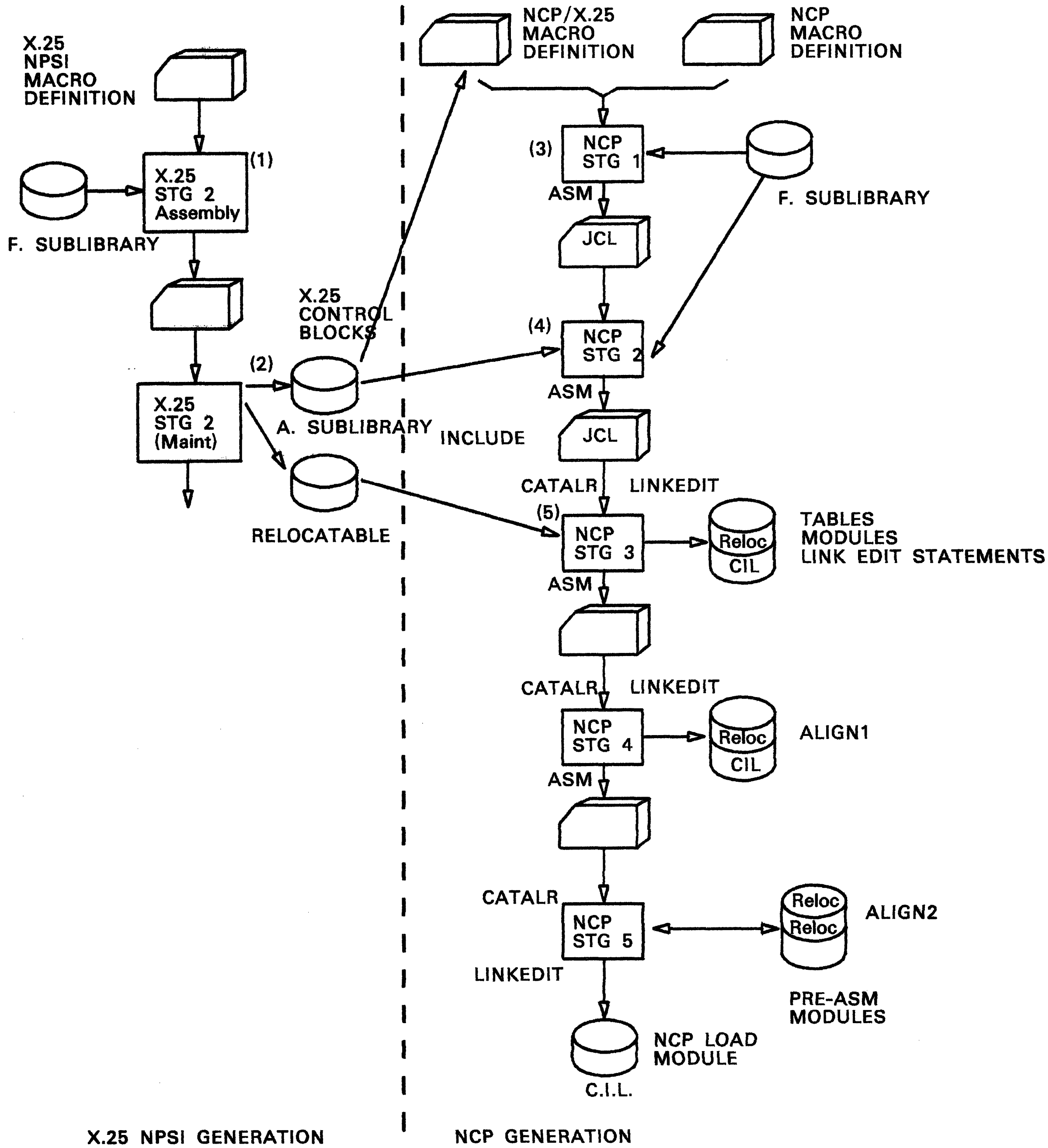
The stage 5 catalogs another alignment module (next 2K boundary) and link edits the final load module of your generation. This module is placed on the Core Image Library. From there, the CSERV utility must be used to move it to a user-defined file, which is used to load the communications controller.

The control statements would be similar to:

```
// JOB  MOVE
// PAUSE
// DLBL IJSYSPCH,'PHASENAME',99/365
// EXTENT SYSPCH,SYSWK1,...    (DEFINE DISK AREA FOR LOAD MODULE)
// ASSIGN SYSPCH,CUU
  LIBDEF CL,FROM=NCP715C       (CIL)
// EXEC CSERV
  PUNCH PHASENAME              (NAME OF LOAD MODULE)
/*
  CLOSE SYSPCH,UA
/&
```

Note: Operator intervention is required during the stages of program generation. Diagnostic messages produced at the end of each stage indicate any errors that may have occurred. In case of errors, no job stream or partial job stream is produced. The source statements must be corrected, and the stage must be re-executed. If no errors occur the operator initiates the next stage using the output of the previous stage as input. The NCP generation must be entirely free of errors.

Each stage (1 To 5) of the network control program can be reassembled if necessary, until the output listing shows no errors found at the end of each job.



| Figure 3-2. Summary of Generation Processing for VSE

CHAPTER 4. SPECIFYING NCP AND ACCESS METHOD MACROS TO ACCOMMODATE THE X.25 NCP PACKET SWITCHING INTERFACE

SPECIFYING ACF/NCP MACROS

Resource Naming Conventions

The SNA resource names can be allocated by the X.25 NCP Packet Switching Interface system generation, or by the user through the X25LINE, X25PU, and X25LU macro instructions.

All resource names built by X.25 NCP Packet Switching Interface stage 1 begin with the letter X. Do not use this letter for resources other than X.25 resources.

More precisely, the prefixes used for the block names are:

XA...	For the UACBs of the VCs (VUA)
XB...	For the VCBs
XL...	For the LKBs (LINE macro)
XP...	For the PUs (PU macro)
XS...	For the SLUBs of the VCs
XX...	for the AXBs of the VCs (Release 3 only)
XU...	For the LUs (LU macro)
X25...	For all other blocks

The names allocated to the SNA resources by the X.25 NCP Packet Switching Interface stage 1 (when they are not allocated by the user) are built as follows:

1. For the physical circuit:

   XLxxx for the label of the LINE macro
   XPxxx for the label of the PU macro
   XUxxx for the label of the LU macro

   Where xxx is the line set address of the transmit leg.

2. For the virtual circuit:

   XLxxxlcn for the label of the LINE macro
   XPxxxlcn for the label of the PU macro
   XUxxxlcn for the label of the LU macro

Where xxx is the line set address of the transmit leg of the related physical circuit, and lcn the logical channel number of the current virtual circuit in hexadecimal.

Note: You should use the generated names because they will simplify the identification of the X.25 resources in the host.

X.25 NCP Packet Switching Interface uses macros to describe its control blocks during the first NCP stage 2 assembly. All these macros are prefixed with BAK2. As a consequence, no other user can utilize this prefix for the same purpose.

All the entry points within the X.25 NCP Packet Switching Interface code in the load module begin with the prefix BAL. Therefore, no other user can utilize these three letters for the same purpose.

BUILD Macro Instruction

Name	Operation	Operands
	BUILD	....
		[,MACLIB=dsname] (OS only)
		[,QUALIFY={NONE }] (OS only) {symbol} {SYS1 }
		[,USERLIB=] (OS only)
		....

The first suboperand of the MACLIB operand must be the same as specified in the X25BUILD macro. The QUALIFY operand should be the same as specified in X25BUILD. The USERLIB operand is used to define SYS1.OBJ3705X which contains the X.25 load modules but it does not have a counterpart in the X25BUILD macro.

LUDRPOOL Macro Instruction

If there are switched virtual circuits defined in the system generation, this macro instruction must be included when the access method is ACF/VTAM, release 2 or higher.

NCP MACRO INSTRUCTIONS PREPARED BY THE X.25 NCP PACKET SWITCHING INTERFACE

The following macro instructions are prepared by the X.25 NCP Packet Switching Interface during the system generation process.

GROUP Macro Instruction

A new operand has been added to this macro instruction to identify the user and the entry of the Block Dump Table used to format the user's blocks. This operand is prepared by X.25 NCP Packet Switching Interface stage 1 with the appropriate value and should be used as is.

```
USERID=(User Identification,Entry Label)
```

User Identification

Specifies the user's identification, and consists of from 1 to 7 alphanumeric characters. For IBM users, using the product number is recommended. For this X.25 NCP Packet Switching Interface, the identification used is 5668981. This identification is used by the system generation as a character constant to identify all the GCBs pertaining to the user.

Entry Label

Specifies the label of the Block Dump Table used by the modified formatted dump to edit and format the user's blocks. For X.25 NCP Packet Switching Interface, the following names are used:

BALMBDT	Block Dump Table for physical circuits
BALPBDT	Block Dump Table for permanent virtual circuits
BALSBDT	Block Dump Table for switched virtual circuits

Note: This operand temporarily causes a warning message to be issued when VTAM loads the 3705 for the first time.

LINE Macro Instruction

All the operands are correctly prepared by X.25 NCP Packet Switching Interface stage 1.

PU Macro Instructions

The SRT operand is not supported by X.25 NCP Packet Switching Interface. Default values for SRT are fixed and equal to 32768 for counters contained in two bytes and 256 for counters contained in one byte. See the Diagnosis Guide for the format of these counters within the RECMS.

PU Macro Instruction Associated with a Physical Circuit

Name	Operation	Operands
[name]	PU	ADDR=01, MAXDATA=261, ANS=...., PUTYPE=1

NAME: Assigned by X.25 NCP Packet Switching Interface generation or taken from PUNAME operand of the X25MCH macro.

ADDR=01: Specifies the hexadecimal representation of the eight-bit address of the physical unit represented by this PU Macro. It must be coded 01.

MAXDATA=261: Specifies the maximum length of a PIU sent to a type 1 PU.

PUTYPE=1: Specifies the type of physical unit constituting the SDLC station represented by this PU macro instruction. It must be coded 1.

ANS=....: copied from the X25MCH macro

PU Macro Instruction Associated with a Permanent Virtual Circuit

When a PVC is defined by an X25VC macro, the PU prepared will be:

- For type 0, 4, or 5 virtual circuits

  ```
  name PU PUTYPE=1,ADDR=01,MAXDATA=261,VPACING=(2,1),PACING=(1,1)
  ```

  When these values do not fit your requirements you must use the X25LINE, X25PU, and X25LU macros to define one virtual circuit at a time instead of using the X25VC. The PUTYPE, ADDR, and PACING operands must be coded as above:

  ```
  PUTYPE=1, ADDR=01, PACING=(1,1)
  ```

- For type 2 or 3 virtual circuits

  Use the X25PU macro instruction.

PU Macro Instruction Associated with a Switched Virtual Circuit

When an SVC is defined by an X25VC macro, the PU prepared will be the following:

```
name PU PUTYPE=(1,2),MAXLU=3
```

LU Macro Instructions

LU Macro Instruction Associated with a Physical Circuit

Name	Operation	Operands
[symbol]	LU	LOCADDR=0 [,ISTATUS=INACTIVE]

LOCADDR=0: Specifies the local address of the logical unit in decimal notation, and without leading zeros. It is coded 0.

ISTATUS=INACTIVE: Specifies to VTAM that this LU should not be activated after IPL in case GATE=NO has been coded in the X25MCH macro.

LU Macro Instruction Associated with a Permanent Virtual Circuit

- For type 0, 4, or 5 virtual circuits

  One LU macro is prepared per VC when you have coded the X25VC macro. This LU is:

  ```
  name LU LOCADDR=0
  ```

  Only one LU can be defined for type 0, 4, or 5 virtual circuits.

- For type 2 virtual circuits, and type 3 virtual circuits to SNA peripheral node:

  Use the X25LU macro instruction.

LU Macro Associated with a Switched Virtual Circuit

This LU must be defined in the switched major node of the host access method.

SPECIFYING ACF/VTAM MACROS

VTAM macros are not changed to define a configuration using an X.25 network. However, some rules have to be followed when coding the parameters required to define a major SNA switched node.

PU Macro Instruction

- ADDR=

  The "ADDR=" operand must be coded even though it has no meaning for the X.25 NCP Packet Switching Interface environment. Any value below 255 is valid.

- MAXDATA=

  For the PU associated with a type 2 or BNN type 3 virtual circuit, the "MAXDATA=" operand must contain the characteristics of the PU.

  For the PU associated with a type 0, 4, or 5 virtual circuit, you must code the "MAXDATA=" operand with a value greater than or equal to the maximum size of the RUs sent by the application to the pseudo-LUs in the 3705.

- PUTYPE=

  For a type 2 or type 3 virtual circuit the 'PUTYPE=' operand is coded as in NCP.

  For a type 0, 4, or 5 virtual circuit, code PUTYPE=1.

- IDBLK=

  For the PU associated with a type 2 or BNN type 3 virtual circuit, the "IDBLK=" operand is as coded in NCP.

  For the PU associated with a type 0, 4, or 5 virtual circuit, this operand must be coded 003.

- IDNUM=

  For the PU associated with a type 2 or BNN type 3 virtual circuit, the "IDNUM=" operand is coded as in NCP.

  For the PU associated with a type 0 virtual circuit, you should remember that the "remote identification number" generated in the Call Request packet (CUD field bytes 1 to 5), and therefore received in an Incoming Call packet, by the remote DTE is equal to:

  - Either the "IDNUM=" operand (SSCP identification number) plus one, if this SSCP identification number (ZZZZZ field) is specified in the "DIALNO=" operand of the PATH macro instruction (with VTAM or TCAM).

  - Or to the "Default Identification Number", if the ZZZZZ field is not specified in the "DIALNO=" operand of the PATH macro instruction (with TCAM only).

    The default identification numbers are generated for each SVC at initialization time. They are generated in the order in which the SVCs appear in the RVT -- that is, in the order in which the SVCs appear in the generation deck. The default identification number is a value beginning at 2 with an increment of 2.

In the Chapter 7 generation sample, the following values are assigned for the default identification number:

```
For XL036109 :  The default identification number = X'0002'
    XL036108 :   "     "            "          "   = X'0004'
    XL036107 :   "     "            "          "   = X'0006'
    XL036106 :   "     "            "          "   = X'0008'
    XL036105 :   "     "            "          "   = X'000A'
    XL036104 :   "     "            "          "   = X'000C'
    XL036103 :   "     "            "          "   = X'000E'
    XL036102 :   "     "            "          "   = X'0010'
    XL036101 :   "     "            "          "   = X'0012'
    XL034009 :   "     "            "          "   = X'0014'
    XL034008 :   "     "            "          "   = X'0016'
    etc.
```

The default identification number value is stored in the VCBXIDDF halfword (displacement of 2).

The IDNUM sent in the Request Contact, when it is built from the default identification number, is five digits long and has the following format: XXYYY

Where:

- XX is the IDNUMH operand value of the X25BUILD macro (default=X'00').

- YYY are the rightmost three digits of the default identification number. See the note that follows to see where this case applies.

Note: The IDNUM, set in the Request Contact sent to the host after XID exchange, is defined in a PU macro of the switched subarea as follows:

Virtual Circuit Type	Outgoing Call	Incoming Call
Type 0 Virtual Circuit Without DATE or with GATE and SUBADDR=NO	zzzzz field of DIALNO	CUD field (*) 5 half-digits starting byte 1
Type 0 Virtual Circuit with GATE and SUBADDRESS	zzzzz field of DIALNO	Default ID
Type 0 or 5 Virtual Circuit with DATE	Default ID	Default ID
Type 2 Virtual Circuit	Remote SNA-DTE ID	Remote SNA-DTE ID
Type 3 BNN Virtual Circuit	Remote SNA-DTE ID	Remote SNA-DTE ID
Type 4 Virtual Circuit	Default ID	Default ID
Type 5 Virtual Circuit Without DATE	zzzzz field of DIALNO	Default ID

(*) CUD is the Call User Data field of the Incoming Call Packet.

Figure 4-1. IDNUM Set in Request Contact

PATH Macro Instruction

- You must code the "DIALNO=" operand of the PATH macro as follows:

  DIALNO=NNN...N[*MMM...M]LXXYY*ZZZZZ

  DIALNO is used to establish a connection by an outgoing call for VC Type 0, 2, 3, or 5 without DATE.

  The maximum length of the "DIALNO=" parameter is 32 characters, including asterisks.

  [*MMM...M] is an optional field that is required only when the calling DTE's network address must be specified.

  - NNN...N

    Is the called DTE's network address. The number of N characters is such that: 1 ≤ number ≤ 15.

- MMM...M

  Is the calling DTE's network address. If this field is specified, the number of M characters is such that: 1 ≤ number ≤ 15.

- L

  Specifies (in one byte) the level of LLC that is to be used by the current connection.

L=0	VC type 0	(Connection with X.25 non-SNA equipment not supporting interrupt packets, or with the X.25 ECHO service).
L=2	VC type 2	(Connection with an SNA terminal via a 5973-L02).
L=3	VC type 3	(Connection with an SNA terminal with BNN QLLC protocol)
L=5	VC Type 5	(Integrated PAD or transparent PAD)
L=8	VC Type 5	
L=9	VC Type 5	

The corresponding CUD field of the Call Request packet will be

L=0: X'C0' followed by either
- 5 last digits of dial number, if present
or
- default ID value

and followed by the concatenated USRFILD and USRFIL2 values operand of the corresponding OUFT entry (see YY below)

L=2: X'C2' followed by the concatenated USRFILD and USRFIL2 values of the corresponding OUFT entry (see YY below)

L=3: X'C3010000' followed by the concatenated USRFILD and USRFIL2 values of the corresponding OUFT entry (see YY below)

L=5: X'01000000'

L=8: X'81000000'

L=9: X'41000000'

- XX

  Is the two-byte VCCPT index whose value ranges from 00 to 19.

  XX=00 means that the packet procedure will work using the values defined in the entry of the VCCPT specified in the "VCCINDX=" operand of the X25VC macro instruction.

  XX=xx means that the packet procedure will work using the values defined in the "xx" entry of the VCCPT. This entry must have been defined during X.25 NCP Packet Switching Interface generation.

- YY

  Is the two-byte OUFT index whose value ranges from 00 to 19.

  YY=00 means that the Call Request packet is built with the facility field and the user data specified in the "OUFINDX=" operand of the X25VC macro instruction.

  YY=yy means that the Call Request packet is built with the facility field and the user data defined in the yy entry of the OUFT. This entry must have been defined during X.25 NCP Packet Switching Interface generation.

- ZZZZZ

  Is the five-byte ID number of the PU ("IDNUM=" keyword). Each Z has a value from 0 to 9 in decimal notation. This field (including the asterisk) is required and valid only when virtual circuit 0 or 5 type is specified.

<u>Examples</u>

- Assuming that the called DTE's network address is 175000233 and the default VCCPT and OUFT entries are used, for a typical type 2 virtual circuit, code:

  DIALNO=17500023320000

- Assuming that the called DTE's network address is 175000235, the VCCPT and OUFT entries 1 are used, the virtual circuit type is 0, and the ID number of the PU is 66666, code:

DIALNO=17500023500101*66666

- Assuming that the calling DTE's network address is necessary and is equal to 4444, the called DTE's network address is 333, entry 19 of the VCCPT is used, the OUFT default entry is used, the virtual circuit type is 0, and the ID number of the PU is 66666, code:

  DIALNO=333*444401900*66666

  Note: The format of the corresponding Call Request packet would be (assuming that, in the OUFT default entry, a 4800 bps throughput class in transmission and a 2400 bps throughput class in reception are defined):

<——————— 1 byte ———————>

CALL REQ Packet Header	Gen. Format Identifier 0 0 0 1	Logical Channel Group Number
	Logical Channel Number	
	Packet Type Identifier 0 0 0 0	1 0 1 1
	Calling DTE Address Length 0 1 0 0	Called DTE Address Length 0 0 1 1
	Called DTE Address 0 0 1 1	0 0 1 1
	0 0 1 1	Calling DTE Address 0 1 0 0
	0 1 0 0	0 1 0 0
	0 1 0 0	0 0 0 0
	0 0 | Facility Length 0 0	0 0 1 0
	Facility Code 0 0 0 0	0 0 1 0
	Facility Parameter 1 0 0 0	1 0 0 1
	Call User Data Field 1 1 0 0	0 0 0 0
	Remote IDNUM= SSCP IDNUM + 1 or default IDNUM 0 1 1 0	0 1 1 0
	0 1 1 0	0 1 1 0
	0 1 1 1	0 0 0 0

The Called and Calling DTE addresses are concatenated by filling one digit per half-byte. If the total number of digits is odd, then the concatenated addresses are padded on the right with a zero. There is no padding between the called DTE address and the calling DTE address.

- The "REDIAL=" operand of the PATH macro is no longer significant. Even if you specify REDIAL=n, no dialing retry will be performed by the X.25 NCP Packet Switching Interface before returning a dialing error to VTAM.

LU Macro Instruction

For a type 0 virtual circuit, you must code the "PACING=" operand PACING=(1,1). This is the default value. For a type 0 virtual circuit, the "LOCADDR=" operand must be coded 0.

SPECIFYING ACF/TCAM MACROS

Do not change TCAM macros used to define a message control program when specifying a configuration using a PSDN. However, some rules have to be followed when coding these macros.

INTRO Macro Instruction

You must use this macro carefully with respect to TCAM buffers. A long inbound RU message may be split into many PIU segments to be adapted to the characteristics of the network. TCAM accumulates the PIU segments before delivering the complete RU to the application. This means that many TCAM buffers may be used at certain times to accommodate inbound messages.

TERMINAL (TERM=LINE) Macro Instruction

The "CALL=" operand specifies whether stations, the host, or both can initialize calls via the virtual circuits represented by the TERMINAL (TERM=LINE) macro instruction. This operand allows reserving a switched virtual circuit for a one-way call.

In order to perform a call, the X.25 network chooses the first virtual circuit available with the lowest logical channel number. Therefore, in order to minimize the possibilities of call collisions, the TERMINAL (TERM=LINE) macro instructions associated with the highest virtual line addresses should be used for outgoing calls (CALL=OUT or CALL=INOUT).

TERMINAL (TERM=PUNT) Macro Instruction

Code the "DIALNO=" operand as follows:

DIALNO=X'FnFnFn...Fn[FCFmFmFm...Fm]F1FxFxFyFy[FCFzFzFzFzFz]'

Coding differences between VTAM and TCAM are:

- The maximum length of the "DIALNO=" operand in TCAM is twenty dial digits for 'F.' configurations only.

  DIALNO=DIRECT is not valid.

- In TCAM, the equivalent of * is the 'FC' configuration. This is why hexadecimal notation is used when a delimiter configuration is needed. When you do not need to specify the MMM.M and ZZZZZ fields, you may use the decimal dial digit notation.

- In TCAM, the ZZZZZ field is optional. TCAM can be generated so as not to be concerned with the XID specified in the Request Contact command resulting from an outgoing call. This is why the ZZZZZ field is between parentheses.

  Otherwise, for a detailed description, refer to the previous discussion of the VTAM PATH Macro Instruction in the preceding "ACF/VTAM Considerations" section of this manual.

  As far as the ZZZZZ field is concerned, you must remember that an SNA station identification is made up of four bytes:

  X'BBBZZZZZ'

  where X'BBB' represents the identification block, and X'ZZZZZ' represents the identification number.

- Code the "DISCNT=" operand YES for the switched virtual PUs. It specifies that TCAM is to end the SSCP-PU session when all the PLU-SLU sessions are terminated. "YES" means TCAM will wait for a "REQUEST DISCONTACT" from the PU.

- The "MAXDATA=" operand specifies the maximum length (in bytes) of a data segment for an SNA-switched PU.

  - For a type 2 or 3 virtual circuit, this operand must reflect the PU's characteristics.

  - For a type 0, 4 or 5 virtual circuit, this operand must be coded with a value equal to at least the maximum size of the RUs sent by the application to the pseudo-LUs in the 3705.

INVLIST Macro Instruction

The "ORDER=" operand specifies the invitation list entries for the line.

If TCAM has to perform an ID verification for NCP-attached stations, you have to remember that:

- For a type 2 or 3 virtual circuit, the identification block is coded in a standard manner. For a type 0, 4, or 5 virtual circuit, this operand must be coded 003.

- For a type 2 or 3 virtual circuit, the identification number is coded in a standard manner.

- For type 0, 4, and 5 virtual circuits, remember that the remote identification number is generated in the Call Request packet and therefore received in an Incoming Call packet. It is equal to:

  - zzzzz plus one, if this field is specified in the "DIALNO=" operand

  - The default identification number, if the 'FzFzFzFzFz' field is not specified in the "DIALNO=" operand. Refer to the discussion of the VTAM PU macro instruction for more details concerning the default identification number.

Note: The IDNUM, set in the Request Contact sent to the host after XID exchange, is set to the following value:

Virtual Circuit Type	Outgoing Call	Incoming Call
Type 0 Virtual Circuit Without DATE or with GATE and SUBADDR=NO	zzzzz field of DIALNO (if present) or Any (note 2)	CUD field (note 1) 5 half-digits starting byte 1
Type 0 Virtual Circuit with GATE and SUBADDR=YES	zzzzz field of DIALNO (if present) or Any (note 2)	Default ID
Type 0 or 5 Virtual Circuit with DATE	Default ID	Default ID
Type 2 Virtual Circuit	Remote SNA-DTE ID	Remote SNA-DTE ID
Type 3 BNN Virtual Circuit	Remote SNA-DTE ID	Remote SNA-DTE ID
Type 4 Virtual Circuit	Default ID	Default ID
Type 5 Virtual Circuit Without DATE	zzzzz field of DIALNO (if present) or Any (note 2)	Default ID

Note 1: CUD is the Call User Data field of the Incoming Call Packet
Note 2: Any means that the value is meaningless and not used by TCAM

CHAPTER 5. WRITING HOST APPLICATION PROGRAMS THAT USE THE X.25 NCP PACKET SWITCHING INTERFACE

This chapter contains information for application programmers who are designing host-resident application programs to communicate with remote DTEs over an X.25 network. Included are considerations for:

- Communicating with non-SNA DTEs via the X.25 NCP Packet Switching Interface Protocol Converter for Non-SNA Equipment (PCNE)
- Writing a communication and transmission control program (CTCP) to communicate with the X.25 NCP Packet Switching Interface General Access to X.25 Transport Extension (GATE) interface
- Writing a CTCP to communicate with the X.25 NCP Packet Switching Interface Dedicated Access to X.25 Transport Extension (DATE) support
- Writing an application program to communicate with an integrated or transparent PAD facility

This chapter does not contain considerations for writing an application program to communicate with LUs in SNA host or peripheral nodes via an LU-LU session over an X.25 network. With the X.25 NCP Packet Switching Interface there are no special considerations for such LU-LU sessions, other than the normal SNA considerations for such sessions.

When communicating with a non-SNA DTE, you will always use facilities provided by LU simulator code which is located within the PCNE portion of the X.25 NCP Packet Switching Interface. The LU simulator allows a primary LU associated with your application program in the host to communicate with a non-SNA DTE by making the non-SNA DTE appear to the host LU as if it were an SNA secondary LU engaged in a type 1 LU-LU session. (An example of a type 1 LU is the IBM 3767 Communication Terminal.)

When you use the PCNE interface, the GATE interface, or the PAD interface, your application program communicates with the LU simulator. (If you use the DATE extension to one of the above interfaces, your application program also communicates with the LU simulator.)

The next section gives general considerations for communicating with the LU simulator, and tells how the simulator handles SNA RUs sent to it by your application program.

The other sections of this chapter discuss specific considerations for using the various interfaces provided by the X.25 NCP Packet Switching Interface to allow your application program to communicate with non-SNA DTEs. The material in the section on the LU simulator applies to each of the interfaces discussed below. (The DATE extension does not use the LU simulator, but DATE must be used in conjunction with another interface, which may use the LU simulator.)

COMMUNICATING WITH THE LU SIMULATOR IN THE X.25 NCP PACKET SWITCHING INTERFACE

The LU simulator in the X.25 NCP Packet Switching Interface simulates a secondary LU engaged in a type 1 LU-LU session. This LU works in half-duplex mode (contention or flip-flop). Since there is only one such secondary LU per virtual circuit, only one LU-LU session at a time is allowed on a virtual circuit to a non-SNA DTE.

You need to understand the SNA functions and concepts involved in a type 1 LU-LU session in order to make use of the following material. For basic conceptual information on SNA, see the publication SNA Concepts and Products (GC30-3072). For a detailed technical discussion of type 1 LU-LU sessions, see the publication SNA Sessions between Logical Units (GC20-1868).

Figure 2-4 in Chapter 2 shows a type 0 virtual circuit to a non-SNA X.25 DTE. The X.25 NCP Packet Switching Interface makes the virtual circuit appear to be an SDLC link to the access method. Associated with the virtual circuit are three SNA sessions:

- An SSCP-PU session between the SSCP and a PU located within the X.25 NCP Packet Switching Interface and associated with the virtual circuit
- An SSCP-LU session between the SSCP and an LU located within the X.25 NCP Packet Switching Interface and associated with the virtual circuit
- An LU-LU session between an LU associated with a host application program and the LU associated with the virtual circuit

Both the PU and the LU in the X.25 NCP Packet Switching Interface are defined via macros provided by the system programmer when he codes the X.25 NCP Packet Switching Interface (see Chapter 2 for details).

The SSCP-PU session allows the SSCP to control the status of the virtual circuit by sending SNA commands to the PU, which are processed by the NCP and by the X.25 NCP Packet Switching Interface. The SSCP-LU and LU-LU sessions allow the SSCP and application program to send PIUs to and receive PIUs from the LU in the X.25 NCP Packet Switching Interface which is associated with the virtual circuit. PIUs sent to the LU by the SSCP are processed by the LU itself, while PIUs sent by the host application program are converted by the LU simulator into X.25 packets and sent to the remote non-SNA DTE. In a similar fashion, the LU simulator converts packets sent by the remote DTE into PIUs and sends them to the application program. This conversion function is performed for virtual circuits using PCNE, GATE, or PAD support.

If it uses the PCNE interface, your application program should behave as if it were communicating with an IBM 3767 terminal over a type 1 LU-LU session, rather than with a remote non-SNA DTE. GATE and DATE support give the application program the additional capability of controlling the setup and takedown of the virtual circuit. PAD support allows your program to communicate with a non-SNA non-X.25 DTE via a remote PAD that converts between the X.25 protocol and that used by the remote terminal. The next section tells how the LU simulator handles various classes of SNA RUs and describes various limitations on the LU simulator support.

Activating and Deactivating an LU-LU Session with a Virtual Circuit LU

As in SNA LU-LU session, an LU-LU session between a host LU and the LU associated with a virtual circuit may be activated and deactivated at the request of the host access method, or at the request of the remote terminal. For example, the session may be established as the result of an ACF/VTAM V NET operator command specifying the virtual-circuit LU as the target resource. (See Chapter 6 for the command sequence that would cause activation in this case.) Or the session might be established as a result of the application program using an OPNDST macro specifying OPTCD=ACQUIRE.

Alternatively, the LU-LU session may be activated via a logon message issued by the secondary LU.

To activate an LU-LU session, the secondary LU sends the SSCP an SNA Initiate Self request over the SSCP-LU session between the two. This request may be formatted or unformatted; if unformatted it is a character string entered by the terminal operator that is converted to SNA format by a component of the host access method called Unformatted System Services (USS). An unformatted Initiate Self request is also known as a logon message.

Non-SNA DTEs use this unformatted Initiate Self request to trigger activation of an SNA LU-LU session between the application-program LU in the host and the LU associated with the virtual circuit. Until the LU-LU session is activated, the X.25 NCP Packet Switching Interface treats any data packet received from the remote DTE as a logon message. After converting this message from packet format to PIU format, the X.25 NCP Packet Switching Interface sends it to the SSCP over the SSCP-LU session associated with the virtual circuit LU. The access method converts the unformatted information (which may span several packets) into a formatted SNA Initiate Self request which triggers session activation.

The format of the logon message entered at the DTE must be identical with that specified to the access-method's Unformatted System Services (USS) component. Both access methods offer defaults, as follows:

- For ACF/VTAM the default format is
  LOGON APPLID(name) LOGMODE(name) DATA(userdata)

- For ACF/TCAM, two default formats are supplied:

1. INITS luname,modename

2. LOGON luname,modename

To trigger deactivation of the LU-LU session, the remote DTE may send the application program a special message having an agreed-upon format; the application program may then request session deactivation by issuing an appropriate operator command or, in the case of ACF/TCAM, the device message handler can cause session termination by issuing an IEDHALT macro.

How the LU Simulator Handles SNA Request/Response Units

The LU simulator converts protocols only between the X.25 packet header (or some X.25 control/interrupt packets) and the transmission/request header of the SNA PIUs. Data contained in SNA function management data (FMD) request/response units or in data packets is not processed by the LU simulator and is transferred end-to-end without any conversion.

Protocol conversion is performed with the following restrictions on X.25 and SNA protocols:

- There is only one PU/LU pair associated with a virtual circuit. As a result, there is only one LU-LU session per virtual circuit.

- Either the SNA half-duplex contention or half-duplex flip-flop mode is supported; the full-duplex mode is not supported.

- Outgoing SNA RUs (from the host) are converted into independent sets of X.25 packets whatever the setting of the chaining bits.

- An incoming set of packets, linked by the "more data" bit, is sent to the host as one RU within a single segment, with the chaining bits set to indicate "only in chain".

- The data part of SNA function management data (FMD) RUs flowing on the LU-LU session is not processed by the LU simulator; that is, the application program must recognize the data format of the X.25 equipment with which it communicates. The LU simulator performs protocol conversion, but does not perform data stream mapping.

- With the exception of PAD support (described below), only the EBCDIC character code is supported.

- When calling a host over a type 0 switched virtual circuit, a non-SNA DTE must insert the following in the Call User Data field of the Call Request packet: X'C0', followed by the five digits (two and one half bytes) of either

  - The "IDNUM=" parameter contained in the PU of the macro describing this remote DTE to ACF/VTAM, or

- The identification number contained in the INVLIST macro instruction describing the remote DTE to ACF/TCAM.

Remember that an SNA station identification is made up of four bytes: X'BBBNNNNN', where X'BBB' represents the identification block and X'NNNNN' represents the identification number.

LU Simulator Actions for Session Control RUs

The LU simulator accepts the following session control RUs when they are issued by the host SSCP or LU:

- Activate Logical Unit
- Bind Session
- Start Data Traffic
- Clear
- Unbind Session
- Deactivate Logical Unit

LU Services returns the appropriate response for each request.

Upon receipt of the Activate Logical Unit command, the LU simulator returns a positive response to the SSCP, indicating that the SSCP-LU session between the host SSCP and the LU associated with the virtual circuit is active. The LU simulator does not check the type of activation (ERP or COLD).

When a Bind Session command is received from a host LU, the LU simulator checks the bind parameters against the value listed in Figure 5-1. If valid, the LU simulator sends a positive response to the host LU, indicating that the LU-LU session is active. Otherwise, the LU simulator rejects the Bind Session command.

The LU simulator does not check the type of activation.

Upon receipt of a Start Data Traffic command, the LU simulator is eligible to receive data, and returns a positive response to the host LU.

Upon receipt of a Clear command, the LU simulator clears all local pending conditions and returns a positive response to the host.

Upon receipt of an Unbind Session command, the LU simulator returns a positive response to the host LU, indicating that the LU-LU session is deactivated.

Upon receipt of a Deactivate Logical Unit command from the SSCP, the LU simulator returns a positive response to the SSCP, indicating that the SSCP-LU session is deactivated.

BYTES	BITS	VALUE	MEANING
0	0-7	X'31'	BIND code
1	0-3	B'0000'	BIND format = 0
	4-7	B'0001'	BIND type =1
2	0-7	X'03'	FM profile = 3
3	0-7	X'03'	TS profile = 3
			DEFINITION OF PRIMARY PROTOCOL:
4	0	B'1'	Multiple request chains
	1	B'0'	Mandatory value
	2-3	B'01'	Exception response
		B'10'	Definite response
		B'11'	Exception and definite response
	4-5	---	Not used
	6	B'0'	Compression not used
	7	B'1'	Primary may send EB
		B'0'	Primary will not send EB
			DEFINITION OF SECONDARY PROTOCOL:
5	0	B'1'	Multiple request chains (the SLU always sends OIC RU to the host)
	1	B'0'	Mandatory value
	2-3	B'01'	Exception response
		B'10'	Definite response
		B'11'	Exception and definite response
	4-5	---	Not used
	6	B'0'	Compression not used
	7	B'1'	Secondary will send EB
		B'0'	Secondary will not send EB
			COMMON PROTOCOL:
6	0	---	Not used
	1	B'0'	FM header not used
	2	B'1'	Bracket used
		B'0'	Bracket not used
	3	B'1'	Bracket termination rule 1
	4	B'0'	EBCDIC
	5-6-7	---	Not used
			COMMON PROTOCOL:
7	0-1	B'01'	HDX Contention
		B'10'	HDX Flip-Flop
	2	B'0'	Primary LU recovery responsibility
	3	B'0'	First speaker is secondary
	4-7	---	Not used

Figure 5-1. The Bind Parameter List

LU Simulator Actions for Data Flow Control RUs

The LU simulator component of the X.25 NCP Packet Switching Interface accepts the following data flow control RUs when they are issued by the host:

- Cancel
- Signal
- Bid
- Chase
- Shutdown

When a Cancel command is received from the host LU, the LU simulator returns a positive response and takes no other action. Because the chaining concept is local to the LU simulator, the host application program needs a higher level end-to-end protocol to cancel a chain of RUs being sent to a remote non-SNA DTE. The LU simulator never sends a Cancel command to the host LU.

When it receives a Signal command from the host LU, the LU simulator returns a positive response and takes no further action. Unless integrated PAD support is being used on the virtual circuit, the secondary LU never generates the Signal command. (For a description of Signal command generation by integrated PAD support, see the section below titled "Using the Integrated PAD Interface".)

The LU simulator accepts the Bid command if the HDX bracket status permits processing an RU request from the host with "Begin Bracket". In this case, the "Begin Bracket Pending" status is entered, and all data packets received from the network are held in buffers until the "Begin Bracket" RU is received. For more details, refer to the discussion of bracket management below.

When a Chase command is received from the host LU, the LU simulator sends a positive response to the host LU and takes no further action.

After receiving a Shutdown request from the host LU, the LU simulator sends a Shutdown Complete request to the host LU as soon as the bracket status changes to "between brackets" and all incoming data packets are discarded.

Note: If the LU simulator can close the brackets, Shutdown Complete is sent after reception of the first packet without the "more data" bit.

LU Services Actions for Function Management Data RUs

Figure 5-2 shows the incoming and outgoing flow for FMD RUs, and shows the conversion of bit settings between RH bits and packet header bits.

LU Simulator Actions for Outgoing Data Flow

The LU simulator does not support segmenting of outgoing SNA PIUs from the host. For this reason, the MAXDATA operand of the ACF/VTAM PU macro instruction, and of the ACF/TCAM TERMINAL macro instruction for switched virtual-circuit PUs, must be coded with a value higher than the maximum RU size sent by the application. The NCP PU macro for permanent virtual circuits also must be coded with a value higher than the maximum RU size sent by the application.

Each outgoing RU is sent as an independent set of packets. In each set, all packets except the last have the "more data" bit on in their packet headers. The last packet has its "more data" bit off. The LU simulator adapts the data length to the characteristics of the connection in such a manner that all the packets with the "more data" bit on contain a number of data bytes equal to the maximum packet length acceptable by the DTE interface (as specified via the MAXPKTL of the X25VCCPT macro.

Chaining of PIUs is supported for compatibility purposes only; the X.25 NCP Packet Switching Interface does not attempt to map the SNA chaining concept to an equivalent X.25 concept.

The outgoing response protocol is defined in the BIND parameters by byte 4, bits 2-3 (see Figure 5-1). Because the LU simulator works with a pacing equal to 1, the LU simulator sends a response (isolated pacing response, positive response or negative response) to each RU received from the host. If requested in the RH, the response is sent as soon as the first packet built from the RU is scheduled on the outgoing queue.

When received in the host, an isolated pacing response and definite response mean only that the beginning of the RU is scheduled on the outgoing queue. They do not mean that it has been correctly sent. An exception response means that the RU cannot be sent and has been discarded.

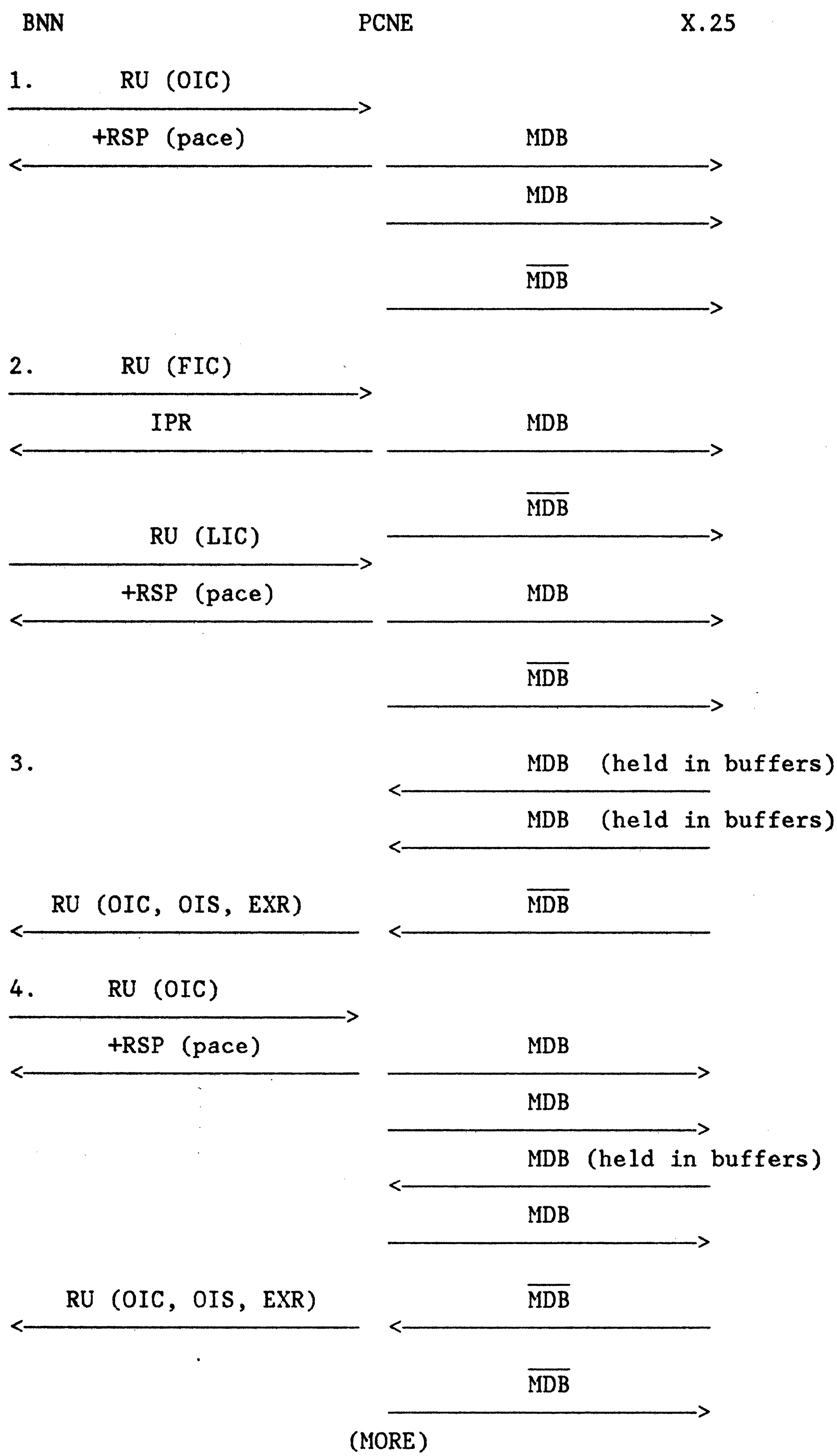


Figure 5-2 (Part 1 of 2). Function Management Data Flow

```
BNN                         PCNE                      X.25

                        (CONTINUED)
5.    RU (FIC)
------------------------------>
         IPR                              MDB          }
<------------------------------  ---------------------> }
      RU (MIC)                            ___          } (FIC)
------------------------------>           MDB          }
                                 ---------------------> }

         IPR                              MDB
<------------------------------  --------------------->   (MIC)
      RU (LIC)
------------------------------>           MDB  (held in buffers)
                                 <---------------------
                                          MDB
                                 --------------------->   (MIC)
                                          ___
                                          MDB  (held in buffers)
                                 <---------------------

                                          ___
                                          MDB
                                 --------------------->   (MIC)
      +RSP (pace)                         MDB
<------------------------------  ---------------------> }
   RU (OIC, OIS, EXR)                     MDB          }
<------------------------------  ---------------------> }
                                          MDB          } (LIC)
                                 ---------------------> }
                                          ___          }
                                          MDB          }
                                 ---------------------> }
```

Figure 5-2 (Part 2 of 2). Function Management Data Flow

LU Simulator Actions for Incoming Data Flow

When a set of incoming packets has the "more data" bit on in all packet-headers except for the last, the set is sent to the host as an only-in-chain (OIC) and single-segment RU. All data packets received from the remote DTE during the transmission of a chain of data from the host are held in buffers until the LU simulator can deliver this data to the host (that is, until the LU simulator processes the last-in-chain (LIC) RU).

Since each RU sent to the host is sent as only-in-chain, the LU simulator sets the response bits in the RH of each request based upon the value of the bind parameters (byte 5, bits 2-3) for the secondary-to-primary protocol. The LU simulator concerns itself with the response coming from the host (whether it is positive or negative) only when the request RU specifies a Definite Response. Otherwise, in

Exception Response mode, the LU simulator internal status changes directly to standby as soon as the request RU is sent to the host. Use of the Exception Response mode for the secondary protocol facilitates incoming traffic flow, since in this case the LU simulator does not have to wait for a response from the host for each PIU.

Session-Level Pacing and Virtual-Route Pacing

For session-level pacing, the LU simulator supports only send pacing, and sends a pacing response each time a request is received with the pacing bit on in its RH. For an LU associated with a virtual circuit, both the primary send pacing-group size and secondary receive pacing group size must be one.

Virtual-route pacing is independent of the X.25 NCP Packet Switching Interface. Virtual-route pacing parameters should be chosen based upon the type of the host application and the buffers available in the NCP.

Though the pacing information placed by the LU simulator in a response does not cause the release of the buffers containing the corresponding RU request, session-level pacing and virtual-route pacing allow regulating the data flow between the host and the NCP. When determining pacing parameters, you should take into account the X.25 packet window processing. In fact, an RU request from the host entering the NCP is processed by the LU simulator only when the packet window is open -- that is, when the previous RUs in the window have been sent to the network.

Flow Direction Control

In half-duplex contention mode, contention is resolved at the X.25 NCP Packet Switching Interface level by the LU simulator, which uses outgoing and incoming data queueing.

In half-duplex flip-flop mode, the LU simulator changes its internal status when it receives a data packet from the network with the "more-data" bit turned off. Receipt of a data packet from the network with the "more-data" bit turned off causes the LU simulator to send a request RU to the host with the "change direction" bit turned on.

Code Selection

The LU simulator does not check the data contained in the data packets; however, the data contained in the logon message must be coded exactly as it is defined in the access method (VTAM/TCAM) USS conversion table in order for the SSCP to establish a successful LU-LU session between a primary LU located in the host and the secondary LU associated with the virtual circuit.

Sequencing

Because the LU simulator supports the FID3 TH only, the sequence numbers are managed by the boundary network node function of the NCP.

Bracket Management

Figure 5-3 shows bracket management for a secondary LU associated with a virtual circuit, and shows how bracket states are mapped into packet-header bit settings. When brackets are used for a session, the PCNE is always the first speaker.

Bracket Protocol when the LU Simulator Cannot Send an End Bracket (EB)

When the LU simulator is in the between brackets (BETB) state, the first data packet with the "more data" bit turned off in its header received from the remote DTE (see Figure 5-3) causes the bracket state manager to enter the in bracket (INB) state, and causes an FMD RU with the "begin bracket" bit turned on in its RH to be sent to the host. The LU simulator remains in the in bracket state until it receives an RU with the "end bracket" bit turned on in its RH from the host.

If the LU simulator is in the between brackets state and receives a Bid command from the host, a positive response is sent to the host and the LU simulator enters the begin bracket pending (BBP) state, and awaits receipt of an RU with the "begin bracket" bit on in its RH from the host LU. While it is waiting for this RU, the LU simulator holds any data packets received from the remote DTE at the other end of the virtual circuit in buffers. The LU simulator enters the in bracket state when the first RU with the "begin bracket" bit set on in its RH is received from the host. The LU simulator leaves the in bracket state when it receives an RU with the "end bracket" bit set on from the host LU.

If while in the between brackets state the LU simulator receives from the host an FMD RU with the "begin bracket" bit set on in its RH, the LU simulator sends one or more data packets to the remote DTE and enters the in bracket state.

If the LU simulator receives a Bid command while in the in bracket state, it returns an error response to the host LU.

If the LU simulator is in the in bracket state and receives an FMD RU with the "begin bracket" bit set on, it returns an error response to the host and remains in the in bracket state.

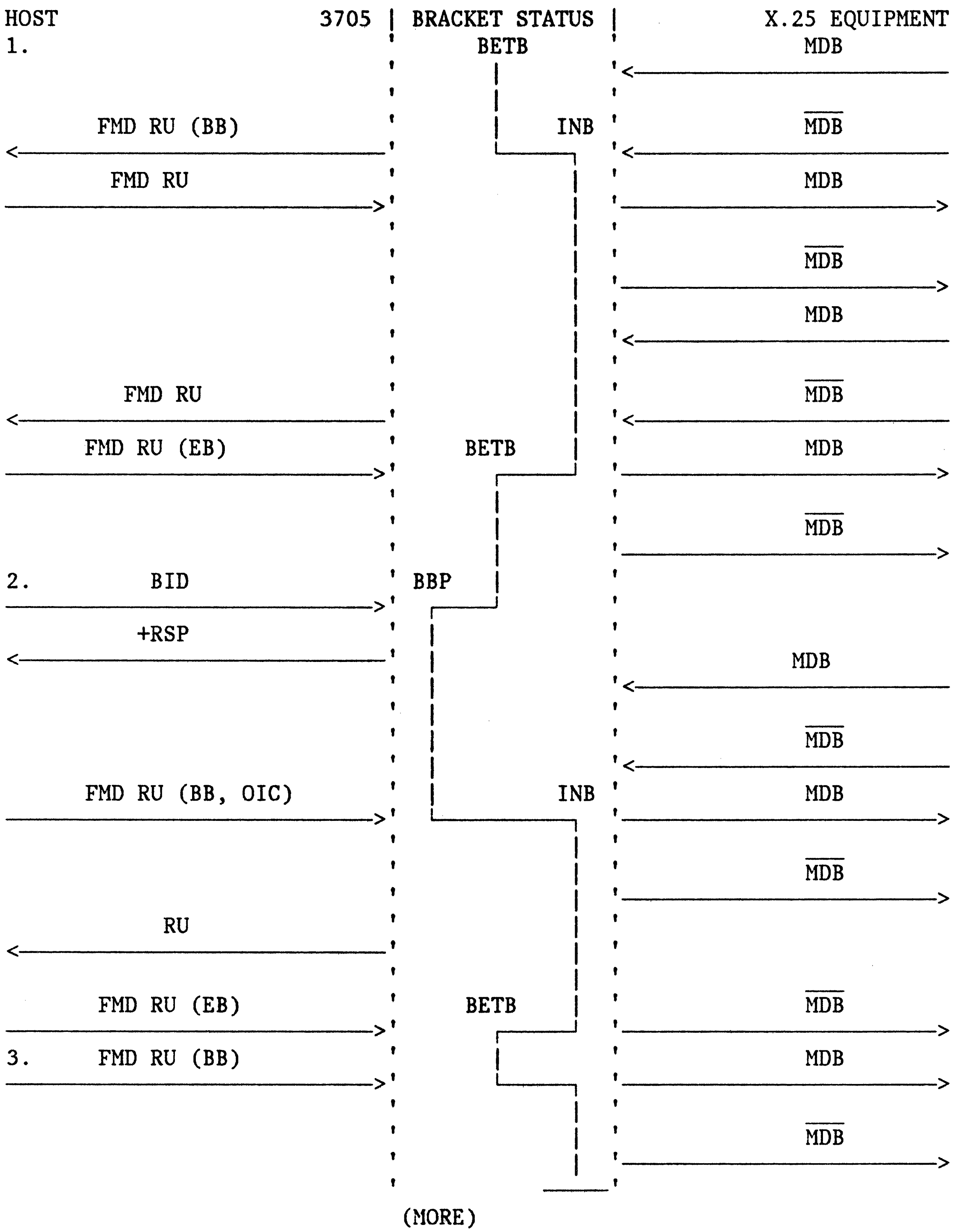


Figure 5-3 (Part 1 of 2). Bracket Protocol When the LU simulator Cannot Send an End Bracket (EB)

```
                                    (CONTINUED)
4.        BID                      '              |  '
---------------------------------->'              |  '
 -RSP with sense X'0813'           '              |  '
<----------------------------------'              |  '
5.    FMD RU (BB)                  '              |  '
---------------------------------->'              |  '
 -RSP with sense X'0813'           '              |  '
<----------------------------------'              |  '
```

Figure 5-3 (Part 2 of 2). Bracket Protocol When the LU simulator Cannot Send an End Bracket (EB)

Bracket Protocol when the LU Simulator Can Send an End Bracket (EB)

If the LU simulator is in the between bracket state and receives a set of data packets with the "more data" bit set on in all headers except the last, it sends one FMD RU with "begin bracket" and "end bracket" bits set on in its header (see Figure 5-4). The LU simulator remains in the between bracket state.

If the PCNE is in the in bracket state and receives a set of data packets with the "more data" bit set on in all headers except the last, it sends the host one FMD RU with the "end bracket" bit set on. The LU simulator then enters the between brackets state.

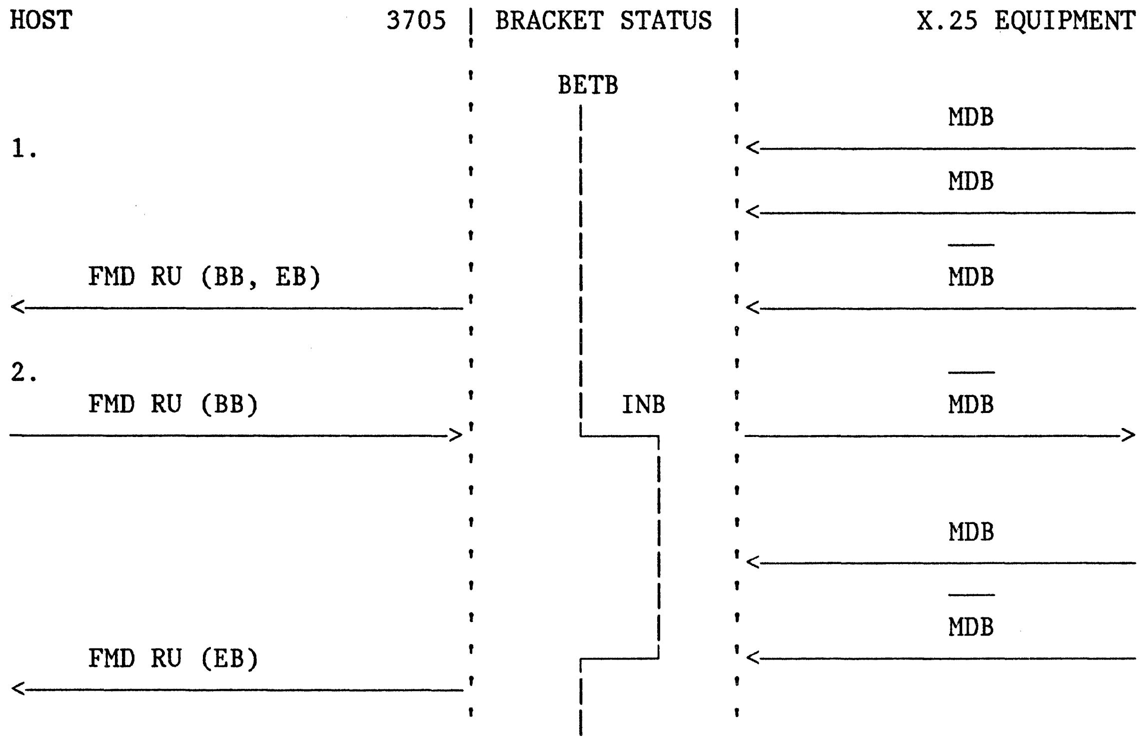


Figure 5-4. Bracket Protocol When the SLU Can Send an End Bracket (EB)

End-to-End Delivery Confirmation

Certain packet-switched data networks offer an end-to-end delivery confirmation service that allows you to ensure that outgoing data reaches its destination DTE. This service depends on the delivery confirmation bit (D-bit) in the packet header. When the delivery confirmation bit is on in an outgoing data packet, the network sends back an RR packet with the D-bit on to indicate that the packet has been successfully delivered to the destination DTE.

The LU simulator performs this service only for type 0 virtual circuits. If delivery confirmation is specified for a virtual circuit to a non-SNA DTE and the LU simulator receives an FMD RU from a host LU with an RH specifying that a definite response is required, the X.25 NCP Packet Switching Interface converts this RU into a data packet with the D-bit set on in its packet header. Upon receipt of a corresponding RR packet, indicating that the outgoing packet has been successfully received at the remote DTE, the LU simulator formats a definite response to the original RU and sends it to the host LU.

If delivery confirmation is specified and the bind parameters allow RUs requesting definite responses to flow from the secondary to the primary

LU, the LU simulator examines each incoming data packet from the remote DTE to determine if the D-bit is on. If it is on, the LU simulator requests a definite response in the RH of the PIU containing the data received in the packet with the D bit on. When the host LU returns a definite response to this PIU, the LU simulator sends a corresponding RR packet with the D-bit turned on to the remote DTE.

Note: The end-to-end delivery confirmation is only supported in the case of half-duplex end-to-end data flow.

USING THE PCNE INTERFACE

All of the data in the section on the LU simulator is applicable when you are using the PCNE interface to non-SNA DTEs.

The LU simulator does a little more than the 3767 LU. The LU simulator provides data queuing for the incoming and outgoing flows. Therefore, the incoming and outgoing data flows can be asynchronous, that is, both end users can transmit data independently from each other. In this manual this support is sometimes called full-duplex end-to-end data flow. However, the host application program exchanges data with the LU simulator, via the 3767 LU protocol only, using half-duplex contention or flip-flop mode.

When working in half-duplex contention mode, no contention occurs because of the data queuing: the LU simulator sends/receives data to/from the host at the first opportunity.

When working in half-duplex flip-flop mode, the LU simulator must wait until it is in the correct state before sending/receiving data to/from the host. This is accomplished via the change direction (CD) bit in the SNA request header. Therefore, the host application program must sent this 'CD' bit at the end of any outgoing (from the host to network) data stream, to allow the LU simulator to send to the host any pending data from the network. At any time, the host application program can take control back by means of the 'SIGNAL' mechanism. The LU simulator never sends a 'SIGNAL' on a type 0 virtual circuit.

Note: The end-to-end delivery confirmation bit is only supported in the case of half-duplex end-to-end data flow, that is, the incoming and outgoing data flows need to be correlated.

To use the full-duplex end-to-end data flow capability of the X.25 physical link (that is, of the LAPB protocol) and acheive maximum efficiency, use:

1. Half-duplex contention mode

2. Exception response mode

3. 'ONLY IN CHAIN' PIU's for both primary and secondary data flows

The following two sections explain the use of the PCNE interface in conjunction with an X.25 network's echo service, and in the connection of two X.25 NCP Packet Switching Interface program products via a PCNE-to-PCNE connection.

PCNE-to-PCNE Considerations

In addition to using a type 3 virtual circuit, an application program may converse with another program in another host node via a type 0 virtual circuit between the PCNE components of two X.25 NCP Packet Switching Interface programs in different communication controllers.

Assume that an application program named APPL1 wishes to communicate with an application program in another host named APPL2 over a switched virtual circuit, and that APPL1 initializes session setup. Figure 5-5 shows this situation.

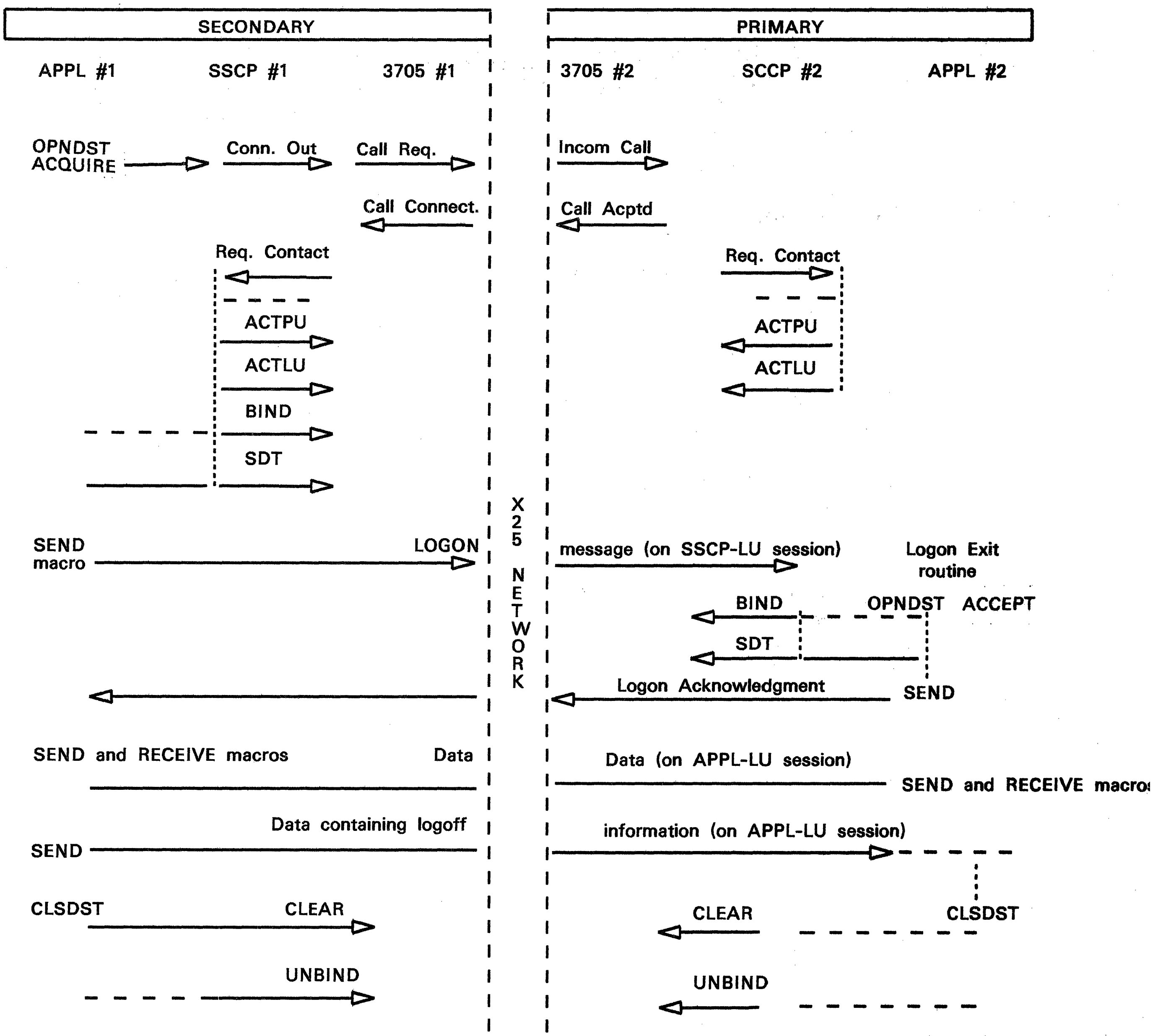


Figure 5-5. Session Setup and Takedown Interaction between Two PCNEs

APPL1 executes an ACF/VTAM OPNDST macro specifying OPTCD=ACQUIRE which causes the establishment of the required sessions:

- In SNA domain 1 the following sessions must be established:
  - SSCP1-virtual circuit physical unit
  - SSCP1-virtual circuit logical unit
  - APPL1 logical unit-virtual circuit logical unit
- In SNA domain 2 the following sessions must be established:
  - SSCP2-virtual circuit physical unit

- SSCP2-virtual circuit logical unit

See Figure 5-5 for details.

To request the establishment of the APPL2-LU session in SNA domain 2, the APPL1 application must send a logon message as data. In SNA domain 2, this logon message can be forwarded to SSCP2 only if the SSCP2-LU session is already established. For this reason, the PCNE retains any data packet preceding the Activate Logical Unit command.

A logon message is a PIU sent by a secondary LU during the SSCP-LU session to request an LU-LU session with the primary LU. It takes place between the Activate Logical Unit and the Bind Session command. Therefore, any data packets received from a remote DTE after transmission to the host of a positive response to the Activate Logical Unit command and before reception of a Bind Session command are considered by the PCNE to be a logon message, and the PCNE delivers this message to the host over the SSCP-LU session.

Upon receipt of the logon message, SSCP2 schedules the logon exit routine of APPL2 which issues an ACF/VTAM OPNDST macro specifying OPTCD=ACCEPT. Thus, the LU-LU session is established between the APPL2 LU and the LU associated with APPL2's end of the virtual circuit. Receipt of the Start Data Traffic command allows the PCNE in domain 2 to forward data packets coming from the network to APPL2 and no longer to SSCP2. Thus, APPL1 must wait for a "Logon Acknowledgment" sent by the APPL2 logon exit routine before sending data to APPL2. You may have to use a timer in APPL1 to cover the cases of non-response to a logon message.

Before performing an ACF/VTAM CLSDST macro to end an APPL1 to APPL2 connection, an application program must send as data logoff information requesting the application in the other domain to end its APPL-LU session.

In general, the above discussion of connection to switched virtual circuits also applies to permanent virtual circuits. However, unlike an application working with a switched virtual circuit, a called application program working with a permanent virtual circuit does not necessarily need a logon message. It can be in a state in which it can receive data from the other side's application program directly. In fact, an application program may issue an ACF/VTAM OPNDST macro specifying OPTCD=ACQUIRE, causing the establishment of the APPL-LU session without any effect on the X.25 network.

Note: Chapter 4 tells how to define the IDs in the switched subarea.

Network Echo Service Considerations

Certain packet-switched data networks provide an echo facility for test purposes. A packet sent to this facility is returned to the originator.

The X.25 NCP Packet Switching Interface allows communications with the echo service of the network, if any. The X.25 NCP Packet Switching Interface treats the echo service as an X.25 non-SNA DTE using the PCNE interface. The PCNE allows these communications by simulating an SNA secondary LU associated with a type 1 PU. Communications with the echo service are allowed only through switched virtual circuits. Thus, the PU associated with the virtual circuit used for communication must be defined as switched to the access method.

When a virtual circuit has been established to the echo service of the network using network specifications, an application program can be used to perform the echo test.

If available, the echo test facility can be used as an aid in debugging an application program.

USING THE GATE INTERFACE

The General Access to X.25 Transport Extension (GATE) interface in the X.25 NCP Packet Switching Interface is an extension of the PCNE (Protocol Converter for Non-SNA Equipment).

The connection and disconnection to a virtual circuit and the exchange of commands and data is performed through the GATE function. GATE is the interface in the X.25 NCP Packet Switching Interface with the Communication and Transmission Control Program (CTCP).

This topic presents application-program considerations for using GATE. For information on specifying the GATE facility for particular virtual circuits, see Chapter 2.

Overview of the GATE Interface

To use the GATE interface, you provide a CTCP to control the setup and takedown of virtual circuits and to process all data flowing between the host and a remote DTE over virtual circuits it establishes. The GATE interface may be used to interact only with non-SNA DTEs. A virtual circuit between a CTCP in the host and a remote non-SNA DTE is called a type 4 virtual circuit.

The GATE interface is selected on a virtual-circuit by virtual-circuit basis as described in Chapter 2. A particular physical circuit may have associated with it virtual circuits communicating via the GATE interface, the PCNE interface, the PAD interface, and the two interfaces provided by the X.25 NCP Packet Switching Interface to SNA nodes.

When you code a CTCP that uses the GATE interface to communicate with a remote non-SNA DTE, X.25 NCP Packet Switching Interface uses the LU simulator to convert your data between SNA PIUs and X.25 packets.

Network Components Involved in Using GATE

Network components involved in using GATE are shown in Figure 2-9 in Chapter 2.

The Command Interface Between the CTCP and the PCNE

To control the flow of data to a remote non-SNA DTE over a type 4 virtual circuit, the CTCP exchanges commands with GATE code in the X.25 NCP Packet Switching Interface. These commands are designated by one-byte command codes located in the first byte of RUs flowing on SNA sessions between the LU associated with the CTCP and LUs associated with the physical circuit and virtual circuit in the X.25 NCP Packet Switching Interface. Commands are used to control virtual circuit setup and takedown, to designate interrupt and diagnostic packets, and to indicate that the RU contains data to be sent to an end user of the session. The X.25 NCP Packet Switching Interface command formats are described below.

SNA Sessions Involved with the GATE Interface

To communicate with a remote DTE over a type 4 virtual circuit using the GATE interface, the CTCP communicates with GATE code in the X.25 NCP Packet Switching Interface over two LU-LU sessions. The first of these is an LU-LU session between the CTCP LU and an LU in the X.25 NCP Packet Switching Interface associated with the physical circuit to be used in communicating with the DTE. The CTCP uses this session to control the setup of switched virtual circuits associated with the physical circuit.

When a virtual circuit to a remote DTE has been established via GATE, the CTCP communicates with the remote DTE via an LU-LU session between the CTCP LU and an LU in the X.25 NCP Packet Switching Interface representing the type 4 virtual circuit to the remote DTE.

Session Establishment Through a Switched Virtual Circuit

In order to setup and takedown switched virtual circuits, the CTCP must send commands to the X.25 NCP Packet Switching Interface over an LU-LU session with the LU associated with the appropriate physical circuit.

If your CTCP is running on the ACF/VTAM application program interface, it may open the session with the physical circuit by issuing an OPNDST macro specifying OPTCD=ACQUIRE. GATE code in the X.25 NCP Packet Switching Interface will find the name of the CTCP application program in the primary-LU name field of the Bind Session command.

Because one CTCP can manage several physical circuits, the user data field of the Bind Session command must contain the symbolic name of the physical circuit LU as it is found in the NCP stage 1 system generation.

This name, associated with the virtual circuit ID or reference portion of the logon data field, enables the CTCP to identify the virtual circuit and physical circuit over which the logon message is received.

There may be only one CTCP per physical circuit.

Once the LU-LU session between the LU associated with the CTCP and the LU associated with the physical circuit has been established, a connection via a switched virtual circuit between the CTCP and a remote DTE may be established in one of two ways:

- Via a Call command from the CTCP to the physical circuit LU
- Via an incoming call packet containing a type 4 virtual circuit identifier

See Chapter 2 for details.

Bind Session Format for a Physical Circuit LU

The format of the Bind Session command between the CTCP LU and the physical circuit LU is the same as that described in Figure 5-1 with the following additions:

Byte 26: crypto options field length
Bytes 27 through k: crypto options
Byte k+1: length of primary LU name (L1)
Bytes k+2 through m: primary LU name (CTCP name)
Byte m+1: length of secondary LU name (L2)
Bytes m+2 through n: secondary LU name (physical circuit LU name)

With no crypto options field the layout of this section of the Bind Session command is as follows:

```
        |X'00'| L1 | PLU name | L2 | SLU name |
        +-----+----+----------+----+----------
 offset   26    27     28       28+   28+L1+2
                                L1+1
```

Bind Session Format for a Virtual Circuit LU

The Bind Session Format for a virtual circuit LU is the same as that shown in Figure 5-1.

Logon Message Format for GATE

Once a switched virtual circuit has been set up between the CTCP and a remote DTE, the X.25 NCP Packet Switching Interface GATE function generates a logon message to set up the LU-LU session between the LU associated with the CTCP and the LU associated with the virtual circuit. This logon message has the following format:

```
LOGON APPLID(XXXXXXXX) DATA(YYYYZZZZZZZZ)
```

Where:

XXXXXXX is the primary (CTCP) LU name (up to 8 characters)

YYYY is the 4-byte reference (if call-out) or VC ID (if call-in)

ZZZZZZZZ is the secondary (virtual circuit) LU name, up to 8 characters and padded to the right with blanks.

Example (assuming that the CTCP application name is CTCP1 and that the physical circuit LU name is XU038):

```
LOGON APPLID(CTCP1) DATA(0001XU038   )
```

GATE Command Formats

In this discussion, both requests and responses are called "commands".

The command code is located in byte 0 of the RU.

Command codes use conventions defined in the X.25 protocol. Bit 7 of byte 0 (the low order bit) is on for control commands as it is in the command byte of the control packets. Bit 7 of byte 0 is off when a data packet is to be sent to or received from the network.

When bit 7 is off, bit 6 gives the Q bit indication. For data exchange, byte 0 may have the following values:

X'00'	data without Q bit	(CTCP LU-virtual circuit LU session)
X'02'	data with Q bit	(CTCP LU-virtual circuit LU session)

For control commands, the following values are used:

X'0B'	Call	(CTCP LU-phys. circuit LU session)
X'0F'	Call Confirmation	(CTCP LU-phys. circuit LU session)
X'13'	Clear	(CTCP LU-phys. circuit LU session)
X'17'	Clear Confirmation	(CTCP LU-phys. circuit LU session)
X'1B'	Reset	(CTCP LU-virtual circuit LU session)
X'1F'	Reset Confirmation	(CTCP LU-virtual circuit LU session)
X'23'	Interrupt	(CTCP LU-virtual circuit LU session)
X'27'	Interrupt Confirmation	(CTCP LU-virtual circuit LU session)
X'F1'	Diagnostic	(CTCP LU-phys. circuit LU session)
X'FF'	Information Report Msg	(CTCP LU-phys. circuit LU session)

The command code is always in byte 0 of an RU flowing on a GATE session. For control commands, the other bytes of the RU also have significance to the CTCP and the GATE code in the X.25 NCP Packet Switching Interface. Following are the formats of these control commands. For

RUs going from the CTCP to the X.25 NCP Packet Switching Interface, the CTCP must format the command according to the following information. For RUs going from the X.25 NCP Packet Switching Interface to the CTCP, the CTCP must interpret the command according to the following information.

The "connection identifier" referred to in the following control command field descriptions is a two-byte field. This field appears in call setup and takedown commands flowing on the session between the CTCP LU and the LU associated with the physical circuit. It is used by the CTCP and the X.25 NCP Packet Switching Interface to uniquely identify a particular request for a virtual circuit, or connection request. Since the field appears in all commands associated with a particular connection request, the CTCP can use it to identify the commands that flow in fulfilling that request. The leftmost half-byte of the connection identifier is set to X'0' when the CTCP requests the connection; it is set to X'F' when the remote DTE requests the connection.

Significant bytes for each control command, after the command byte (byte 0) are as follows:

1. Call Out (CTCP to GATE on session between CTCP LU and physical circuit LU)

   - Byte 0: X'0B'
   - Bytes 1 and 2: connection identifier. The leftmost half-byte must be X'0'; the remainder may be filled in by the CTCP with any unique identifier
   - Byte 3: packet window size in hexadecimal
   - Bytes 4 and 5: packet size used for this virtual circuit in hexadecimal
   - Bytes 6 through n: The Call Request packet as it will be sent through the X.25 network (without the three-byte packet header)

2. Call Confirm (GATE to CTCP on session between CTCP LU and physical circuit LU

   - Byte 0: X'0F'
   - Bytes 1 and 2: connection identifier specified in bytes 1 and 2 of the Call Out command
   - Bytes 3 and 4: the virtual circuit identifier (logical channel group number plus logical channel number; leftmost half-byte set to X'F')
   - Bytes 5 through n: optional bytes following the packet header of the Call Connected packet

3. Call In (GATE to CTCP on session between CTCP LU and physical circuit LU)

   - Byte 0: X'0B'
   - Bytes 1 and 2: virtual circuit identifier (logical channel group number plus logical channel number; leftmost half-byte set to X'F')

- Bytes 3 through n: Incoming Call packet received from the network (without the 3-byte packet header)

4. Call Confirm (CTCP to GATE on session between CTCP LU and physical circuit LU)

   - Byte 0: X'0F'
   - Bytes 1 and 2: the virtual circuit identifier found in bytes 1 and 2 of the corresponding call in command from the GATE
   - Byte 3: virtual circuit window size
   - Bytes 4 and 5: packet size
   - Bytes 6 through n: Call Connected packet as sent to the network without the three-byte packet header

5. Clear on Incoming Call (CTCP to GATE on session between CTCP LU and physical circuit LU)

   - Byte 0: X'13'
   - Bytes 1 and 2: the virtual circuit identifier found in bytes 1 and 2 of the corresponding Call In command from the GATE
   - Bytes 3 and 4: the cause and request diagnostic fields which are to be inserted in the Clear Request packet
   - Bytes 5 through n: optional user data to be put in the Clear Request packet after the cause and diagnostic fields

6. Clear on Outgoing Call (GATE to CTCP over session between CTCP LU and physical circuit LU)

   - Byte 0: X'13'
   - Bytes 1 and 2: connection identifier found in bytes 1 and 2 of the corresponding Call Out command
   - Bytes 3 and 4: cause and diagnostic fields from the Clear Indication packet
   - Bytes 5 through n: optional user data found in the Clear Indication packet after the cause and diagnostic fields

7. Clear Confirm after Clear Command for Incoming Call Refused (GATE to CTCP over session between CTCP LU and physical circuit LU)

   - Byte 0: X'17'
   - Bytes 1 and 2: the virtual circuit identifier, found in bytes 1 and 2 of the corresponding Clear on Incoming Call; leftmost half-byte set to X'F'
   - Bytes 3 through n: optional data if present in the DCE Clear Confirmation packet

8. Clear (GATE to CTCP, CTCP to GATE over session between CTCP LU and virtual circuit LU)

   - Byte 0: X'13'
   - Bytes 1 and 2: Clear cause and diagnostic fields
   - Bytes 3 through n: optional user data following the cause and diagnostic fields

9. Reset (GATE to CTCP, CTCP to GATE over session between CTCP LU and virtual circuit LU)

   - Byte 0: X'1B'
   - Bytes 1 and 2: Reset cause and diagnostic fields
   - Bytes 3 through n: optional user data following cause and diagnostic fields

10. Interrupt (CTCP to GATE, GATE to CTCP over session between CTCP LU and LU associated with virtual circuit)

   - Byte 0: X'23'
   - Byte 1: interrupt user data byte
   - Bytes 2 through n: optional user data following the interrupt user data byte

11. Interrupt Confirmation (CTCP to GATE, GATE to CTCP over session between CTCP LU and virtual circuit LU

   - Byte 0: X'27'
   - Bytes 1 through n: optional user data following the packet header

12. Diagnostic (GATE to CTCP over session between CTCP LU and physical circuit LU)

   - Byte 0: X'F1'
   - Byte 1: diagnostic code
   - Bytes 2-4: optional diagnostic explanation

13. Error/Information Report (GATE to CTCP over session between CTCP LU and physical circuit LU)

   - Byte 0: X'FF'
   - Bytes 1 and 2: connection identifier
   - Byte 3: command code for the command in error
   - Byte 4: error cause, as follows:
     - X'30' timer elapsed on control packet sent without receiving the response
     - X'AB' error in the packet sequence numbering

14. Reset Because Permanent Virtual Circuit not in SNA Session (GATE to CTCP over session between CTCP LU and physical circuit LU)

   - Byte 0: X'1B'
   - Bytes 1 and 2: connection identifier
   - Byte 3: cause
   - Byte 4: diagnostic
   - Bytes 5 through n: Optional user data if present in the Received Reset Information packet

When control commands from the CTCP to the GATE contain optional user data, such data will be put in the resulting control packet without any checking on the part of GATE. Remember that no segmenting via the "more data" bit in the packet header is performed for control packets; hence, all user data must fit in a single packet.

The Clear Confirm, Reset Confirm and Interrupt Confirm commands consist of a single command byte, but if necessary they may contain optional user data.

Representative Command Exchanges for GATE

Representative command exchanges for GATE are presented in Chapter 6.

USING THE DATE INTERFACE

The Dedicated Access to X.25 Transport Extension (DATE) interface permits a unique host application program, in session with the LU associated with a physical circuit, to receive and transmit all Control, Interrupt, or Qualified Data packets exchanged with the X.25 PSDN (Packet-Switched Data Network).

This unique host application program, called the Communication and Transmission Control Program (CTCP), is written by the user. DATE is the interface between the CTCP and the PSDN.

Overview of the DATE Interface

To use the DATE interface you provide a CTCP to control the setup and takedown of virtual circuits, and to process Control, Interrupt and Qualified Data packets. All other data packets flowing between the host and the remote DTE or SNA node are processed by another application program in the host. This other application program may communicate with

a remote DTE via the PCNE or transparent PAD interface

an SNA subarea via a type 3 virtual circuit

or a peripheral node via a type 2 or type 3 virtual circuit

Thus, DATE is really an extension to another X.25 NCP Packet Switching Interface interface. With the DATE extension, the CTCP handles call setup and takedown, but another application program handles data packets using another X.25 NCP Packet Switching Interface interface.

You associate the DATE extension with a particular physical circuit at program generation time. If it is associated with a particular physical circuit, the DATE extension manages virtual circuit setup and takedown for all virtual circuits associated with the physical circuit. All the switched virtual circuits must be defined with the CALL=IN operand in the X25VC or X25LINE macros.

Network Components Involved in Using DATE

Figure 2-11 on page 2-25 shows the network components that use the DATE interface.

Application Program and CTCP Interfaces in a DATE Environment

When the DATE extension is used, the application program must communicate with two other programs:

- It must communicate with the CTCP to initiate control actions such as virtual circuit establishment.
- It must communicate with the X.25 NCP Packet Switching Interface to send data over the network, using the PCNE or PAD interface to a remote non-SNA DTE and a type 2 or 3 virtual circuit to interface with a remote SNA node.

The type of data handled by the application program (as opposed to the CTCP) depends upon the virtual circuit type used to handle data flow between the application program and the remote DTE or SNA node:

- For type 0 virtual circuits (PCNE), the application program sends or receives the contents of data packets only; the CTCP sends or receives the contents of Restart, Call, Clear, Reset, Interrupt, and Qualified packets.
- For type 2 or 3 virtual circuits (SNA), the application program sends or receives the contents of data packets; the CTCP handles Restart, Call, Clear, and Reset packets. For type 2 virtual circuits, Interrupt and Qualified packets are not supported. For type 3 virtual circuits, Interrupt packets are not supported; Qualified packets are handled by the X.25 NCP Packet Switching Interface itself.
- For type 5 virtual circuits (transparent PAD), the application program sends or receives all packets except Restart, Call, and Clear packets, which are handled by the CTCP.

To communicate with the DATE code in the X.25 NCP Packet Switching Interface, the CTCP exchanges commands with the DATE code. These commands are contained in RUs that flow on an SNA session between the CTCP LU and an LU associated with the physical circuit in the X.25 NCP Packet Switching Interface. The commands are similar to those described above for GATE.

Once a virtual circuit is active, the application program in the host communicates over the network via a session between the application program LU and an LU associated with the virtual circuit (in the case of the PCNE or PAD interface) or with an LU associated with a remote SNA resource (in the case of virtual circuit types 2 and 3).

Interface between the CTCP and Host Application Programs

The CTCP must communicate with the application program it controls. For example, the CTCP must know when to issue a Call command to set up a virtual circuit on behalf of a particular application. If the application program is IMS and CICS, only a call-in operation is allowed.

The application programmer should write a Programmed Operator Interface (POI) to facilitate starting or restarting communication with the access method and to coordinate operator, CTCP, and application-program communication.

Interface Between the CTCP and DATE

The CTCP manages the packet level processor (PLP) states and the PLP timers (for restart timer T20, 180 seconds is a recommended value). The CTCP must recognize the command formats described below, and is free to assign any control data within the given format. The CTCP does not manage PLP counters; X.25 NCP Packet Switching Interface controls them. X.25 NCP Packet Switching Interface also controls the packet modulo and M bit for type 0, 2, 3, and 5 virtual circuits, and the D bit for type 0 virtual circuits.

CTCP Activation and Deactivation of Virtual Circuits

General Considerations

To control the X.25 network through DATE, the CTCP must first establish a session with the physical circuit LU. This session is a type 1 LU-LU session. Only after the Start Data Traffic command has been exchanged is the CTCP able to monitor the DATE function. The format of the Bind Session command is the same as for GATE.

The CTCP must initiate setup of the physical circuit dedicated to the DATE function by sending a Restart command (as described below). A timer (X.25 T20) must be started by CTCP to control the packet level of the X.25 network.

Upon receipt of the Restart command, the DATE code in the X.25 NCP Packet Switching Interface clears all of the virtual circuits associated with the physical circuit being restarted, and initiates the Link Setup procedure. When Link Setup is performed correctly, DATE sends the Restart Request packet corresponding to the command passed by the CTCP.

The response from the X.25 Network is passed on to the CTCP as a Restart Confirmation command. The CTCP must then stop its T20 timer.

For sequences illustrating the above operations, see Chapter 6.

Specifying an End-to-End Control Protocol for Virtual Circuits Using DATE

After the physical circuit has been activated, the CTCP/DATE/X.25 network system is ready to operate as specified by the user application.

For permanent virtual circuits (PVCs), normal operations can start. (Except for type 5 virtual circuits, only the Reset, Interrupt, and Qualified packets will be exchanged on the CTCP/DATE interface. The CTCP must pass on appropriate information from these packets to the user application program. DATE does not act on these packets, but only transfers them to their appropriate destinations.)

For switched virtual circuits (SVCs), the CTCP must determine whether a user application program is ready to be called or waiting to call out. The type of virtual circuit to be used with a given application program must be known to the CTCP. The CTCP must pass this information to DATE at the call exchange time. Then DATE can update the corresponding blocks in the NCP Packet Switching Interface to allow the usual procedure at the data level.

INCOMING CALL: When DATE receives an Incoming Call packet, it transfers it to the CTCP as a call command with an indication of the appropriate virtual circuit number. According to the called number, the CTCP determines the type of virtual circuit to be set up, and according to the X.25 network supported, the CTCP selects the packet length and packet window size to be used. Then the CTCP passes this information to DATE via a Call Accepted command. DATE transfers the Call Accepted packet to the network.

When a type 0 or type 5 virtual circuit is chosen, the CTCP can also provide an application-program name. This is interpreted by DATE as a demand to build a logon message with this application-program name (PLU name).

CALL OUT: When an application program requests, the CTCP sends a Call Request command to the DATE code in the X.25 NCP Packet Switching Interface. In this command, the CTCP passes on all the necessary information: virtual circuit type, packet length, packet window size, PLU name for logon (if appropriate), and a connection identifier that will be used to associate the virtual circuit with this command.

Upon receipt of the Call Request command, the DATE code in the X.25 NCP Packet Switching Interface selects a free virtual circuit on which to send a Call Request packet to the X.25 network. The values received by DATE for virtual-circuit type, packet length, and packet window size are transmitted in the Call Request command.

Upon receipt of the Call Connected packet from the X.25 network, DATE transfers it to the CTCP in a Call Connected command in which the CTCP connection identifier is associated with the virtual circuit on which the X.25 call exchange has occurred. Thus, the CTCP is aware of the virtual circuit number for the virtual circuit that will be established for the application program.

At this time DATE contacts the NCP to inform the access method of the connect-in operation performed on the port associated with the virtual circuit. Thus, a connection is established directly between the user application program and the corresponding DTE through the chosen virtual circuit.

NEGOTIATION: The preceding topic describes how the CTCP and the DATE function of the X.25 NCP Packet Switching Interface select the type of virtual circuit for a particular application program.

The DTE may negotiate with the CTCP with respect to the values for packet length and window size that are to apply for this virtual circuit. DATE keeps the values initially defined by the CTCP. The CTCP must analyze the Call Connected command to check if a negotiation has been performed, and to clear the connection if necessary before sending a new Call Request command containing correct negotiated values to update DATE.

PROTOCOL FOR A TYPE 0 VIRTUAL CIRCUIT: When a type 0 virtual circuit has been requested (X'C0' in byte 6 of the Call Request command or Call Accepted command), the logon message can be either the first data received by DATE from the remote DTE or a logon message built by DATE. In the second case the CTCP gives the application-program name via the Call Request or Call Accepted command.

The logon message is sent as data over the selected virtual circuit, through the access method, to the application program's LU. The Logon Exit Routine is scheduled and execution of an ACF/VTAM OPNDST macro coded OPNDST=ACCEPT in the application program causes the SNA Bind Session and Start Data Traffic commands to flow in order to establish the LU-LU session associated with the selected switched virtual circuit. The application program then works under standard PCNE protocol, except when Control packets, Interrupt packets, or Qualified packets are received. The DATE code transmits such packets to the CTCP for processing.

When the Call Request command or the Call Accepted command carries an application name (that is, byte 7 is not equal to 0), the DATE code builds a Logon message with the following format:

```
LOGON APPLID(XXXXXXXX) DATA(YYYYZZZZZZZZ)
where
XXXXXXXX is the application program name given in the Call command
         (up to 8 characters)
YYYY     is the four-byte connection identifier
ZZZZZZZZ is the physical circuit LU name (up to 8 characters, padded
         to the right with blanks if less than 8 characters)
```

PROTOCOL FOR TYPE 2 VIRTUAL CIRCUITS: When a type 2 virtual circuit has been requested (X'C2' in byte 6 of the Call Request or Call Accepted commands), after the call exchange has been performed the switched virtual circuit is available to the application program as in the case of a permanent type 2 virtual circuit.

The CTCP must establish an interface with the user application program to synchronize the different activities. A programmed operator interface must be developed with the CTCP.

PROTOCOL FOR TYPE 3 VIRTUAL CIRCUIT TO SNA PERIPHERAL NODE: When a type 3 virtual circuit has been requested (X'C3' in byte 6 of the Call Request or Call Accepted commands), after the call exchange has been performed the switched virtual circuit is available to the application program as in the case of a permanent type 3 virtual circuit.

PROTOCOL FOR TYPE 3 VIRTUAL CIRCUITS TO SNA SUBAREA NODE: Only permanent virtual circuits are supported.

The actions of DATE are the same as for type 0 virtual circuits, except that Interrupt packets and Qualified packets are not authorized on the CTCP interface.

PROTOCOL FOR TYPE 5 VIRTUAL CIRCUITS: When a type 5 virtual circuit has been selected (X'01', X'41', or X'81' in byte 6 of the Call Request or Call Accepted command), it is treated as if it were a type 0 virtual circuit for the Logon message processing. Following the logon, the standard virtual-circuit type 5 processing occurs. During the session, Reset, Interrupt, and Qualified packets are not authorized or conveyed on the CTCP interface because these packets are under the control of the PAD procedure.

For sequences illustrating the above operations, see Chapter 6.

Format of the Commands Exchanged between the CTCP and DATE

In this discussion, both requests and responses are called "commands".

The command code is located in byte 2 of the RU.

Command codes use conventions defined in the X.25 protocol. Bit 7 of byte 2 (the low order bit) is on for control commands as it is in the command byte of the control packets. Bit 7 of byte 2 is off when a qualified data packet is to be sent to or received from the network.

When bit 7 is off, bit 6 gives the Q bit indication. For data exchange, byte 2 may have the value X'02', indicating data with Q bit.

Control and qualified data commands are exchanged between the CTCP LU and the LU associated with the physical circuit. With the exception of data commands flowing on type 5 virtual circuits, data commands exchanged between the application program LU and the LU associated with the virtual circuit do not contain a command byte.

For control commands, the following values are used:

X'0B'	Call Request/Incoming Call
X'0F'	Call Accepted/Call Connected
X'13'	Clear Request/Indication
X'17'	DCE/DTE Clear Confirmation
X'1B'	Reset Request/Reset Indication
X'1F'	DCE/DTE Reset Confirmation
X'23'	Interrupt
X'27'	Interrupt Confirmation
X'F1'	Diagnostic
X'00'	Information Report Msg
X'FB'	Restart Indication/Request
X'FF'	DCE/DTE Restart Confirmation

The command code is always in byte 2 of an RU flowing on a DATE session. For control commands, the other bytes of the RU also have significance to the CTCP and the DATE code in the X.25 NCP Packet Switching Interface. Following are the formats of these control commands. For RUs going from the CTCP to the X.25 NCP Packet Switching Interface, the CTCP must format the command according to the following information. For RUs going from the X.25 NCP Packet Switching Interface to the CTCP, the CTCP must interpret the command according to the following information.

The "connection identifier" referred to in the following control command field descriptions is a two-byte field. This field appears in call setup and takedown commands; it is used by the CTCP and the X.25 NCP Packet Switching Interface to uniquely identify a particular request for a virtual circuit (connection request). Since the field appears in all commands associated with a particular connection request, the CTCP can use it to identify the commands that flow in fulfilling that request. The leftmost half-byte of the connection identifier is set to X'0' when the CTCP requests the connection; it is set to X'F' when the remote DTE requests the connection.

Significant bytes for each control command are as follows:

1. Call Request (CTCP to DATE)

   - Bytes 0 and 1: connection identifier. The leftmost half-byte must be X'0'; the CTCP may fill in the remainder with any unique identifier
   - Byte 2: X'0B'
   - Byte 3: packet window size in hexadecimal
   - Bytes 4 and 5: packet size used for this virtual circuit
   - Byte 6: the type of virtual circuit to be set up, as follows:
     - X'C0' type 0 virtual circuit
     - X'C2' type 2 virtual circuit
     - X'C3' type 3 virtual circuit to SNA peripheral node

- X'01'or X'41' or X'81' type 5 virtual circuit

  If a type 5 virtual circuit is specified, only transparent PAD support may be used. A type 4 virtual circuit may not be specified.
- Byte 7: Application name length (X'00' through X'08')
- Bytes 8 through n: Application name followed by Call Request packet (without packet header)

2. Call Connected (DATE to CTCP)

   - Bytes 0 and 1: connection identifier (logical channel group number plus logical channel number; leftmost half-byte set to X'F'
   - Byte 2: X'0F'
   - Bytes 3 and 4: connection identifier given in bytes 0 and 1 of the corresponding Call Request command
   - Bytes 5 through n: Call Connected packet (without the packet header)

3. Incoming Call (DATE to CTCP)

   - Bytes 0 and 1: connection identifier (logical channel group number plus logical channel number; leftmost half-byte is set to X'F')
   - Byte 2: X'0B'
   - Bytes 3 through n: Call packet received from the network (without the 3-byte packet header)

4. Call Accepted (CTCP to DATE)

   - Bytes 0 and 1: the connection identifier found in bytes 0 and 1 of the corresponding Incoming Call command from the DATE
   - Byte 2: X'0F'
   - Byte 3: virtual circuit window size
   - Bytes 4 and 5: packet size
   - Byte 6: type of virtual circuit to be set up, as follows:
     - X'C0' type 0 virtual circuit
     - X'C2' type 2 virtual circuit
     - X'C3' type 3 virtual circuit to SNA peripheral node
     - X'01'or X'41' or X'81' type 5 virtual circuit

     If a type 5 virtual circuit is specified, only transparent PAD support may be used. A type 4 virtual circuit may not be specified.
   - Byte 7: application name length (X'00' through X'08')
   - Bytes 8 through n: application name followed by Call Accepted packet (without 3-byte packet header)

5. Clear on Incoming Call (CTCP to DATE)

   - Bytes 0 and 1: the connection identifier found in bytes 0 and 1 of the corresponding Incoming Call command from the DATE
   - Byte 2: X'13'
   - Bytes 3 and 4: the diagnostic fields that are to be inserted in the Clear packet

- Bytes 5 through n: optional user data

6. Clear on Outgoing Call (DATE to CTCP)

   - Bytes 0 and 1: connection identifier (logical channel group number plus logical channel number; leftmost half-byte set to X'F'
   - Byte 2: X'13'
   - Bytes 3 and 4: connection identifier given in bytes 0 and 1 of the corresponding Call Request command
   - Bytes 5 and 6: cause and diagnosis fields from the Clear packet
   - Bytes 7 through n: optional user data

7. Clear Confirm after Clear Command for Incoming Call Refused (DATE to CTCP)

   - Bytes 0 and 1: connection identifier
   - Byte 2: X'17'

8. Clear/Reset (DATE to CTCP, CTCP to GATE)

   - Bytes 0 and 1: connection identifier (logical channel group number plus virtual circuit number) provided to the CTCP in the Call Confirm or Incoming Call command
   - Byte 2: X'13' for Clear, X'1B' for Reset
   - Bytes 3 and 4: Clear/Reset cause and diagnosis fields
   - Bytes 5 though n: optional user data

9. Interrupt (CTCP to DATE, DATE to CTCP)

   - Bytes 0 and 1: connection identifier
   - Byte 2: X'23'
   - Byte 3: interrupt user data
   - Bytes 4 through n: optional user data

10. Interrupt Confirm (CTCP to DATE, DATE to CTCP)

    - Bytes 0 and 1: connection identifier
    - Byte 2: X'27'

11. Diagnostic (DATE to CTCP)

    - Bytes 0 and 1: X'0000'
    - Byte 2: X'F1'
    - Byte 3: diagnostic code
    - Bytes 4-n: optional diagnostic information

12. Error/information report (DATE to CTCP)

    - Bytes 0 and 1: connection identifier
    - Byte 2: X'00'
    - Byte 3: command code for the command in error
    - Byte 4: error cause (see below)

13. Restart Request/Restart Indication

- Bytes 0 and 1: X'0000'
- Byte 2: X'FB'
- Byte 3: cause
- Byte 4: diagnostic

14. Restart Confirmation

- Bytes 0 and 1: X'0000'
- Byte 2: X'FF'

When control commands from the CTCP to the DATE contain optional user data, such data is put in the resulting control packet without any checking on the part of DATE. Remember that no segmenting via the "more data" bit in the packet header is performed for control packets; therefore all user data within control packets must fit in a single packet. For qualified packets, user data may be spread over several packets.

The Clear Confirm, and Reset Confirm commands consist of a single command byte.

Representative Command Exchanges for DATE

Representative command exchanges for DATE are presented in Chapter 6.

The following chart shows the commands that are processed by the CTCP for each virtual circuit type:

Type 0 Virtual Circuits

Call Request	Incoming Call	SVC only
Call Accepted	Call Connected	SVC only
Clear Request	Clear Indication	SVC only
Clear Confirmation	Clear Confirmation	SVC only
Reset Request	Reset Indication	PVC only
Reset Confirmation	Reset Confirmation	PVC only
Interrupt Request	Interrupt Request	
Interrupt Confirmation	Interrupt Confirmation	
Diagnostic (DCE)	Diagnostic	
Qualified Data	Qualified Data	
Restart Request	Restart Indication	
Restart Confirmation	Restart Confirmation	
Information Report Msg	Information Report Msg (internal, not X.25)	

Type 2 Virtual Circuits
Type 3 Virtual Circuits to SNA Peripheral Node

Call Request	Incoming Call
Call Accepted	Call Connected
Clear Request	Clear Indication
Clear Confirmation	Clear Confirmation
Reset Request	Reset Indication

Reset Confirmation	Reset Confirmation
Diagnostic (DCE)	Diagnostic
Restart Request	Restart Indication
Restart Confirmation	Restart Confirmation
Information Report Msg	Information Report Msg
(Other commands not supported)	

Type 3 Virtual Circuits to SNA Subarea Node

Reset Request	Reset Indication
Reset Confirmation	Reset Confirmation
Diagnostic (DCE)	Diagnostic
Restart Request	Restart Indication
Restart Confirmation	Restart Confirmation
Information Report Msg	Information Report Msg
(Other commands not supported)	

Type 5 Virtual Circuits

Call Request	Incoming Call
Call Accepted	Call Connected
Clear Request	Clear Indication
Clear Confirmation	Clear Confirmation
Diagnostic (DCE)	Diagnostic
Restart Request	Restart Indication
Restart Confirmation	Restart Confirmation
Information Report Msg	Information Report Msg
(Other commands directly managed by PAD)	

Note: With type 0 or type 5 virtual circuits, a logon message can be generated by DATE if it is requested in a Call Request or Call Accepted packet. If it is not requested, the first received data from the network is sent to the host as a logon message.

INFORMATION-REPORT Messages Exchanged between DATE and the CTCP

A special format of command allows for the exchange of information between DATE and the CTCP without involving either the access method or the X.25 network.

This Information-Report message can be used in both directions; however, if received by DATE, it is ignored. If sent from date to the CTCP, the CTCP must react to the code in the message according to the following chart:

Error Cause	Sent by DATE For	CTCP Must Answer With
X'01'	VC type not consistent with DATE	
X'02'	unknown format	(up to CTCP)
X'03'	VC ID not consistent with existing ones	(up to CTCP)
X'04'	no VC available	retry a Call Request command
X'05	unsuccessful XIO to X.25 network	(up to CTCP)
X'06'	PC is not running	a Restart Request command
X'07'	application abandons connection	a Clear Request command

No action is taken by DATE when sending an Information-Report message. The receiving buffer that caused the message is released and DATE waits for new instructions from the CTCP.

When DATE cannot determine on which virtual circuit the problem occurred, the Information-Report message is sent with a virtual circuit identifier of zero.

Representative Command Exchanges for DATE

See Chapter 6 for representative command exchanges for DATE.

USING THE INTEGRATED PAD INTERFACE

The integrated PAD interface is very similar to the PCNE interface described above, as far as the application program is concerned. The considerations for running with the LU simulator described earlier in this chapter apply in the case of the integrated PAD interface. Integrated PAD code within the X.25 NCP Packet Switching Interface interacts with the remote PAD according to CCITT Recommendations X.28 and X.29. The remote PAD is generally transparent to the application program, and the application program is not generally involved in sending or receiving PAD messages.

An exception occurs when the host or the terminal attempts to interrupt the data it is receiving by sending a Break or an Interrupt packet. The host application program can cause the X.25 NCP Packet Switching Interface to send a Break packet to the remote PAD by sending an SNA Signal command to the LU associated with the virtual circuit.

Upon receipt of an Interrupt packet from the PAD, the X.25 NCP Packet Switching Interface sends a Signal command to the host LU. The host application program must interrupt as soon as possible the transmission of data to the remote DTE and await an inquiry from the DTE.

The DATE extension may not be used on a physical circuit associated with virtual circuits using integrated PAD support.

USING THE TRANSPARENT PAD INTERFACE

The transparent PAD interface is designed for application programs that need to control the remote PAD by means of commands exchanged between the application program and the X.25 NCP Packet Switching Interface.

For application programs using the transparent PAD interface, the virtual circuit setup and takedown is identical to that for the type 0 virtual circuit. However, the contents of the following types of packets are sent from or routed to the application program over the LU-LU session between the application program LU and the virtual circuit LU:

- Data packets
- Qualified data packets
- Interrupt packets
- Reset packets

Commands and information for PAD control are contained in Qualified data packets.

As is the case with GATE, with transparent PAD a header in the first byte of each RU exchanged between the application program LU and the virtual circuit LU defines the type of data contained in the RU. The first byte of each RU must contain one of the following values:

- X'00' Data packet without Q bit
- X'02' Data packet with Q bit
- X'1B' Reset packet
- X'1F' Reset confirmation
- X'23' Interrupt request
- X'27' Interrupt confirmation

Qualified data packets (that is, data packets with the Q bit on) are used to exchange information between the application program and the remote PAD. Data packets without the Q bit on are used to exchange information between the application program and the remote DTE.

For Reset packets, the second and third bytes of the RU contain a cause and a diagnostic value.

For Interrupt packets, the second byte of the RU contains the interrupt cause byte (usually set to 0). For Interrupt packets from the PAD containing indications of reset or interrupt, it is the application program's responsibility to initiate the transmission of the Interrupt Confirmation packet. When Reset packets are exchanged, the only action of the X.25 NCP Packet Switching Interface is to set the P(R) and P(S) counters to 0.

Depending upon a generation option, the X.25 NCP Packet Switching Interface does or does not translate between EBCDIC and International Alphabet No. 5.

When translation is requested, data beyond byte 1 in RUs flowing on transparent PAD sessions is translated by the X.25 NCP Packet Switching Interface. The X.25 NCP Packet Switching Interface does perform normal segmenting and recombining via the "more data" indicator in packet headers.

The RU format is as follows:

1. Data without Q bit

   - Byte 0: X'00'
   - Bytes 1 through n: Bytes 3 through n of data packet (modulo 8)
   - Bytes 1 through n: Bytes 4 through n of data packet (modulo 128)

2. Data with Q bit

   - Byte 0: X'02'
   - Bytes 1 through n: Bytes 3 through n of data packet (modulo 8)
   - Bytes 1 through n: Bytes 4 through n of data packet (modulo 128)

3. Reset Packet

   - Byte 0: X'1B'
   - Bytes 1 and 2: Cause and diagnostic fields
   - Bytes 3 through n: optional user data following the cause and diagnostic fields

4. Reset Confirmation

   - Byte 0: X'1F'
   - Bytes 1 through n: optional user data following the 3-byte packet header

5. Interrupt

   - Byte 0: X'23'
   - Byte 1: Interrupt user data byte
   - Bytes 2 through n: optional data following the Interrupt user data byte

6. Interrupt Confirmation

   - Byte 0: X'27'
   - Byte 1: optional user data following the 3-byte packet header.

The transparent PAD support may be used on a physical circuit defined for any mode of operation; that is, the X25MCH macro may specify GATE=NO, GATE=GENERAL, or GATE=DEDICAT.

Chapter 6 contains sequences illustrating the setup and closedown of type 5 virtual circuits.

CHAPTER 6. OPERATING THE X.25 NCP PACKET SWITCHING INTERFACE

ACTIVATING AND DEACTIVATING THE PROGRAM

All the SNA resources should be activated. The LU of the MCH should be activated only if GATE or DATE is used.

SNA resources may be activated in any order. X.25 NCP Packet Switching Interface synchronizes the SNA activation commands with network action and handles both in the appropriate sequence. For example, the Contact/XID of the virtual circuits is accepted only when the connection is established with the network.

Note that deactivating the MCH's PU involves the deactivation of all the virtual circuits defined on this MCH.

The remainder of this chapter describes the actions performed by X.25 NCP Packet Switching Interface for operator commands.

Physical Circuit Commands

```
OPERATOR   SSCP                     3705                 X.25 Node

VTAM: V NET,ACT,ID=linename
TCAM: F Procname,ACTIV=linename
            Act Link MCH
          ----------------------->  Set DTR
                                  -------------->
                                    DSR on
            Positive Response     <--------------
          <-----------------------

VTAM: V NET,ACT,ID=puname
TCAM: F Procname,ACTIV=puname
            CONTACT
          ---------------------->
            Positive Response      SABM-Frame
          <---------------------+----------------------->
                                    UA-Frame
                                 <-----------------------
            CONTACTED              Restart
          <---------------------+----------------------->
                                   Restart Confirmation
                                 <----------------------
            Activate PU MCH
          ---------------------->
            Positive Response
          <----------------------

VTAM: V NET,INACT,ID=puname
TCAM: F Procname,DEACT=puname
            Deactivate PU MCH
          ---------------------->
            Positive Response
          <----------------------
            DISCONTACT
          ---------------------->
                                   DISC-Frame
                                 ----------------------->
                                    UA-Frame
                                 <-----------------------
            Positive Response
          <----------------------
```

(MORE)

(CONTINUED)

```
             Inop Station for all active VCs
            <-----------------------

VTAM: V NET,INACT,ID=linename
TCAM: F Procname,DEACT=linename
             Deact Link MCH
            ----------------------->  Reset DTR
                                     -------------->
                                      DSR off
             Positive Response       <--------------
            <------------------------
```

MCH RECOVERY: For Inoperative Station, the PU must be reactivated.

For Inoperative Link, the link and the PU must be reactivated.

If you issue a Deactivate command for the MCH's PU, all the VCs defined on this MCH will be deactivated immediately.

A normal deactivation consists of the following:

- Deactivation of the LUs, PUs, and links of the PVCs.
- Deactivation of the LUs, PUs, and links of the SVCs.
- Deactivation of the PU and link of the MCH.

The Permanent Virtual Circuit (PVC) - Type 2 Virtual Circuit (LLC=LLC2)

```
OPERATOR    SSCP                         3705              X.25 Node

VTAM: V NET,ACT,ID=linename
TCAM: F Procname,ACTIV=linename
            Act Link PVC
          ------------------------>
            Positive Response
          <------------------------
VTAM: V NET,ACT,ID=puname
TCAM: F Procname,ACTIV=puname
            CONTACT
          ----------------------->
            Positive Response        PSCONT
          <-----------------------+---------------------->
                                     PSCONT
                                 <-----------------------
            CONTACTED
          <-----------------------
            Activate PU Type 1 PVC
          ----------------------->
            Positive Response
          <-----------------------
      or    Activate PU Type 2
          ----------------------------------------------->
            Positive Response
          <-----------------------------------------------
VTAM: V NET,ACT,ID=luname
TCAM: F Procname,ACTIV=luname
            Activate LU
          ----------------------------------------------->
            Positive Response
          <-----------------------------------------------

VTAM: V NET,INACT,ID=puname
TCAM: F Procname,DEACT=puname
            Deactivate PU PVC
          ----------------------->
            Positive Response
          <-----------------------
            DISCONTACT
          ----------------------->
                                     PSDISC
                                 ----------------------->
                                     PSDISC
                                 <-----------------------
```

(MORE)

```
                (CONTINUED)

                Positive Response
               <-----------------------

VTAM: V NET,INACT,ID=linename
TCAM: F Procname,DEACT=linename
                Deact Link PVC
               ------------------------>

                Positive Response
               <------------------------
```

PVC RECOVERY: For Inoperative Station, the PU and the LU must be reactivated.

For Inoperative Link, the link, the PU, and the LU must be reactivated.

The Switched Virtual Circuit (SVC) - Type 2 Virtual Circuit (LLC=LLC2)

OUTGOING CALL (FOR TCAM)

```
OPERATOR    SSCP                     3705                    X.25 Node

TCAM: F Procname,ACTIV=linename
             Act Link SVC
            ------------------------->
             Positive Response
            <-------------------------

TCAM: F Procname,ACTIV=puname
             CONNECT-OUT
            ------------------------>
             Positive Response          Call Request
            <-----------------------+----------------------->
                                        Call Connected
                                   <------------------------
                                        PSXID
                                   ------------------------>
                                        PSXID (Station)
                                   <------------------------
             Request Contact
            <-----------------------
             Set Control Vector-PU
            ----------------------->
             Positive Response
            <-----------------------
             CONTACT
            ----------------------->
```

...then same as for PVC or typical SNA switched PU/LU....

INCOMING CALL (FOR VTAM)

```
OPERATOR   SSCP                     3705                X.25 Node

VTAM: V NET,ACT,ID=luname,ANS=ON
             Act Link SVC
           ------------------------->
             Positive Response
           <-------------------------
             Activate Connect-In
           ------------------------>
             Positive Response
           <------------------------
                                       Incoming Call
                                    <-----------------------
                                       Call Accepted
                                    ----------------------->
                                       PSXID
                                    ----------------------->
                                       PSXID (Station)
                                    <-----------------------
             Request Contact
           <------------------------
             Set Control Vector-PU
           ------------------------>
             Positive Response
           <------------------------
             CONTACT
           ------------------------>

    ...Then same as for PVC or typical SNA switched PU/LU....
```

OPERATOR RECOVERY CONSIDERATIONS

MCH Recovery

For Inoperative Station, the PU must be reactivated.

For Inoperative Link, the link and the PU must be reactivated.

If you issue a Deactivate command for the MCH's PU, all the VCs defined on this MCH will be deactivated immediately.

A normal deactivation consists of the following:

- Deactivation of the LUs, PUs, and links of the SVCs.
- Deactivation of the MCH's PU and link.

PVC Recovery

For Inoperative Station, the PU and the LU must be reactivated.

For Inoperative Link, the link, the PU, and the LU must be reactivated.

OPERATION SEQUENCES

Activation and Deactivation of MCH

Activation of MCH without Date (GATE=NO, GATE=GENERAL)

The MCH should be activated to enable the data transfer on Permanent Virtual Circuit or to enable the call establishment on Virtual Call. The activation sequence of MCH working in LAPB without DATE is shown in Figure 6-1 on page 6-9.

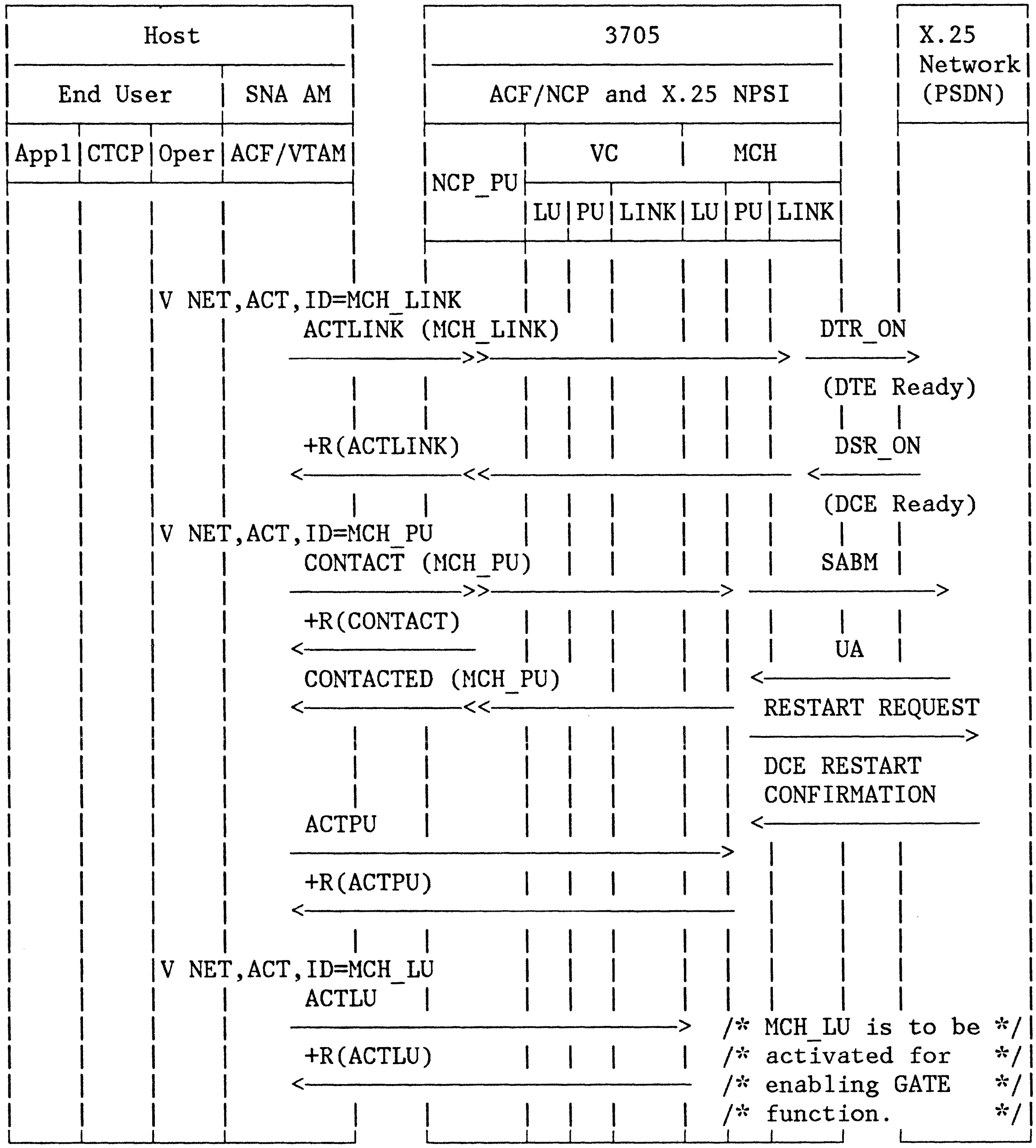


Figure 6-1. MCH Activation Sequence without DATE.

Deactivation Sequence - MCH - without DATE

<u>Deactivation of MCH</u>

The MCH will be deactivated to disconnect an X.25 DTE from an X.25 network. If the MCH is deactivated, all switched virtual circuits and permanent virtual circuits on the MCH become inoperative. The orderly deactivation sequence of MCH will become as follows:

1. Deactivation of the LUs, PUs and Links of the permanent virtual circuits.

2. Deactivation of the LUs, PUs and Links of the switched virtual circuits.

3. Deactivation of the LU, PU and Link of the MCH.

The deactivation sequence of MCH is shown in Figure 6-2.

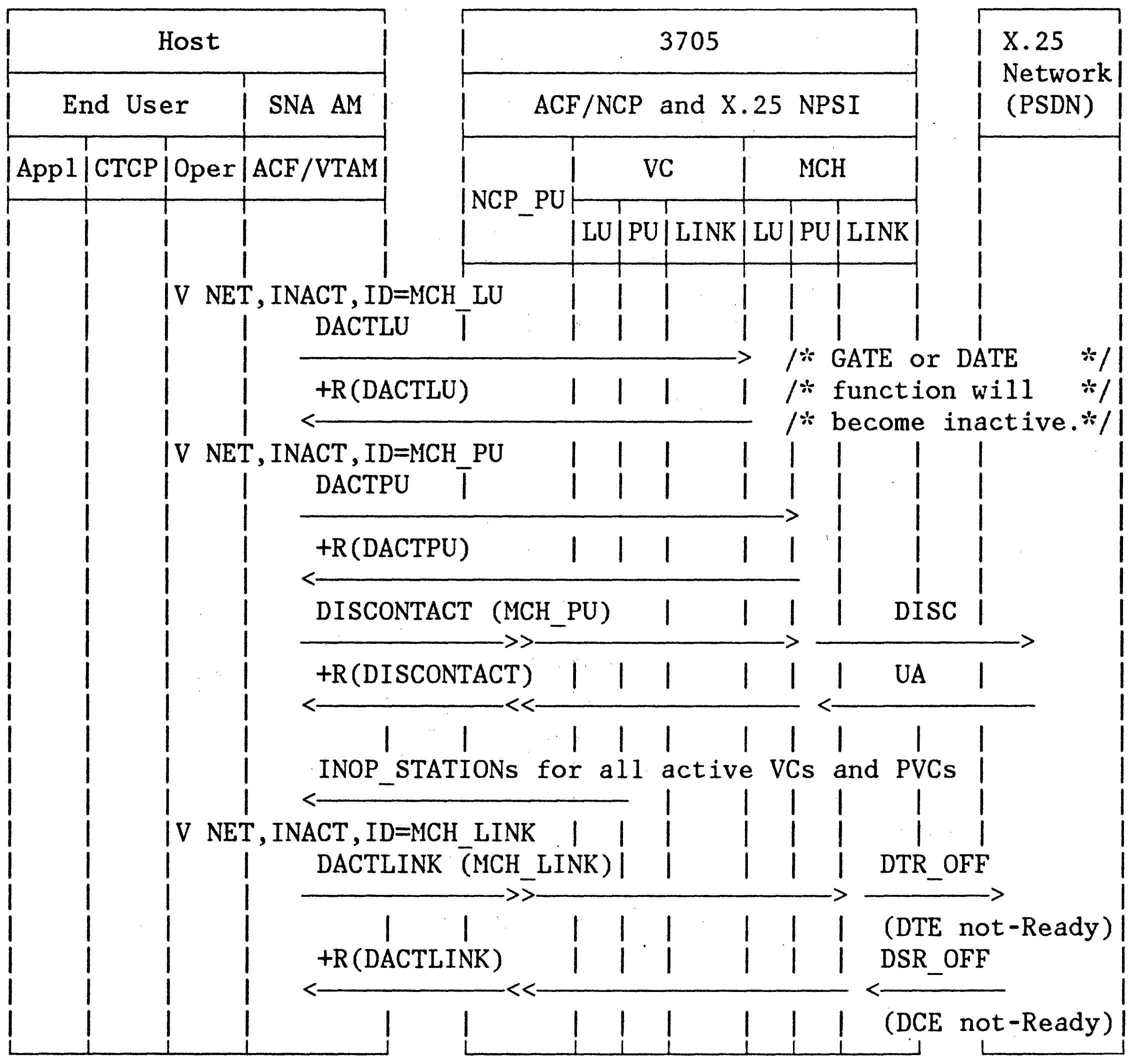


Figure 6-2. MCH Deactivation Sequence

Virtual Call Establishment and Clearing Procedure

Virtual Call Establishment Sequence

GATE=NO

For Call-Out: Type 0 Virtual Circuit

```
┌───────────────────────────────┐   ┌──────────────────────────────────────┐   ┌──────────┐
│            Host               │   │                 3705                 │   │ X.25     │
├───────────────────────┬───────┤   ├──────────────────────────────────────┤   │ Network  │
│      End User         │SNA AM │   │        ACF/NCP and X.25 NPSI         │   │ (PSDN)   │
├──────┬──────┬─────────┼───────┤   ├────────┬───────────────┬─────────────┤   ├──────────┤
│Appl  │CTCP  │Oper     │ACF/VTAM│  │        │      VC       │     MCH     │   │          │
├──────┼──────┼─────────┼───────┤   │NCP_PU  ├──┬──┬─────────┼──┬──┬───────┤   │          │
│      │      │         │       │   │        │LU│PU│LINK     │LU│PU│LINK   │   │          │
│      │      │         │       │   ├────────┼──┼──┼─────────┼──┼──┼───────┤   │          │
│      │      │         │       │   │        │  │  │         │/* Link Level of          */│
│      │      │         │       │   │        │  │  │         │/* DTE/DCE interface      */│
│      │      │         │       │   │        │  │  │         │/* is active.             */│
│      │      │         │       │   │        │  │  │         │  │  │       │   │          │
│      │      │V NET,ACT,ID=switched major node                │  │  │       │   │          │
│      │      │V NET,ACT,ID=VC_LINK       │  │  │             │  │  │       │   │          │
│      │      │         │       │   │        │  │  │         │  │  │       │   │          │
│      │      │         │  ACTLINK (VC_LINK) │  │            │  │  │       │   │          │
│      │      │         │  ─────────────────────────>        │  │  │       │   │          │
│      │      │         │  +R(ACTLINK)       │  │  │         │  │  │       │   │          │
│      │      │         │  <─────────────────────────        │  │  │       │   │          │
│      │      │         │       │   │        │  │  │         │  │  │       │   │          │
│      │      │V NET,ACT,ID=VC_PU     │  │  │  │              │  │  │       │   │          │
│      │      │V NET,ACT,ID=VC_LU     │  │  │  │              │  │  │       │   │          │
│      │      │         │       │   │        │  │  │         │  │  │       │   │          │
│OPNDST ACQUIRE,VC_LU   │       │   │        │  │  │         │  │  │       │   │          │
│      │      │         │       │   │        │  │  │         │  │  │       │   │          │
│      │      │         │  CONNOUT (VC_LINK) │  CALL REQUEST │  │  │       │   │          │
│      │      │         │  ──────────────────────────────────────────────────>│   │          │
│      │      │         │/* LLC Level 0 is      */ /* Call User Data field             */│
│      │      │         │/* specified as a part */ /* will be X'COKKKKK',              */│
│      │      │         │/* of DIALNO.          */ /* KKKKK=zzzzz+1.                   */│
│      │      │         │/* IDNUM=zzzzz is also */ │       │  │  │       │   │          │
│      │      │         │/* specified as a part */ │       │  │  │       │   │          │
│      │      │         │/* of DIALNO.          */ │       │  │  │       │   │          │
└──────┴──────┴─────────┴───────┘   └────────┴──┴──┴─────────┴──┴──┴───────┘   └──────────┘
```

Figure 6-3 (Part 1 of 3). Call Establishment Sequence for Type 0 VC (GATE=NO, Call-Out)

Call Sequence - VC - GATE=NO

```
+-----------------------------+  +-----------------------------+  +--------+
|            Host             |  |            3705             |  | X.25   |
|-----------------------------|  |-----------------------------|  | Network|
|    End User      | SNA AM   |  |   ACF/NCP and X.25 NPSI     |  | (PSDN) |
|------------------|----------|  |-----------------------------|  |--------|
|Appl|CTCP|Oper|ACF/VTAM|  |      |     VC      |    MCH      |  |        |
|----|----|----|--------|  |NCP_PU|-------------|-------------|  |        |
|    |    |    |        |  |      |LU|PU|LINK|LU|PU|LINK|      |  |        |
|    |    |    |        |  |------|--|--|----|--|--|----|      |  |        |
|    |    |    |        |  |      |  |  |    |  |  |    |      |  |        |
|    |    |    |   +R(CONNOUT)    |  |  |    |  |  |    |      |  |        |
|    |    |    |   <-----------|  |  |CALL CONNECTED   |      |  |        |
|    |    |    |   REQCONT (VC_PU)|  |  <---------------------------------- |
|    |    |    |   <---------------------                                   |
|    |    |    |/* IDNUM of XID I-field*/  |    |  |  |  |  |  |  |        |
|    |    |    |/* image will be       */  |    |  |  |  |  |  |  |        |
|    |    |    |/* X'zzzzz'.           */  |    |  |  |  |  |  |  |        |
|    |    |    |        |    |    |  |  |    |  |  |  |  |  |  |        |
|    |    |    |   SETCV (VC_PU)  |  |  |    |  |  |  |  |  |  |        |
|    |    |    |   -------------->   |  |    |  |  |  |  |  |  |        |
|    |    |    |   +R(SETCV)      |  |  |    |  |  |  |  |  |  |        |
|    |    |    |   <--------------   |  |/* During this period,     */|
|    |    |    |        |    |    |  |  |/* DCE DATA packets from   */|
|    |    |    |   CONTACT (VC_PU)|  |  |/* X.25 network will be    */|
|    |    |    |   ------------->>------>|/* buffered in the X.25    */|
|    |    |    |   +R(CONTACT)    |  |  |/* NCP Packet Switching    */|
|    |    |    |   <--------------   |  |/* Interface               */|
|    |    |    |        |    |    |  |  |    |  |  |  |  V  |        |
|    |    |    |   CONTACTED (VC_PU) |  |    |  |  |  |  |  |        |
|    |    |    |   <------------<<------  |    |  |  |  |  |  |        |
|    |    |    |        |    |    |  |  |    |  |  |  |  |  |        |
|    |    |    |   ACTPU     |    |  |  |    |  |  |  |  |  |        |
|    |    |    |   ------------------------> |  |  |  |  |  |        |
|    |    |    |   +R(ACTPU)      |  |  |    |  |  |  |  V  |        |
|    |    |    |   <-----------------------  |  |  |  |  V  |        |
|    |    |    |        |    |    |  |  |    |  |  |  |  |  |        |
|    |    |    |   RNAA (VC_LU)   |  |  |    |  |  |  |  |  |        |
|    |    |    |   -------------->   |  |    |  |  |  |  |  |        |
|    |    |    |   +R(RNAA) |     |  |  |    |  |  |  |  |  |        |
|    |    |    |   <--------------   |  |    |  |  |  |  |  |        |
|    |    |    |        |    |    |  |  |    |  |  |  |  |  |        |
|    |    |    |   SETCV (VC_LU)  |  |  |    |  |  |  |  |  |        |
|    |    |    |   -------------->   |  |    |  |  |  |  |  |        |
|    |    |    |   +R(SETCV)      |  |  |    |  |  |  |  |  |        |
|    |    |    |   <--------------   |  |    |  |  |  |  |  |        |
|    |    |    |        |    |    |  |  |    |  |  |  |  |  |        |
+----+----+----+--------+    +----+--+--+----+--+--+--+--+--+  +--------+
```

Figure 6-3 (Part 2 of 3). Call Establishment Sequence for Type 0 VC (GATE=NO, Call-Out)

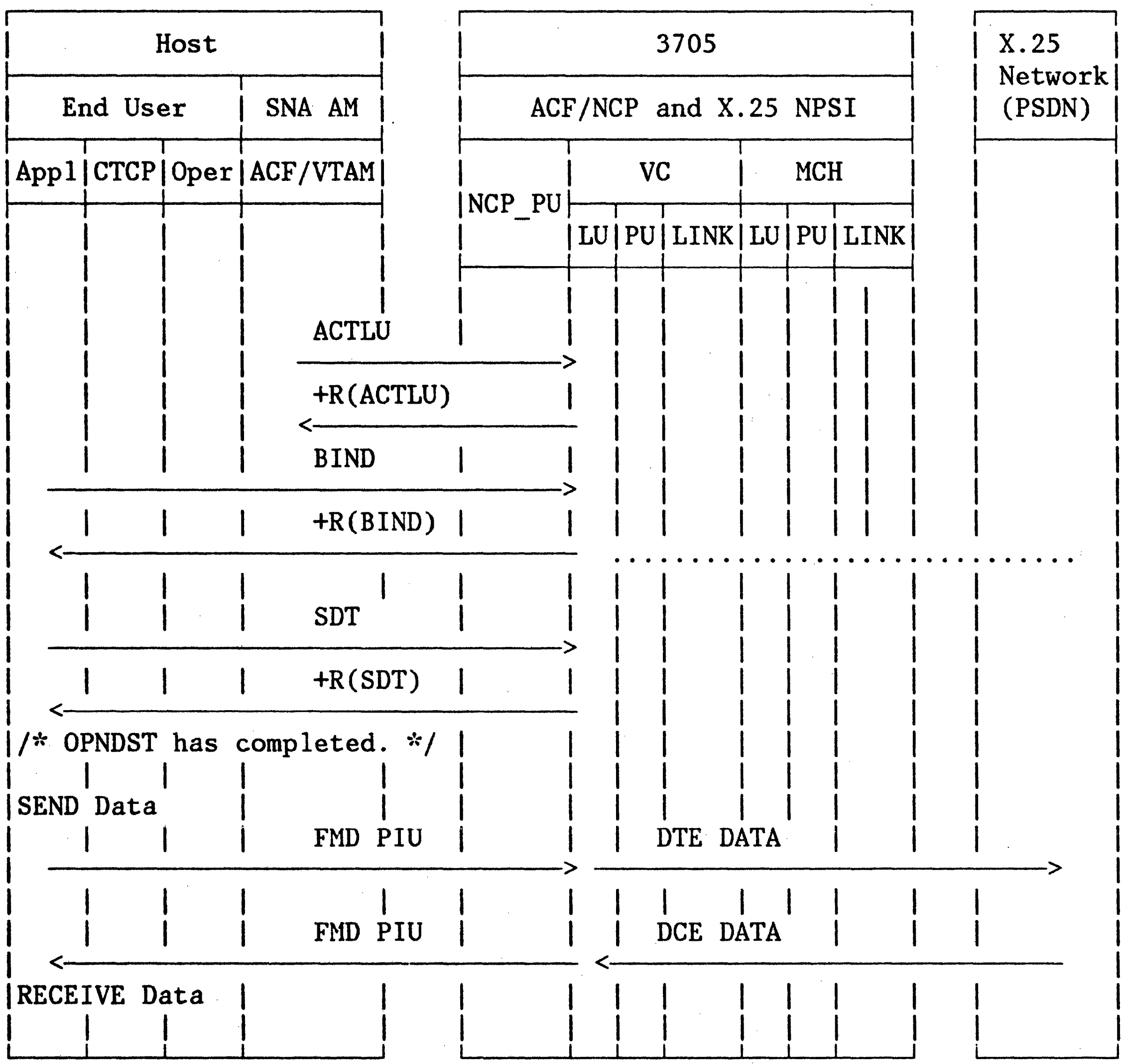


Figure 6-3 (Part 3 of 3). Call Establishment Sequence for Type 0 VC (GATE=NO, Call-Out)

Call Sequence - VC - GATE=NO

For Call-out: Type 2 Virtual Circuit

```
┌──────────────────────────────┐  ┌────────────────────────────────────┐  ┌───────────┐
|            Host              |  |                3705                |  | X.25      |
├──────────────────┬───────────┤  ├────────────────────────────────────┤  | Network   |
|    End User      |  SNA AM   |  |       ACF/NCP and X.25 NPSI        |  | (PSDN)    |
├─────┬─────┬──────┼───────────┤  ├────────┬─────────────┬─────────────┤  ├───────────┤
|Appl |CTCP |Oper  |ACF/VTAM   |  |        |     VC      |     MCH     |  |           |
├─────┼─────┼──────┼───────────┤  |NCP_PU  ├──┬──┬───────┼──┬──┬───────┤  |           |
|     |     |      |           |  |        |LU|PU|LINK   |LU|PU|LINK   |  |           |
|     |     |      |           |  ├────────┼──┼──┼───────┼──┼──┼───────┴──┴─          |
|     |     |      |           |  |        |  |  |       |/* Link Level of        */|
|     |     |      |           |  |        |  |  |       |/* DTE/DCE interface    */|
|     |     |      |           |  |        |  |  |       |/* is active.           */|
|     |     |V NET,ACT,ID=switched major node              |  |  |       |  |           |
|     |     |V NET,ACT,ID=VC_LINK          |  |  |       |  |  |       |  |           |
|     |     |      |   ACTLINK (VC_LINK)   |  |  |       |  |  |       |  |           |
|     |     |      |   ─────────────────>  |  |  |       |  |  |       |  |           |
|     |     |      |   +R(ACTLINK)         |  |  |       |  |  |       |  |           |
|     |     |      |   <─────────────────  |  |  |       |  |  |       |  |           |
|OPNDST ACQUIRE,VC_LU        |  |        |  |  |       |  |  |       |  |           |
|     |     |      |   CONNOUT (VC_PU)  |  |  CALL REQUEST          |  |           |
|     |     |      |   ───────────>>──────> ──────────────────────────────>          |
|     |     |      |/* LLC Level 2 is       */ /* Call User Data field    */|
|     |     |      |/* specified as a part  */ /* will be X'C2' followed  */|
|     |     |      |/* of DIALNO.           */ /* Optional user data      */|
|     |     |      |   +R(CONNOUT)         |  |  |       |  |  |       |  |           |
|     |     |      |   <───────────────    |  |  CALL CONNECTED         |  |           |
|     |     |      |           |  |        |  | <──────────────────────────────        |
|     |     |      |           |  |        |  |  DTE DATA (PSXID)          |           |
|     |     |      |           |  |        |  | ──────────────────────────────>        |
|     |     |      |           |  |        |  |  DCE DATA (PSXID)          |           |
|     |     |      |   REQCONT (VC_PU)  |  | <──────────────────────────────        |
|     |     |      |   <──────────<<──────   |  |       |  |  |       |  |           |
└─────┴─────┴──────┴───────────┘  └────────┴──┴──┴───────┴──┴──┴───────┘  └───────────┘
```

Figure 6-4 (Part 1 of 3). Call Establishment Sequence Type 2 VC (GATE=NO, Call-Out)

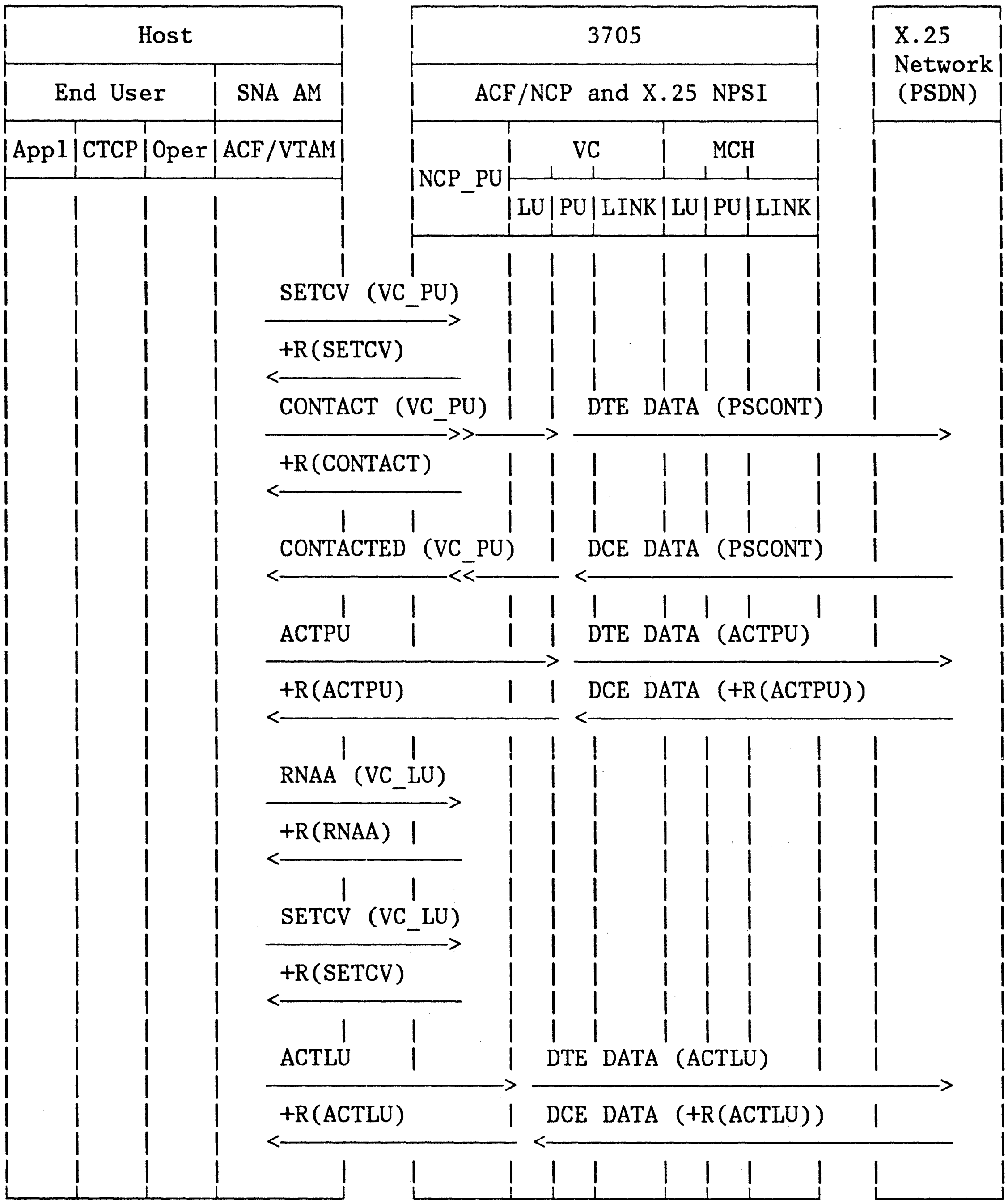


Figure 6-4 (Part 2 of 3). Call Establishment Sequence Type 2 VC (GATE=NO, Call-Out)

Call Sequence - VC - GATE=NO

```
┌────────────────────────┐     ┌─────────────────────────────┐   ┌────────┐
|          Host          |     |            3705             |   | X.25   |
├─────────┬──────────────┤     ├─────────────────────────────┤   | Network|
|End User | SNA AM       |     |   ACF/NCP and X.25 NPSI     |   | (PSDN) |
├────┬────┼────┬─────────┤     ├───────┬──────────┬──────────┤   ├────────┤
|Appl|CTCP|Oper|ACF/VTAM |     |       |    VC    |   MCH    |   |        |
├────┴────┴────┴─────────┤     |NCP_PU ├──┬──┬────┼──┬──┬────┤   |        |
|    |    |    |         |     |       |LU|PU|LINK|LU|PU|LINK|   |        |
|    |    |    |         |     ├───────┴──┴──┴────┴──┴──┴────┘   |        |
|    |    |    |   BIND        |       | DTE DATA (BIND)    |    |        |
|  ──────────────────────────────────> ──────────────────────────────>    |
|    |    |    |   +R(BIND)  |         | DCE DATA (+R(BIND))    |         |
|  <──────────────────────────────────  <──────────────────────────────   |
|    |    |    |         |   |         |  |  |    |  |  |    |   |        |
|    |    |    |   SDT       |         | DTE DATA (SDT)     |    |        |
|  ──────────────────────────────────> ──────────────────────────────>    |
|    |    |    |   +R(SDT)   |         | DCE DATA (+R(SDT))     |         |
|  <──────────────────────────────────  <──────────────────────────────   |
|/* OPNDST has completed. */ |         |  |  |    |  |  |    |   |        |
|    |    |    |         |   |         |  |  |    |  |  |    |   |        |
|SEND Data     |         |   |         |  |  |    |  |  |    |   |        |
|    |    |    |   FMD PIU   |         |  |  DTE DATA (FMD PIU)   |        |
|  ──────────────────────────────────> ──────────────────────────────>    |
|    |    |    |         |   |         |  |  |    |  |  |    |   |        |
|    |    |    |   FMD PIU   |         |  |  DCE DATA (FMD PIU)   |        |
|  <──────────────────────────────────  <──────────────────────────────   |
|RECEIVE Data  |         |   |         |  |  |    |  |  |    |   |        |
|    |    |    |         |   |         |  |  |    |  |  |    |   |        |
└────┴────┴────┴─────────┘   └─────────┴──┴──┴────┴──┴──┴────┘   └────────┘
```

Figure 6-4 (Part 3 of 3). Call Establishment Sequence Type 2 VC (GATE=NO, Call-Out)

For Call-out: Type 3 BNN Virtual Circuit

```
┌────────────────────────┐   ┌─────────────────────────────┐   ┌────────┐
│          Host          │   │            3705             │   │ X.25   │
├──────────────┬─────────┤   ├─────────────────────────────┤   │ Network│
│   End User   │ SNA AM  │   │    ACF/NCP and X.25 NPSI    │   │ (PSDN) │
├────┬────┬────┼─────────┤   ├──────┬───────────┬──────────┤   ├────────┤
│Appl│CTCP│Oper│ACF/VTAM │   │      │    VC     │   MCH    │   │        │
├────┼────┼────┼─────────┤   │NCP_PU├──┬──┬─────┼──┬──┬────┤   │        │
│    │    │    │         │   │      │LU│PU│LINK │LU│PU│LINK│   │        │
│    │    │    │         │   ├──────┼──┼──┼─────┼──┼──┼────┤   │        │
│    │    │    │         │   │      │  │  │     │/* Link Level of      */│
│    │    │    │         │   │      │  │  │     │/* DTE/DCE interface  */│
│    │    │    │         │   │      │  │  │     │/* is active.         */│
│    │    │    │         │   │      │  │  │     │  │  │    │   │        │
│    │    │V NET,ACT,ID=switched major node     │  │  │    │   │        │
│    │    │V NET,ACT,ID=VC_LINK     │  │  │     │  │  │    │   │        │
│    │    │    │         │   │      │  │  │     │  │  │    │   │        │
│    │    │    │  ACTLINK (VC_LINK) │  │  │     │  │  │    │   │        │
│    │    │    │  ───────────────>  │  │  │     │  │  │    │   │        │
│    │    │    │  +R(ACTLINK)       │  │  │     │  │  │    │   │        │
│    │    │    │  <───────────────  │  │  │     │  │  │    │   │        │
│    │    │    │         │   │      │  │  │     │  │  │    │   │        │
│    │    │    │         │   │      │  │  │     │  │  │    │   │        │
│OPNDST ACQUIRE,VC_LU    │   │      │  │  │     │  │  │    │   │        │
│    │    │    │         │   │      │  │  │     │  │  │    │   │        │
│    │    │    │  CONNOUT (VC_PU) │ │  CALL REQUEST         │   │        │
│    │    │    │  ──────────>>──────> ──────────────────────────────>   │
│    │    │    │/* LLC Level 3 is    */ /* Call User Data field        */│
│    │    │    │/* specified as a part */ /* will be X'C3010000'       */│
│    │    │    │/* of DIALNO.        */ /* followed by optional        */│
│    │    │    │         │   │      │  │  /* user data                 */│
│    │    │    │  +R(CONNOUT)       │  │  │     │  │  │    │   │        │
│    │    │    │  <──────────────   │  │  CALL CONNECTED    │   │        │
│    │    │    │         │   │      │  │  <─────────────────────────────│
│    │    │    │         │   │      │  │  │     │  │  │    │   │        │
│    │    │    │         │   │      │  │  DTE DATA (QXID)   │   │        │
│    │    │    │         │   │      │  │  ──────────────────────────────>
│    │    │    │         │   │      │  │  DCE DATA (QXID)   │   │        │
│    │    │    │  REQCONT (VC_PU)   │  │  <─────────────────────────────│
│    │    │    │  <──────────<<──────  │  │     │  │  │    │   │        │
│    │    │    │         │   │      │  │  │     │  │  │    │   │        │
└────┴────┴────┴─────────┘   └──────┴──┴──┴─────┴──┴──┴────┘   └────────┘
```

Figure 6-5 (Part 1 of 3). Call Establishment Sequence Type 3 BNN VC (GATE=NO, Call-Out)

Call Sequence - VC - GATE=NO

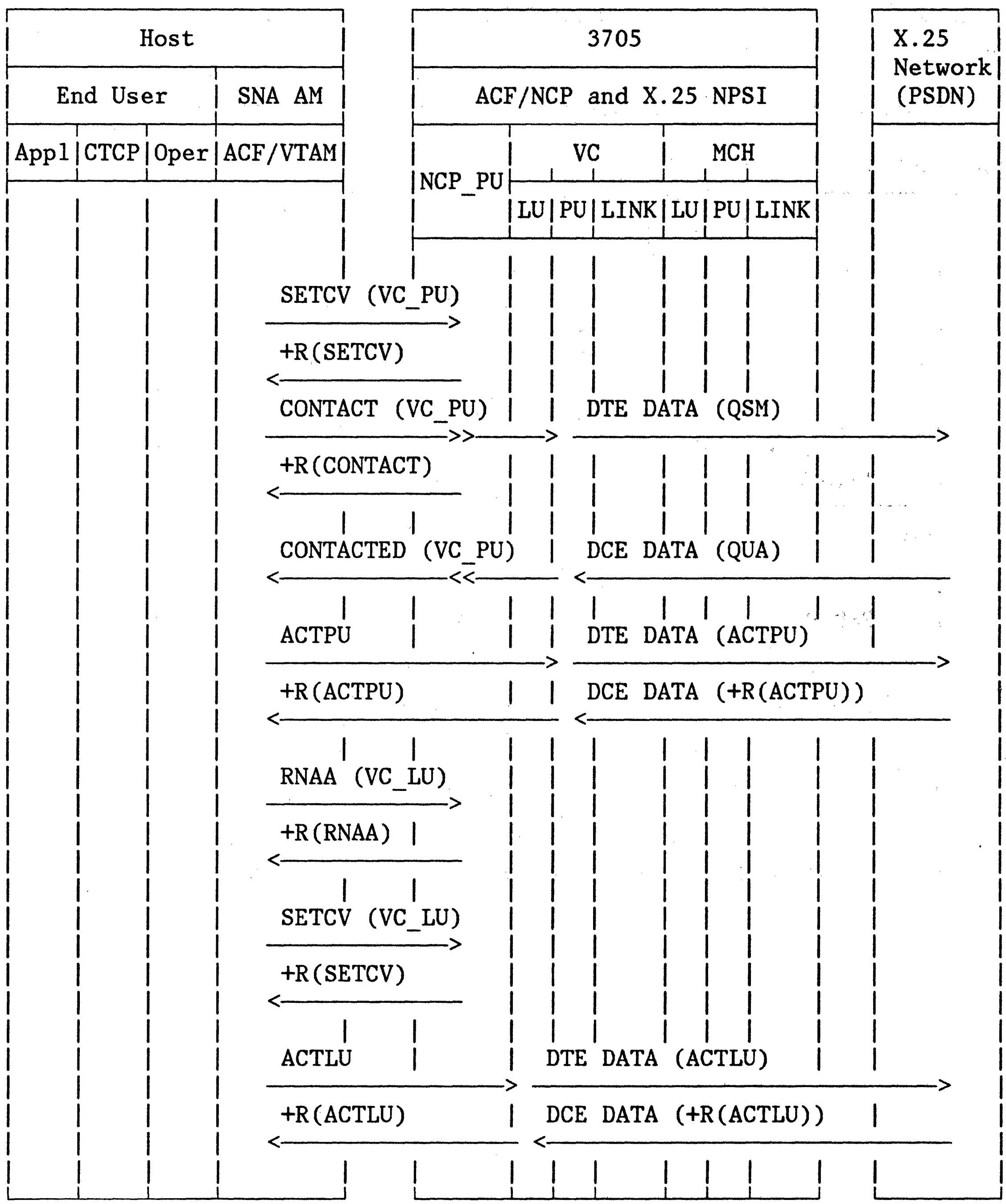


Figure 6-5 (Part 2 of 3). Call Establishment Sequence Type 3 BNN VC (GATE=NO, Call-Out)

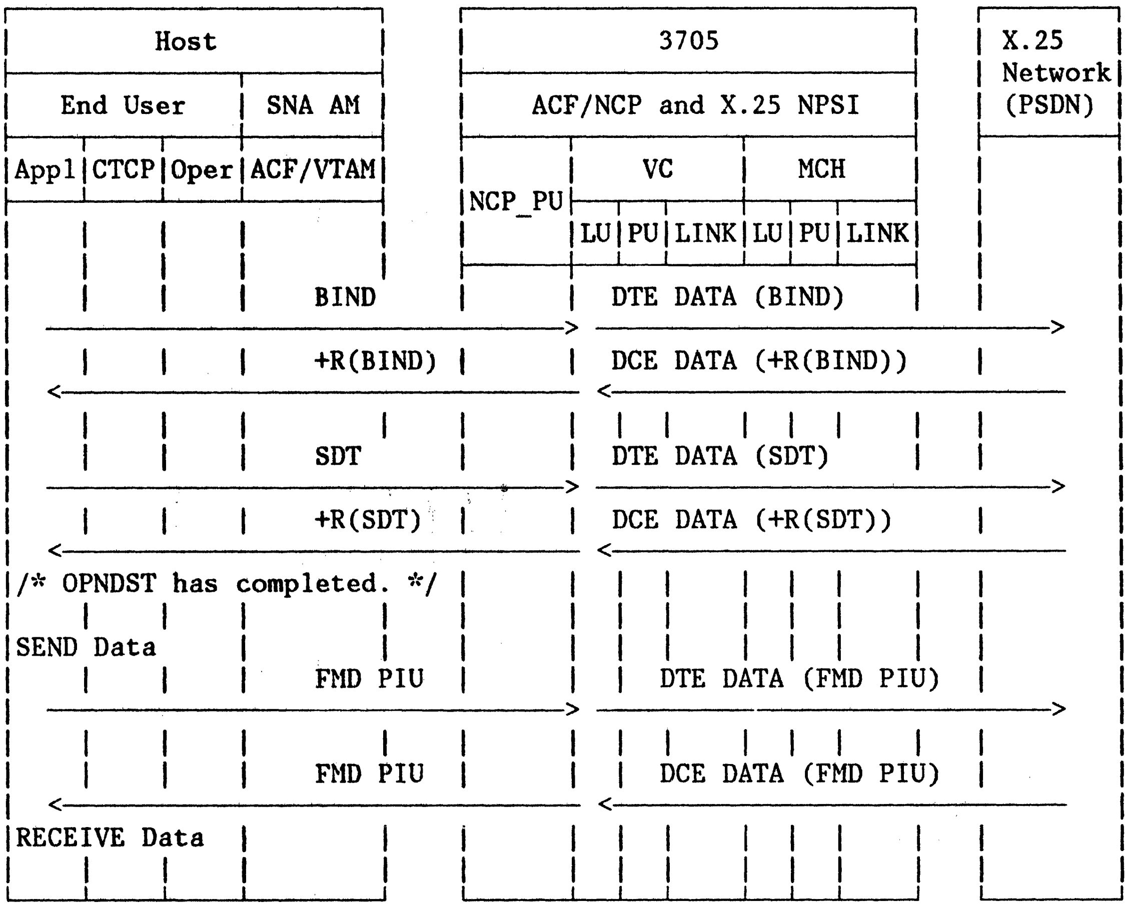


Figure 6-5 (Part 3 of 3). Call Establishment Sequence Type 3 BNN VC (GATE=NO, Call-Out)

Call Sequence - VC - GATE=NO

For Call-In: Type 0 Virtual Circuit

```
┌───────────────────────────────┐     ┌────────────────────────────────────┐    ┌─────────┐
|              Host             |     |                3705                |    | X.25    |
├───────────────────────────────┤     ├────────────────────────────────────┤    | Network |
|     End User        | SNA AM  |     |      ACF/NCP and X.25 NPSI         |    | (PSDN)  |
├──────┬──────┬───────┼─────────┤     ├────────┬────────────┬──────────────┤    ├─────────┤
|Appl  |CTCP  |Oper   |ACF/VTAM |     |        |     VC     |     MCH      |    |         |
├──────┴──────┴───────┴─────────┤     |NCP_PU  ├───┬───┬────┼───┬───┬──────┤    |         |
|      |      |       |         |     |        |LU |PU |LINK|LU |PU |LINK  |    |         |
|      |      |       |         |     ├────────┴───┴───┴────┴───┴───┴──────┘    |         |
|      |      |       |         |     |        |   |   |    |/* Link Level of        */|
|      |      |       |         |     |        |   |   |    |/* DTE/DCE interface    */|
|      |      |       |         |     |        |   |   |    |/* is active.           */|
|      |      |       |         |     |        |   |   |    |   |   |   |    |   |    |
|      |      |V NET,ACT,ID=switched major node              |   |   |   |    |   |    |
|      |      |V NET,ACT,ID=VC_LINK                  |   |    |   |   |   |    |   |    |
|      |      |       |         |     |        |   |   |    |   |   |   |    |   |    |
|      |      |       |   ACTLINK (VC_LINK)        |   |    |/* During this period*/   |
|      |      |       |  ───────────────────────────>  |    |/* Incoming Call      */   |
|      |      |       |   +R(ACTLINK)          |   |   |    |/* packet is rejected*/   |
|      |      |       |  <───────────────────────────  |    |/* and Clear Request */    |
|      |      |       |         |     |        |   |   |    |/* packet is sent to */    |
|      |      |       |   ACTCONNIN (VC_LINK)      |   |    |/* the DCE.          */    |
|      |      |       |  ───────────────>>──────────────>   |   |   |   |         |    |
|      |      |       |   +R(ACTCONNIN)        |   |   |    |   |   |   |         |    |
|      |      |       |  <───────────────<<──────────────   ........................   |
|      |      |       |         |     |        |   |   |    |   |   |   |    |    |    |
|      |      |       |         |     |        |   |   |    |   |   |   |    |    |    |
|      |      |       |         |     |        |   |  INCOMING CALL        |    |    |
|      |      |       |         |     |        |   | <───────────────────────────     |
|      |      |       |         |     |        |   |/* Call User Data field        */|
|      |      |       |         |     |        |   |/* will be X'C0' to specify    */|
|      |      |       |         |     |        |   |/* the LLC Level 0, and        */|
|      |      |       |         |     |        |   |/* X'kkkkk' follows to         */|
|      |      |       |         |     |        |   |/* indicate IDNUM.        |    */|
|      |      |       |         |     |        |   |   |    |   |   |         |    |
|      |      |       |         |     |        |   |  CALL ACCEPTED       |    |     |
|      |      |       |   REQCONT (VC_PU)      |   | ───────────────────────────>     |
|      |      |       |  <─────────────────────────    |    |   |   |   |    |    |    |
|      |      |       |/* IDNUM of XID I-field*/   |    |   |   |   |    |    |    |
|      |      |       |/* image will be       */   |    |   |   |   |    |    |    |
|      |      |       |/* X'kkkkk'.           */   |    |   |   |   |    |    |    |
└──────┴──────┴───────┴─────────┘     └────────┴───┴───┴────┴───┴───┴──────┘    └─────────┘
```

Figure 6-6 (Part 1 of 3). Call Establishment Sequence Type 0 VC (GATE=NO, Call-In)

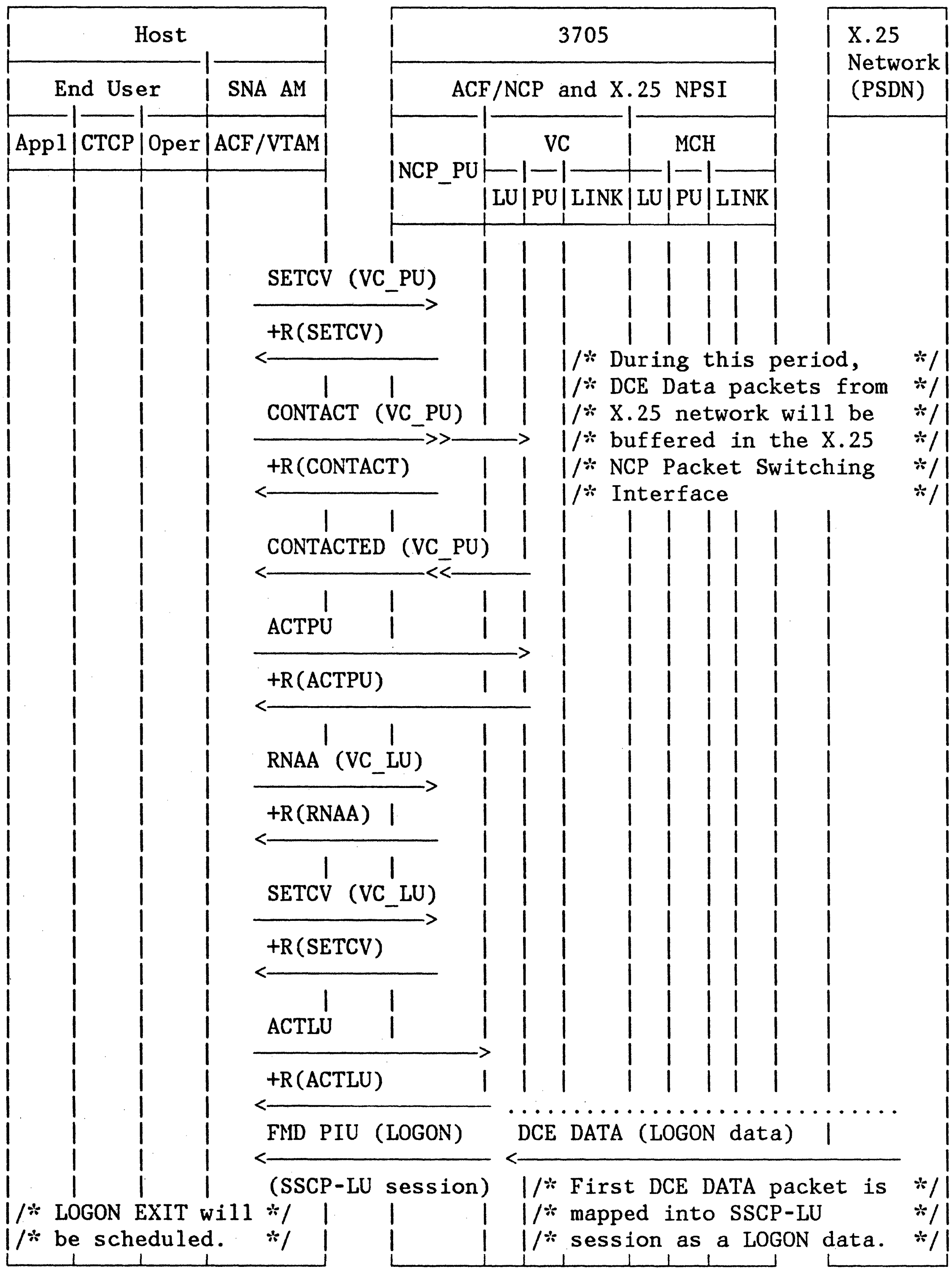


Figure 6-6 (Part 2 of 3). Call Establishment Sequence Type 0 VC (GATE=NO, Call-In)

Call Sequence - VC - GATE=NO

```
┌────────────────────────────────┐     ┌──────────────────────────────────────┐    ┌──────────┐
│             Host               │     │                3705                  │    │ X.25     │
├────────────────────┬───────────┤     ├──────────────────────────────────────┤    │ Network  │
│      End User      │  SNA AM   │     │       ACF/NCP and X.25 NPSI          │    │ (PSDN)   │
├─────┬──────┬───────┼───────────┤     ├────────┬──────────────┬──────────────┤    ├──────────┤
│Appl │CTCP  │Oper   │ACF/VTAM   │     │        │      VC      │     MCH      │    │          │
├─────┼──────┼───────┼───────────┤     │NCP_PU  ├──┬──┬────────┼──┬──┬────────┤    │          │
│     │      │       │           │     │        │LU│PU│LINK    │LU│PU│LINK    │    │          │
│     │      │       │           │     ├────────┼──┼──┼────────┼──┼──┼────────┤    │          │
│     │      │       │           │     │        │  │  │        │  │  │        │    │          │
│OPNDST ACCEPT,VC_LU             │     │        │  │  │        │  │  │        │    │          │
│     │      │       │   BIND          │        │  │  │        │  │  │        │    │          │
│   ─────────────────────────────────────────>  │  │  │        │  │  │        │    │          │
│     │      │       │   +R(BIND)      │        │  │  │        │  │  │        │    │          │
│   <──────────────────────────────────────────    │  │        │  │  │        │    │          │
│     │      │       │           │     │        │  │  │        │  │  │        │    │          │
│     │      │       │   SDT           │        │  │  │        │  │  │        │    │          │
│   ─────────────────────────────────────────>  │  │  │        │  │  │        │    │          │
│     │      │       │   +R(SDT)       │        │  │  │        │  │  │        │    │          │
│   <──────────────────────────────────────────    │  │        │  │  │        │    │          │
│/* OPNDST has completed. */     │     │        │  │  │        │  │  │        │    │          │
│     │      │       │           │     │        │  │  │        │  │  │        │    │          │
│SEND Data           │           │     │        │  │  │        │  │  │        │    │          │
│     │      │       │   FMD PIU       │        │  │  DTE DATA    │  │        │    │          │
│   ─────────────────────────────────────────>   ──────────────────────────────────────────>  │
│     │      │       │           │     │        │  │  │        │  │  │        │    │          │
│     │      │       │   FMD PIU       │        │  │  DCE DATA    │  │        │    │          │
│   <──────────────────────────────────────────   <──────────────────────────────────────────│
│RECEIVE Data        │           │     │        │  │  │        │  │  │        │    │          │
│     │      │       │           │     │        │  │  │        │  │  │        │    │          │
└─────┴──────┴───────┴───────────┘     └────────┴──┴──┴────────┴──┴──┴────────┘    └──────────┘
```

Figure 6-6 (Part 3 of 3). Call Establishment Sequence Type 0 VC (GATE=NO, Call-In)

For Call-In: Type 2 Virtual Circuit

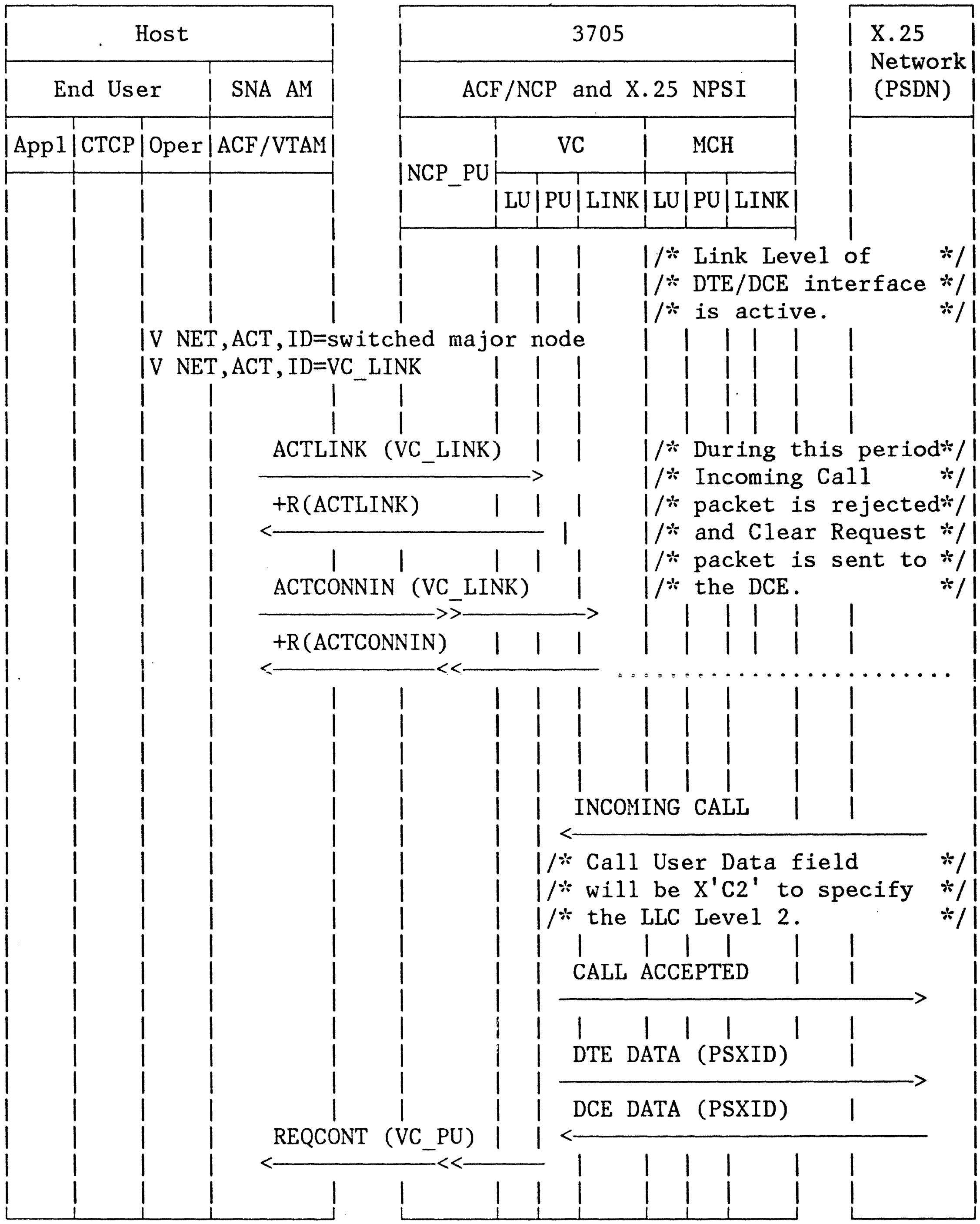


Figure 6-7 (Part 1 of 3). Call Establishment Sequence Type 2 VC (GATE=NO, Call-In)

Call Sequence - VC - GATE=NO

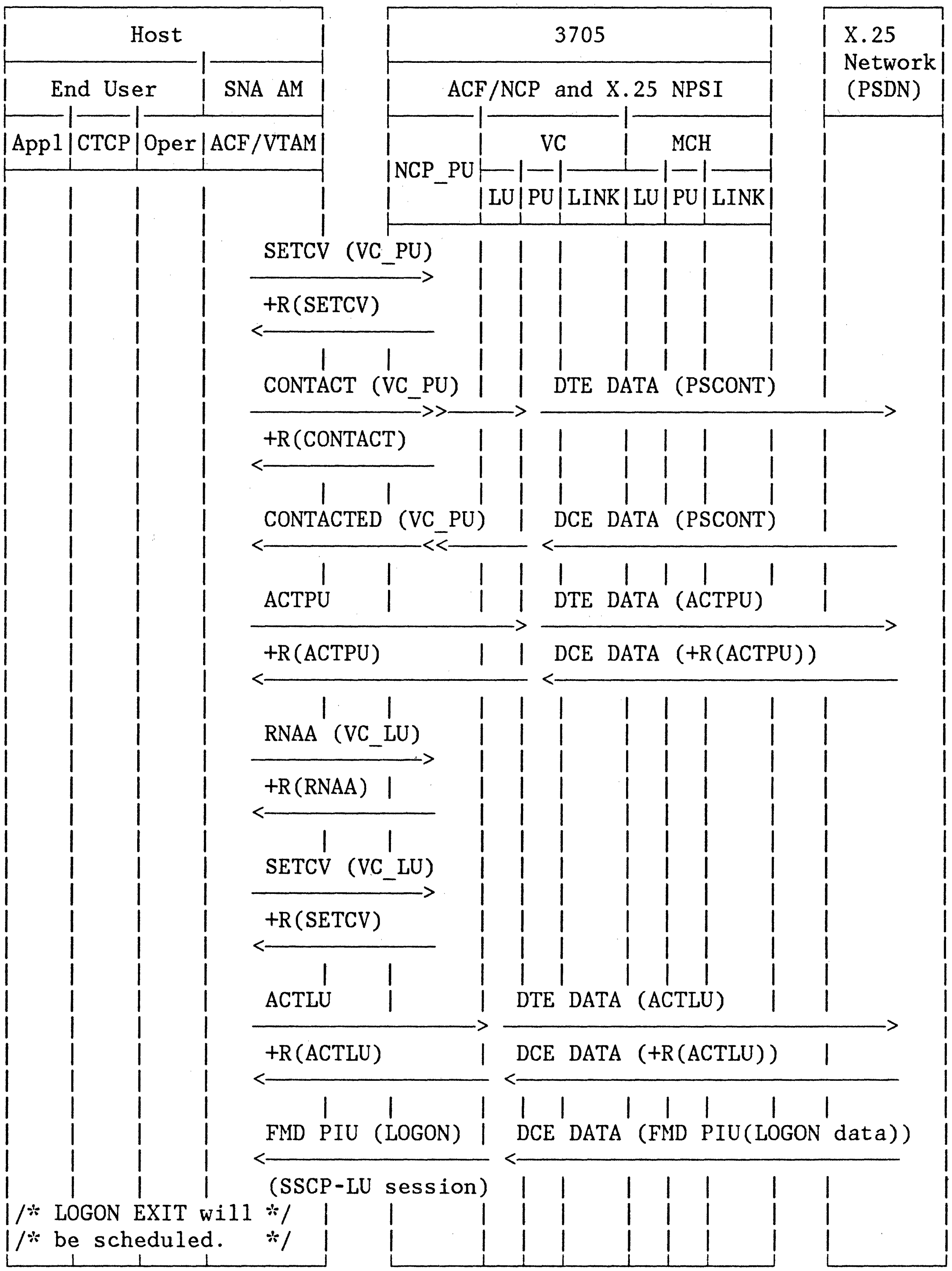


Figure 6-7 (Part 2 of 3). Call Establishment Sequence Type 2 VC (GATE=NO, Call-In)

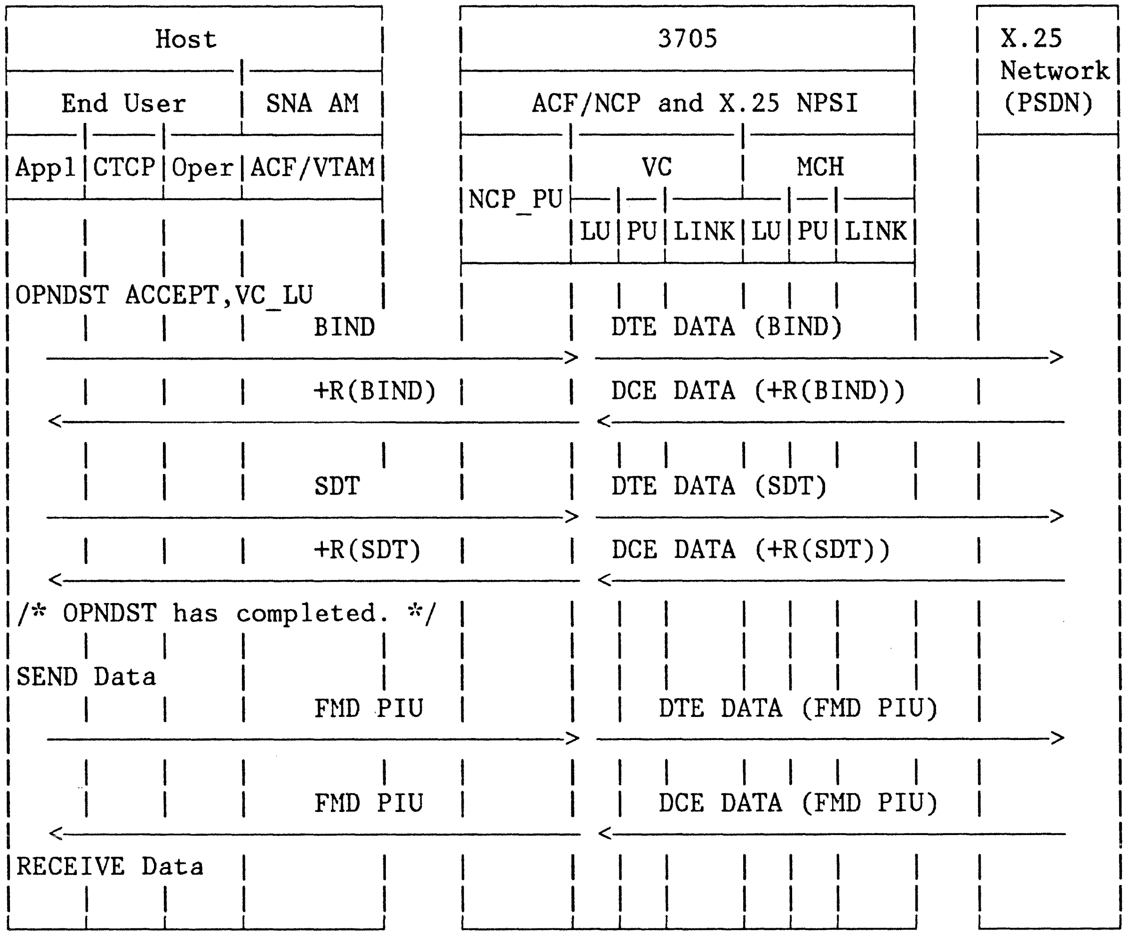


Figure 6-7 (Part 3 of 3). Call Establishment Sequence Type 2 VC (GATE=NO, Call-In)

Call Sequence - VC - GATE=NO

For Call-In: Type 3 BNN Virtual Circuit

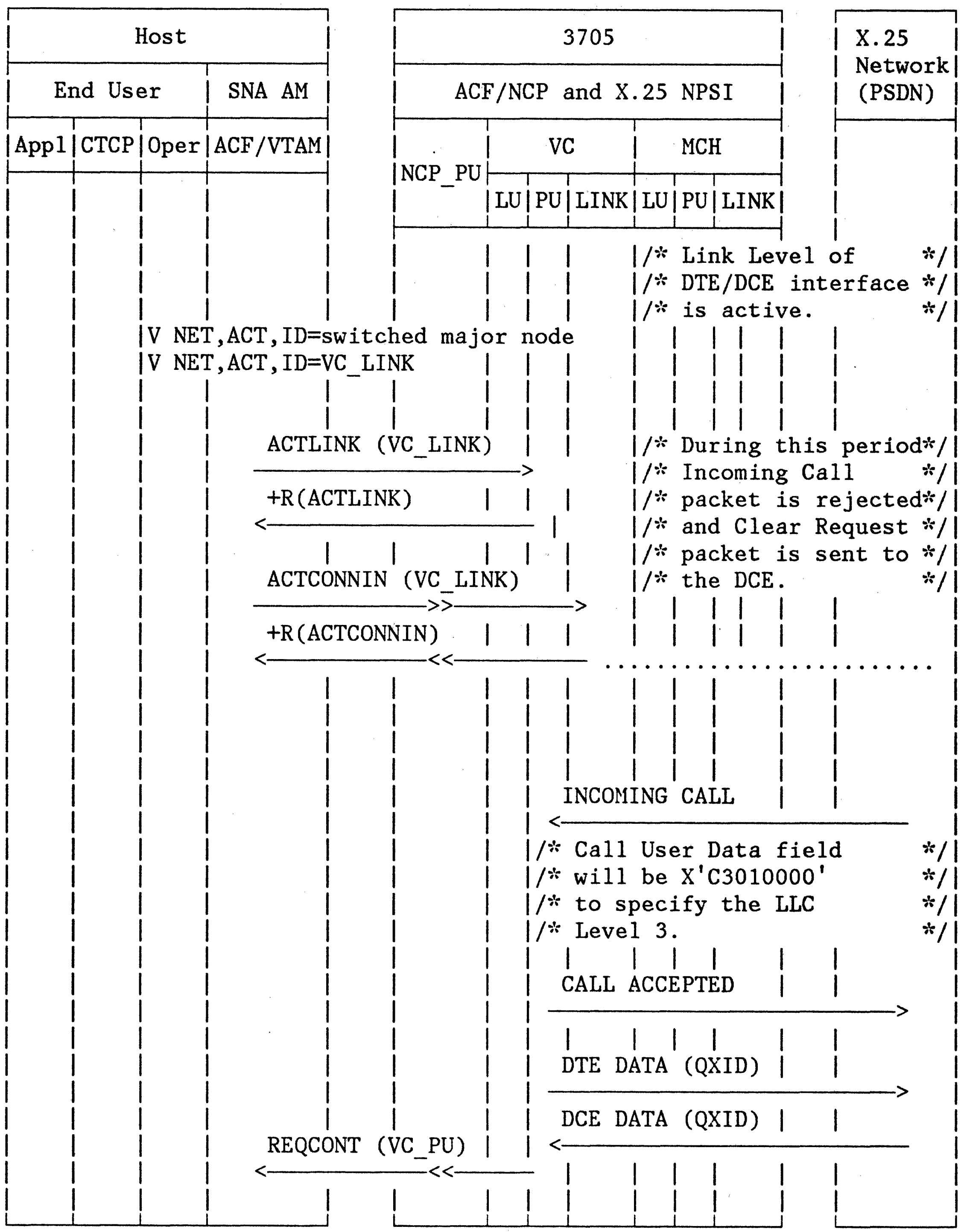


Figure 6-8 (Part 1 of 3). Call Establishment Sequence Type 3 BNN VC (GATE=NO, Call-In)

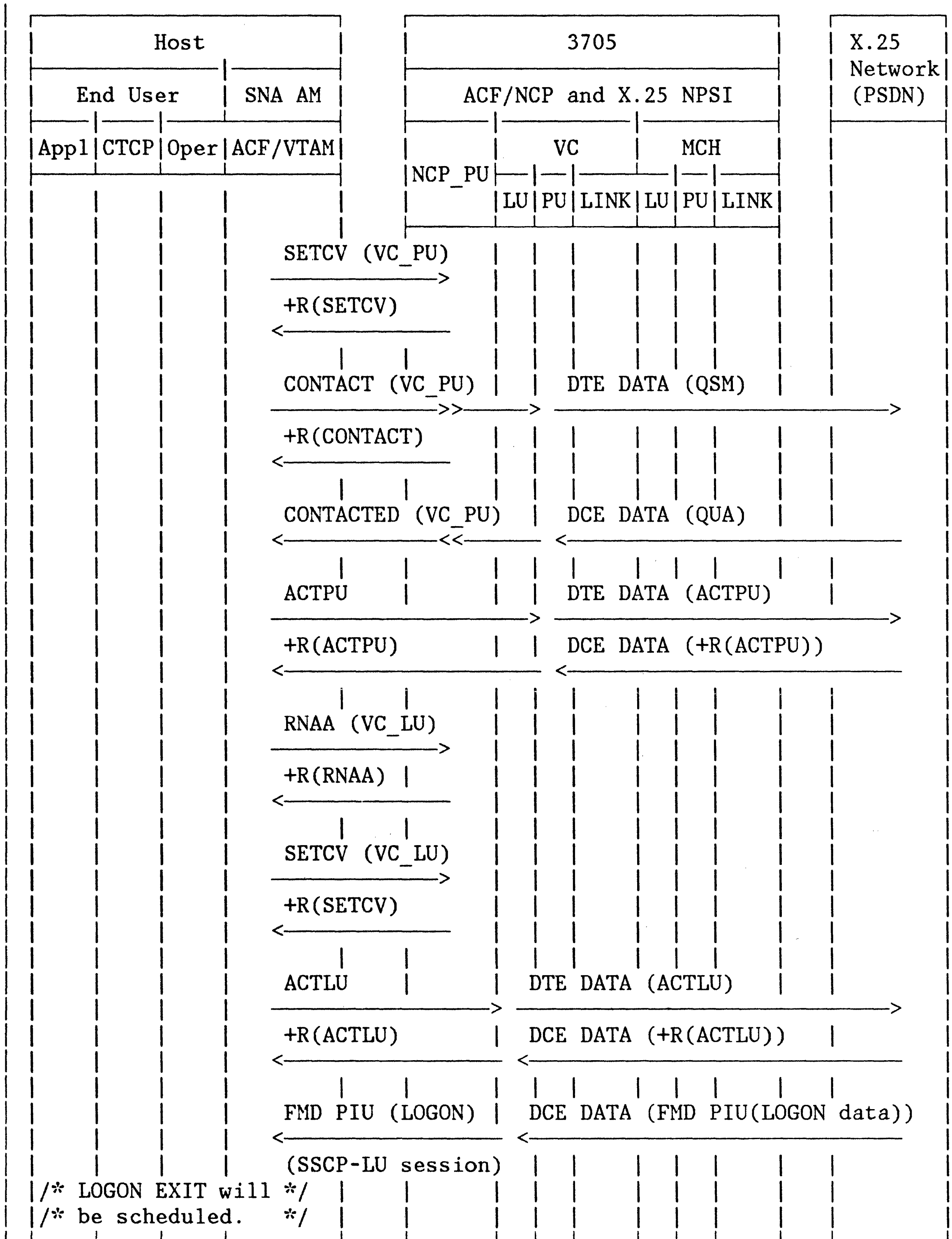


Figure 6-8 (Part 2 of 3). Call Establishment Sequence Type 3 BNN VC (GATE=NO, Call-In)

Call Sequence - VC - GATE=NO

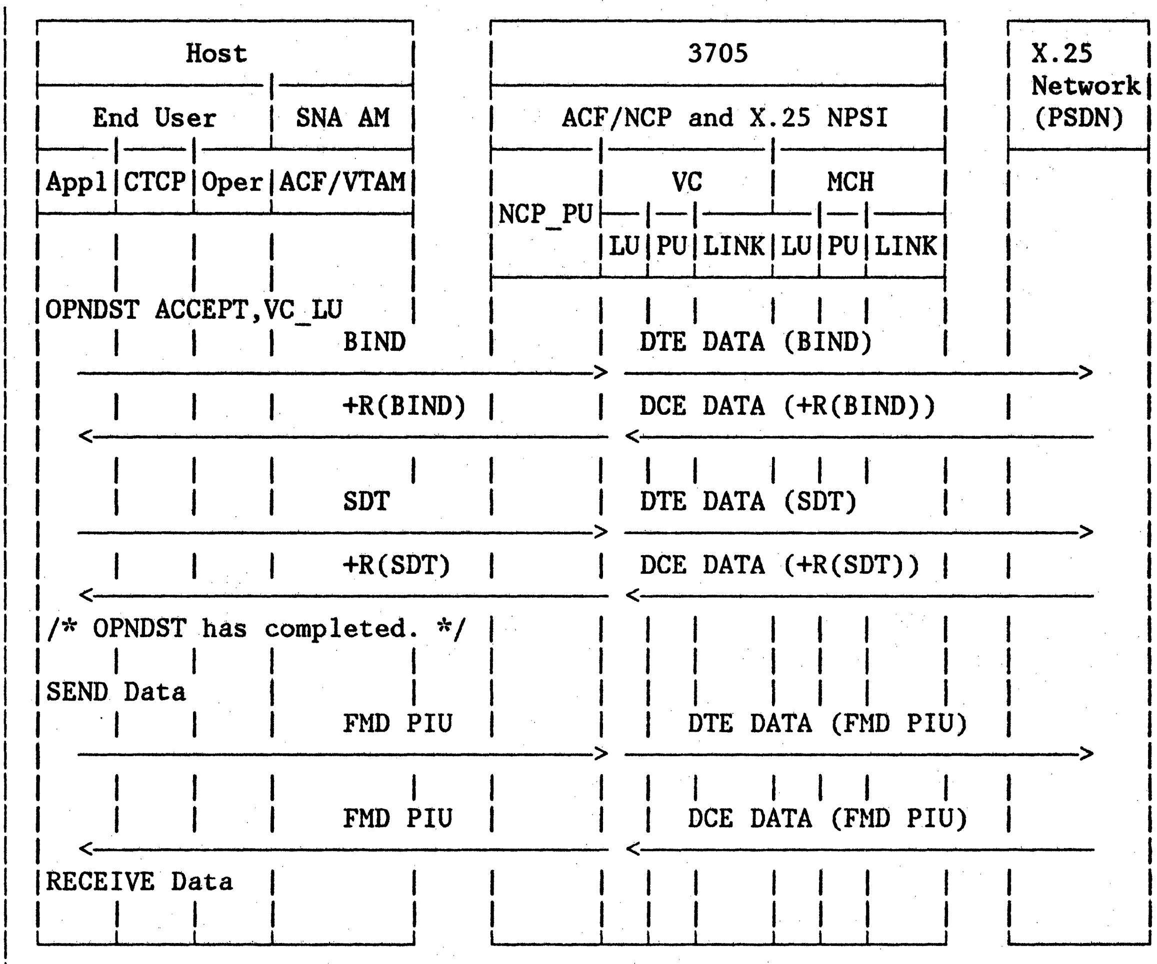


Figure 6-8 (Part 3 of 3). Call Establishment Sequence Type 3 BNN VC (GATE=NO, Call-In)

For Call-Out: Type 5 Virtual Circuit

Same as Type 0 Virtual Circuit in Figure 6-3 on page 6-11 except that the first bytes of the Call User Data field will be chosen according to the L field of the DIALNO operand (see Chapter 4) as in:

```
DIALNO=5 ———> CUD field = X'01000000'
       8 ———>           = X'81000000'
       9 ———>           = X'41000000'
```

For Call-In: Type 5 Virtual Circuit

Same as Type 0 Virtual Circuit in Figure 6-6 on page 6-20 except that the Call User Data must be one of the three values:

```
X'01000000'
X'81000000'
X'41000000'
```

The IDNUM of the REQCONT is built by X.25 NCP Packet Switching Interface for Call-Out and Call-In and is equal to the default identification number (described in Chapter 4), whether it is used with the Integrated PAD or the Transparent PAD.

Call Sequence - VC - GATE=GENERAL

GATE=GENERAL

For Call-Out: Type 4 Virtual Circuit

```
┌────────────────────────────┐  ┌─────────────────────────────────┐  ┌──────────┐
│            Host            │  │              3705               │  │ X.25     │
├──────────────────┬─────────┤  ├─────────────────────────────────┤  │ Network  │
│    End User      │ SNA AM  │  │    ACF/NCP and X.25 NPSI        │  │ (PSDN)   │
├─────┬─────┬──────┼─────────┤  ├───────┬────────────┬────────────┤  ├──────────┤
│Appl │CTCP │Oper  │ACF/VTAM │  │       │     VC     │    MCH     │  │          │
├─────┼─────┼──────┼─────────┤  │NCP_PU ├──┬──┬──────┼──┬──┬──────┤  │          │
│     │     │      │         │  │       │LU│PU│LINK  │LU│PU│LINK  │  │          │
│     │     │      │         │  ├───────┼──┼──┼──────┼──┼──┼──────┤  │          │
│     │     │      │         │  │       │  │  │      │/* Link Level of     */│
│     │     │      │         │  │       │  │  │      │/* DTE/DCE interface */│
│     │     │      │         │  │       │  │  │      │/* is active.        */│
│     │     │      │         │  │       │  │  │      │  │  │      │  │          │
│     │     │V NET,ACT,ID=MCH_LU        │  │  │      │  │  │      │  │          │
│     │     │      │   ACTLU      │     │  │  │      │  │  │      │  │          │
│     │     │      │ ─────────────────────────────────>  │  │      │  │          │
│     │     │      │   +R(ACTLU)        │  │  │      │  │  │      │  │          │
│     │     │      │ <─────────────────────────────────  │  │      │  │          │
│     │     │      │         │  │       │  │  │      │  │  │      │  │          │
│     │OPNDST ACQUIRE,MCH_LU   │  │       │  │  │      │  │  │      │  │          │
│     │     │      │   BIND       │     │  │  │      │  │  │      │  │          │
│     │ ────────────────────────────────────────────>/* PLU (CTCP) and     */│
│     │     │      │              │     │  │  │      /* SLU (LU-MCH) name   */│
│     │     │      │   +R(BIND)         │  │  │      /* carried by BIND are*/│
│     │ <────────────────────────────────────────────/* stored in X.25 NCP */│
│     │     │      │   SDT        │     │  │  │      /* Packet Switching   */│
│     │ ────────────────────────────────────────────>/* Interface to build */│
│     │     │      │   +R(SDT)    │     │  │  │      /* data.              */│
│     │ <──────────────────────────────────────────── │  │      │  │          │
│     │     │      │         │  │       │  │  │      │  │  │      │  │          │
│     │     │V NET,ACT,ID=switched major node   │      │  │  │      │  │          │
│     │     │V NET,ACT,ID=VC_LINK       │  │  │      │  │  │      │  │          │
│     │     │      │         │  │       │  │  │      │  │  │      │  │          │
│     │     │      │  ACTLINK (VC_LINK)    │  │      │  │  │      │  │          │
│     │     │      │ ──────────────────>│  │  │      │  │  │      │  │          │
│     │     │      │  +R(ACTLINK)       │  │  │      │  │  │      │  │          │
│     │     │      │ <──────────────────│  │  │      │  │  │      │  │          │
│     │     │      │         │  │       │  │  │      │  │  │      │  │          │
│     │     │      │  ACTCONNIN (VC_LINK)     │      │  │  │      │  │          │
│     │     │      │ ──────────────────>>──────────>   │  │  │      │  │          │
│     │     │      │  +R(ACTCONNIN)     │  │  │      │  │  │      │  │          │
│     │     │      │ <──────────────────<<──────────   │  │  │      │  │          │
│     │     │      │         │  │       │  │  │      │  │  │      │  │          │
└─────┴─────┴──────┴─────────┘  └───────┴──┴──┴──────┴──┴──┴──────┘  └──────────┘
```

Figure 6-9 (Part 1 of 3). Call Establishment Sequence Type 4 VC (GATE=GENERAL, Call-Out)

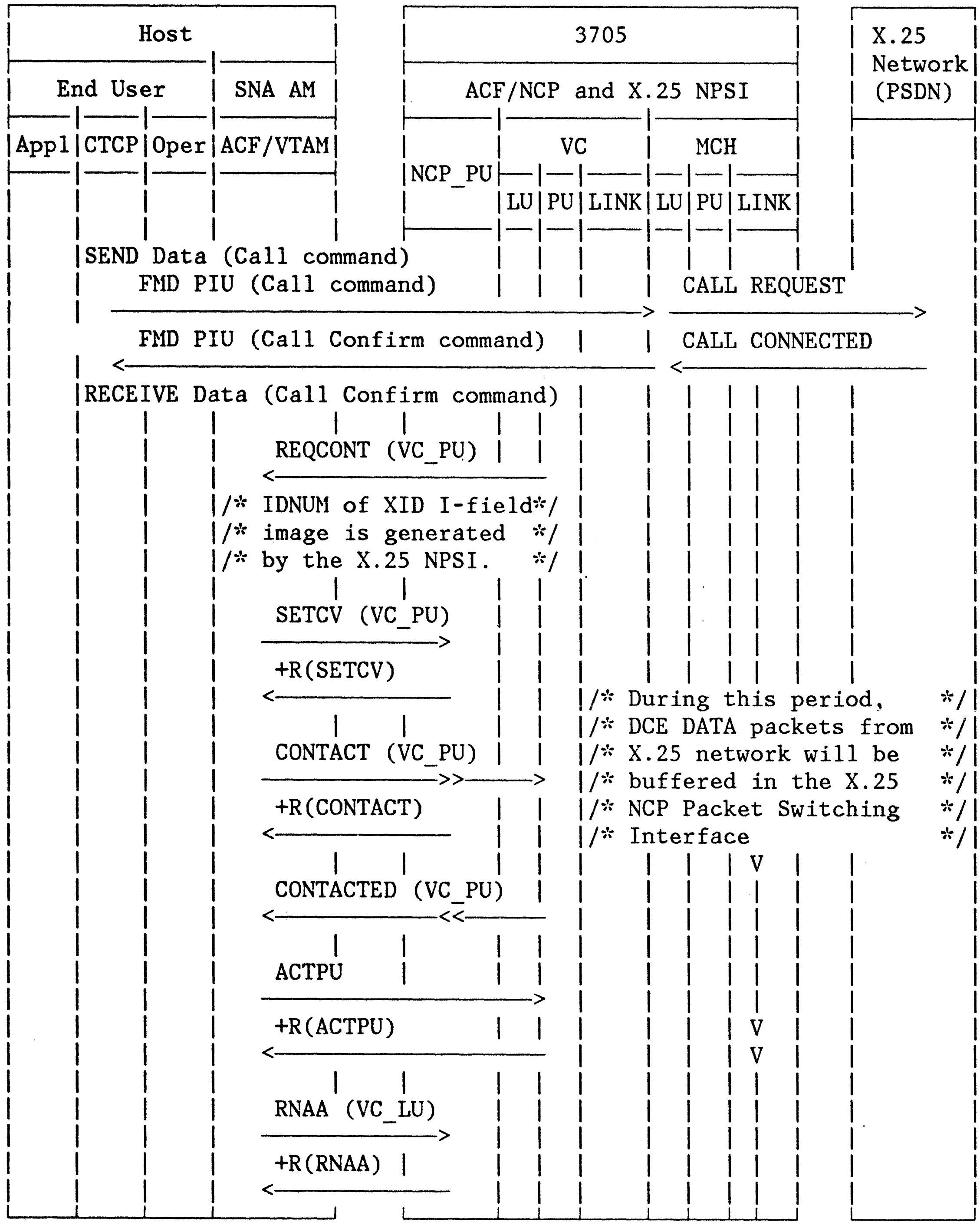


Figure 6-9 (Part 2 of 3). Call Establishment Sequence Type 4 VC (GATE=GENERAL, Call-Out)

Call Sequence - VC - GATE=GENERAL

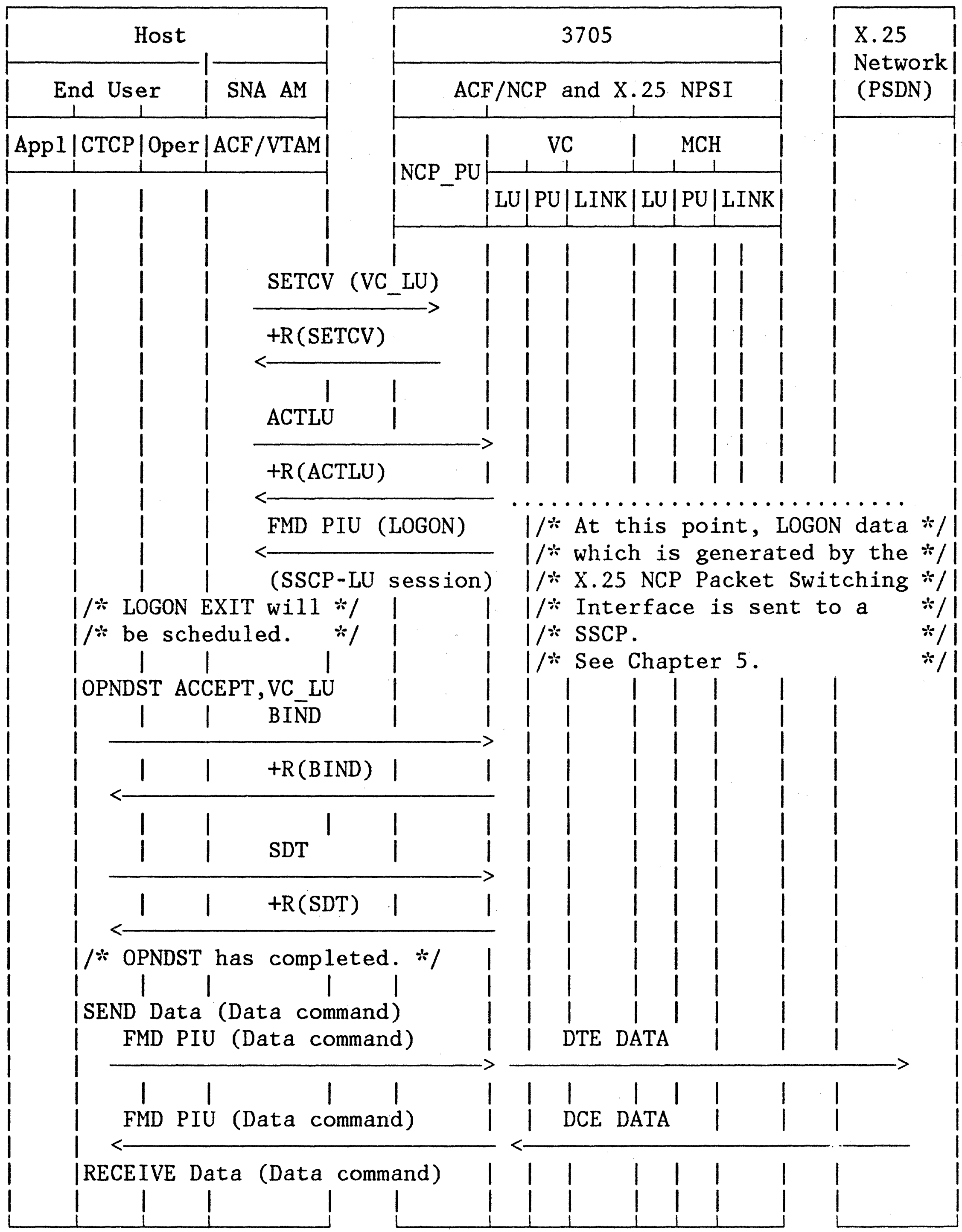


Figure 6-9 (Part 3 of 3). Call Establishment Sequence Type 4 VC (GATE=GENERAL, Call-Out)

For Call-In: Type 4 Virtual Circuit

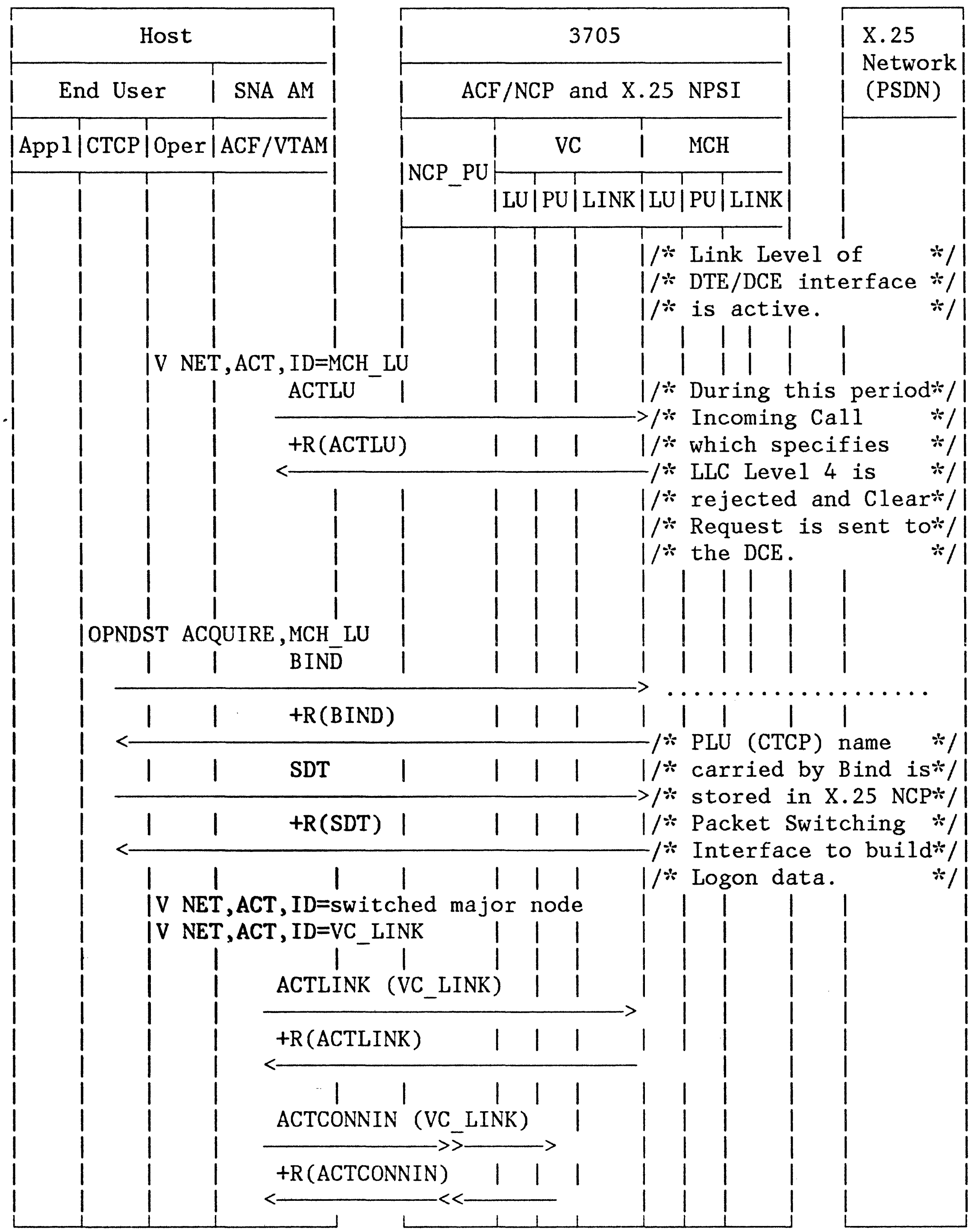


Figure 6-10 (Part 1 of 3). Call Establishment Sequence Type 4 VC (GATE=GENERAL, Call-In)

Call Sequence - VC - GATE=GENERAL

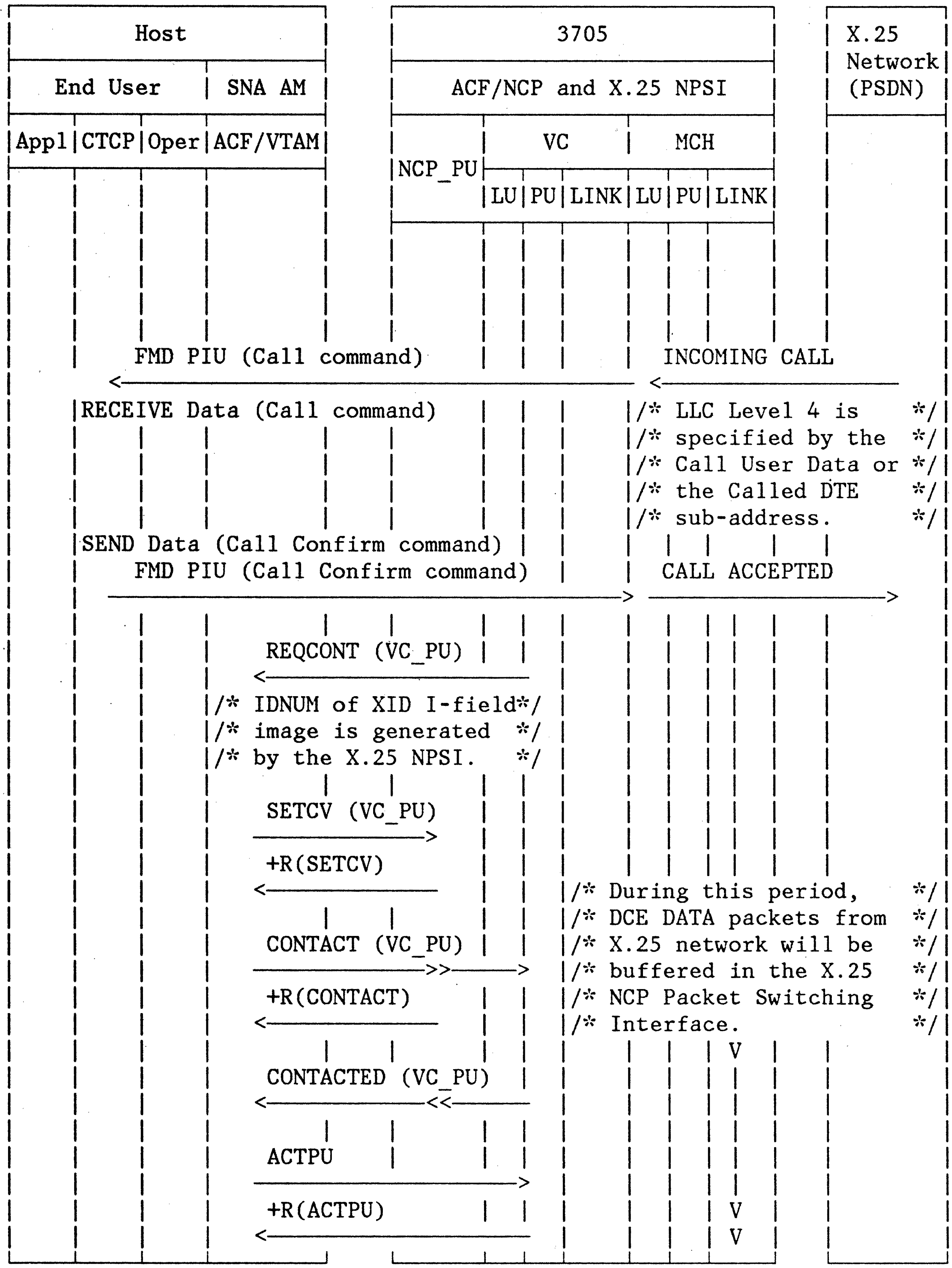


Figure 6-10 (Part 2 of 3). Call Establishment Sequence Type 4 VC (GATE=GENERAL, Call-In)

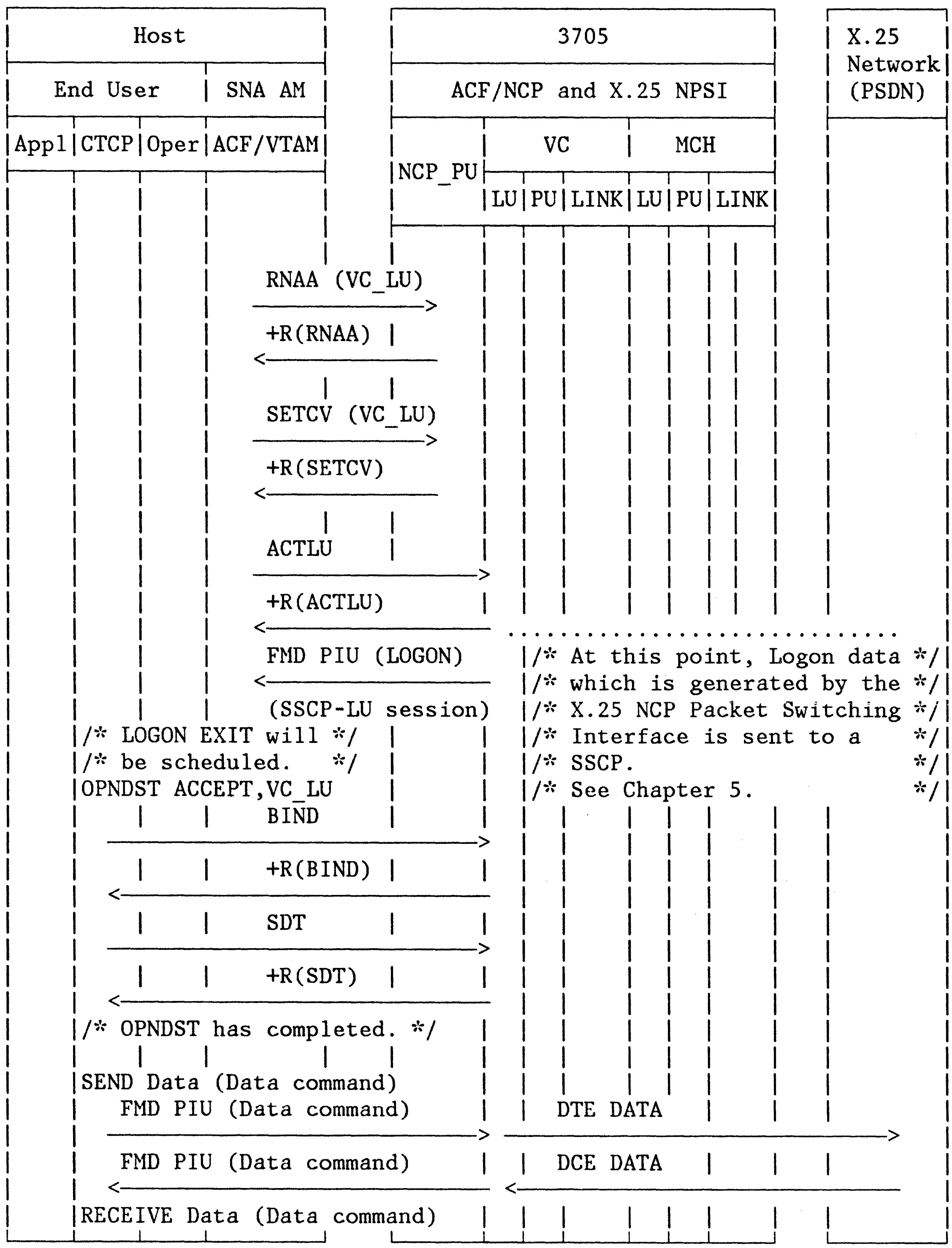


Figure 6-10 (Part 3 of 3). Call Establishment Sequence Type 4 VC (GATE=GENERAL, Call-In)

Activation Sequence - MCH - with DATE

<u>MCH Activation with DATE</u>

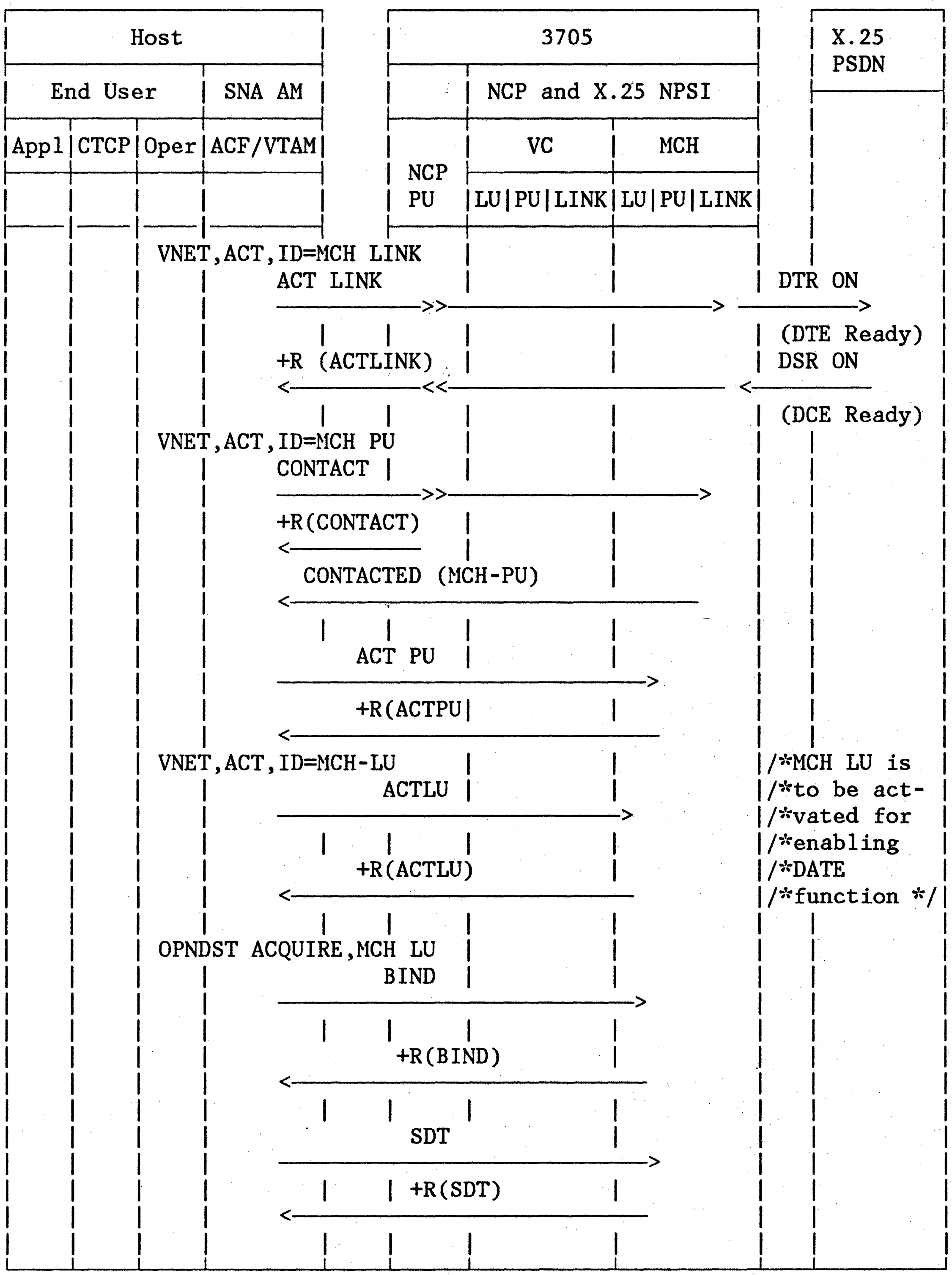


Figure 6-11 (Part 1 of 2). MCH Activation Sequence with DATE

```
┌────────────────────────────────┐    ┌───────────────────────────────────┐    ┌──────────────┐
|             Host               |    |              3705                 |    | X.25         |
├─────────────────┬──────────────┤    ├───────┬───────────────────────────┤    | PSDN         |
|   End User      | SNA AM       |    |       | NCP and X.25 NPSI         |    ├──────────────┤
├─────┬──────┬────┼──────────────┤    ├───────┼──────────────┬────────────┤    |              |
|Appl |CTCP  |Oper|ACF/VTAM      |    |       |     VC       |    MCH     |    |              |
├─────┼──────┼────┼──────────────┤    | NCP   |──────────────────────────|    |              |
|     |      |    |              |    | PU    |LU|PU|LINK|LU|PU|LINK      |    |              |
├─────┼──────┼────┼──────────────┤    ├───────┼──────────────┼────────────┘    |              |
|     | SEND DATE (RESTART COMMAND) |         |              |             |    |              |
|     |      | FMD PIU (Restart Request Command) |           |             | SABM              |
|     |      | ──────────────────────────────────────────>    ──────────────────>              |
|     |      |    |          |    |       |              |             | UA|                 |
|     |      |    |          |    |       |              |    <──────────────                |
|     |      |    |          |    |       |              |      RESTART REQUEST              |
|     |      |    |          |    |       |              |      ──────────────>              |
|     | RECEIVE DATE (RESTART CONFIRMATION)              |DCE RESTART CONFIRMATION|           |
|     | <────────────────────────────────────────────────     <──────────────                 |
|     |      |FMD PIU (Restart Confirmation Command)             |    |                       |
|     |      |    |          |    |       |              |       |    |                       |
|     |      |    |          |    |       |              |       |    |                       |

                                   OR

|     |      |    |          |    |       |              |       |    |                       |
|     |      |    |          |    |       |              |       |    |                       |
|     | SEND DATE (Restart Command) |     |              |       |    |                       |
|     |      | FMD PIU (Restart Request Command) |          SABM|                               |
|     | ────────────────────────────────────────────>    ──────────────────>                   |
|     |      |    |          |    |       |              |      |UA |                         |
|     |      |    |          |    |       |              |    <──────────────                  |
|     |      |    |          |    |       |              |    RESTART INDICATION              |
|     |      |    |          |    |       |              |    <──────────────                  |
|     |      | FMD PIU (Restart Confirmation Command)  DTE Restart Conf.                      |
|     |      | <──────────────────────────────────────    ──────────────────>                  |
|     |      |  Receive Data (Restart Confirmation)         |    |                            |
|     |      |    |          |    |       |              | After this set-up                  |
|     |      |    |          |    |       |              | Incoming Calls are                 |
|     |      |    |          |    |       |              | handled as described|              |
|     |      |    |          |    |       |              | below.|    |                       |
└─────┴──────┴────┴──────────┴────┴───────┴──────────────┴───────┴────┴───────────────────────┘
```

Figure 6-11 (Part 2 of 2). MCH Activation Sequence with DATE

Deactivation Sequence - MCH - with DATE

MCH Deactivation with DATE

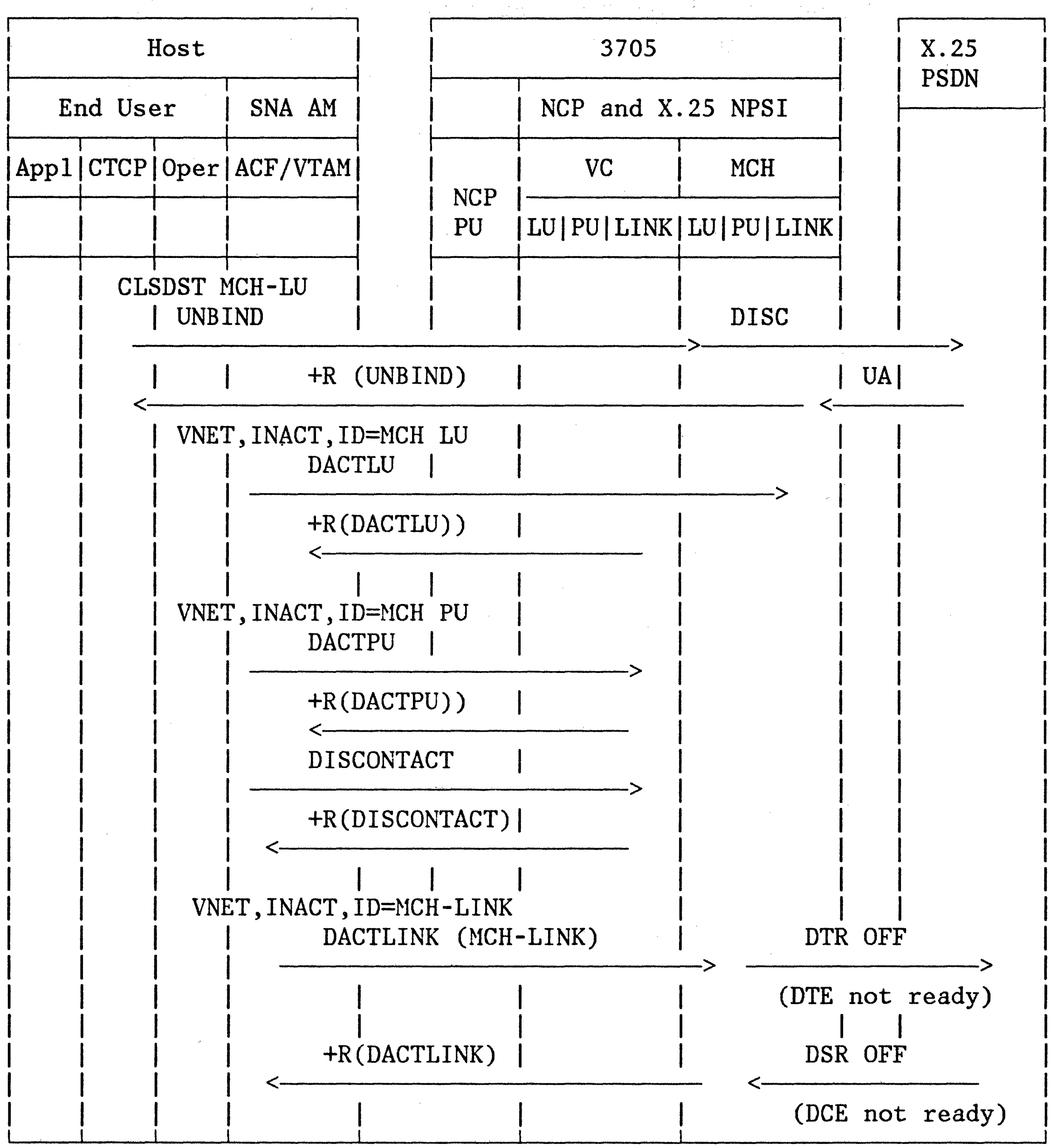


Figure 6-12. Deactivation of the MCH with DATE

- When the host operator deactivates the LU before the CTCP has issued a CLSDST the DISC/UA exchange is done when receiving the DACTLU.

- If the Discontact is received without previous Unbind or DACTLU received, the DISC/UA exchange is done as in Figure 6-2 on page 6-10.

LLC Level 5: Same as the case of GATE=NO. If sub-addressing mechanism is used, the LLC Level is specified by the last digit of Called DTE sub-address instead of the first 4 bytes of Call User Data.

GATE=DEDICAT

For Call-Out: Type 0 Virtual Circuit

```
┌──────────────────────────┐  ┌───────────────────────────────┐  ┌─────────┐
│          Host            │  │             3705              │  │ X.25    │
├───────────────────┬──────┤  ├───────────────────────────────┤  │ Network│
│    End User       │SNA AM│  │    ACF/NCP and X.25 NPSI      │  │ (PSDN)  │
├────┬────┬────┬────┴──────┤  ├───────┬───────────┬───────────┤  ├─────────┤
│Appl│CTCP│Oper│ACF/VTAM   │  │       │    VC     │    MCH    │  │         │
├────┼────┼────┼───────────┤  │NCP_PU ├──┬──┬─────┼──┬──┬─────┤  │         │
│    │    │    │           │  │       │LU│PU│LINK │LU│PU│LINK │  │         │
│    │    │    │           │  ├───────┼──┼──┼─────┼──┼──┼─────┤  │         │
│    │    │    │           │  │       │  │  │     │/*MCH-LU should be in*/│
│    │    │    │           │  │       │  │  │     │/*session with CTCP  */│
│    │    │    │           │  │       │  │  │     │/* Link Level of     */│
│    │    │    │           │  │       │  │  │     │/* DTE/DCE interface */│
│    │    │    │           │  │       │  │  │     │/* is active.        */│
│    │    │    │           │  │       │  │  │     │  │  │     │  │         │
│    │    │    │           │  │       │  │  │     │  │  │     │  │         │
│    │    │    │           │  │       │  │  │     │  │  │     │  │         │
└────┴────┴────┴───────────┘  └───────┴──┴──┴─────┴──┴──┴─────┘  └─────────┘
```

Figure 6-13 (Part 1 of 3). Call Establishment Sequence Type 0 VC (GATE=DEDICAT, Call-Out)

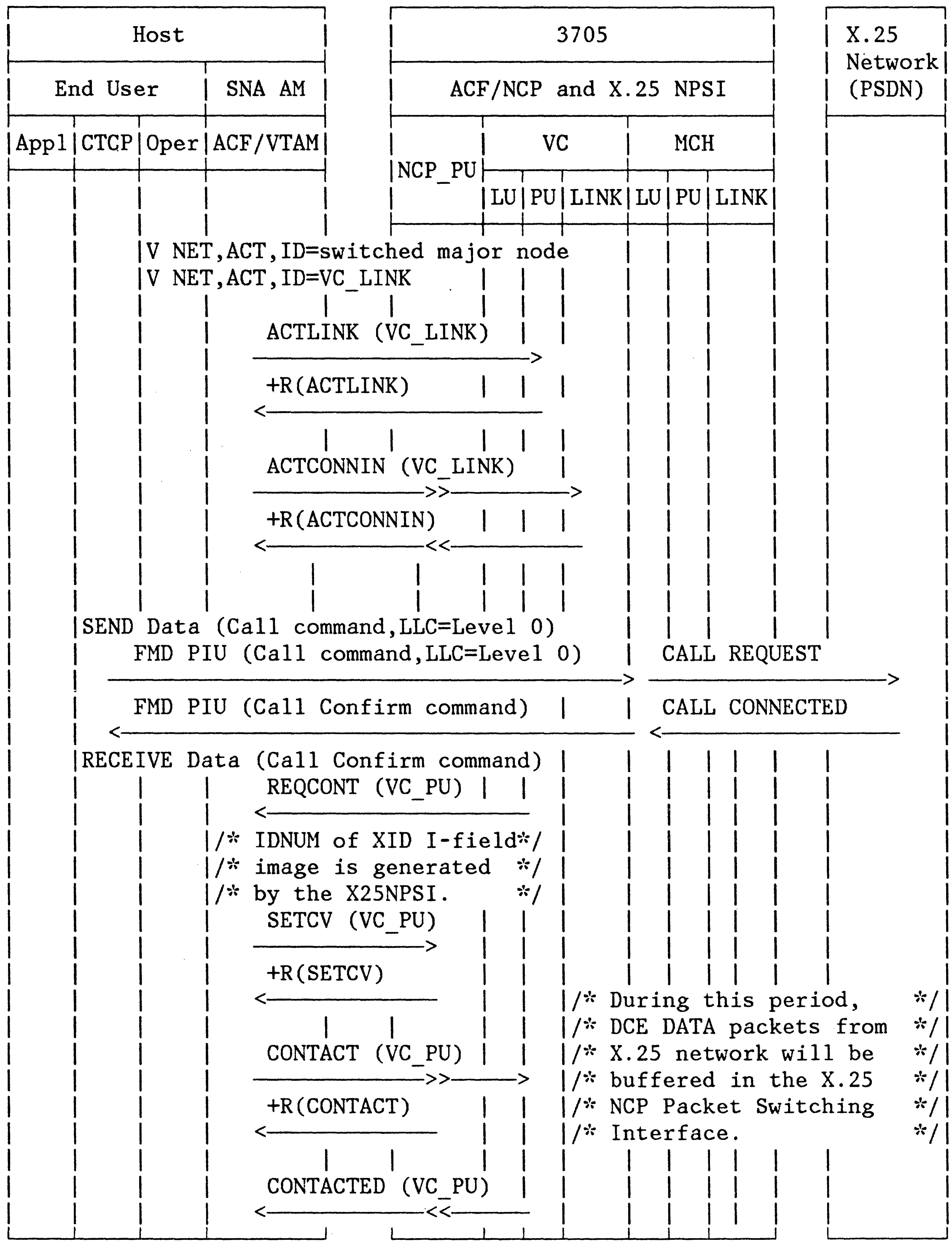


Figure 6-13 (Part 2 of 3). Call Establishment Sequence Type 0 VC (GATE=DEDICAT, Call-Out)

Call Sequence - VC - GATE=DEDICAT

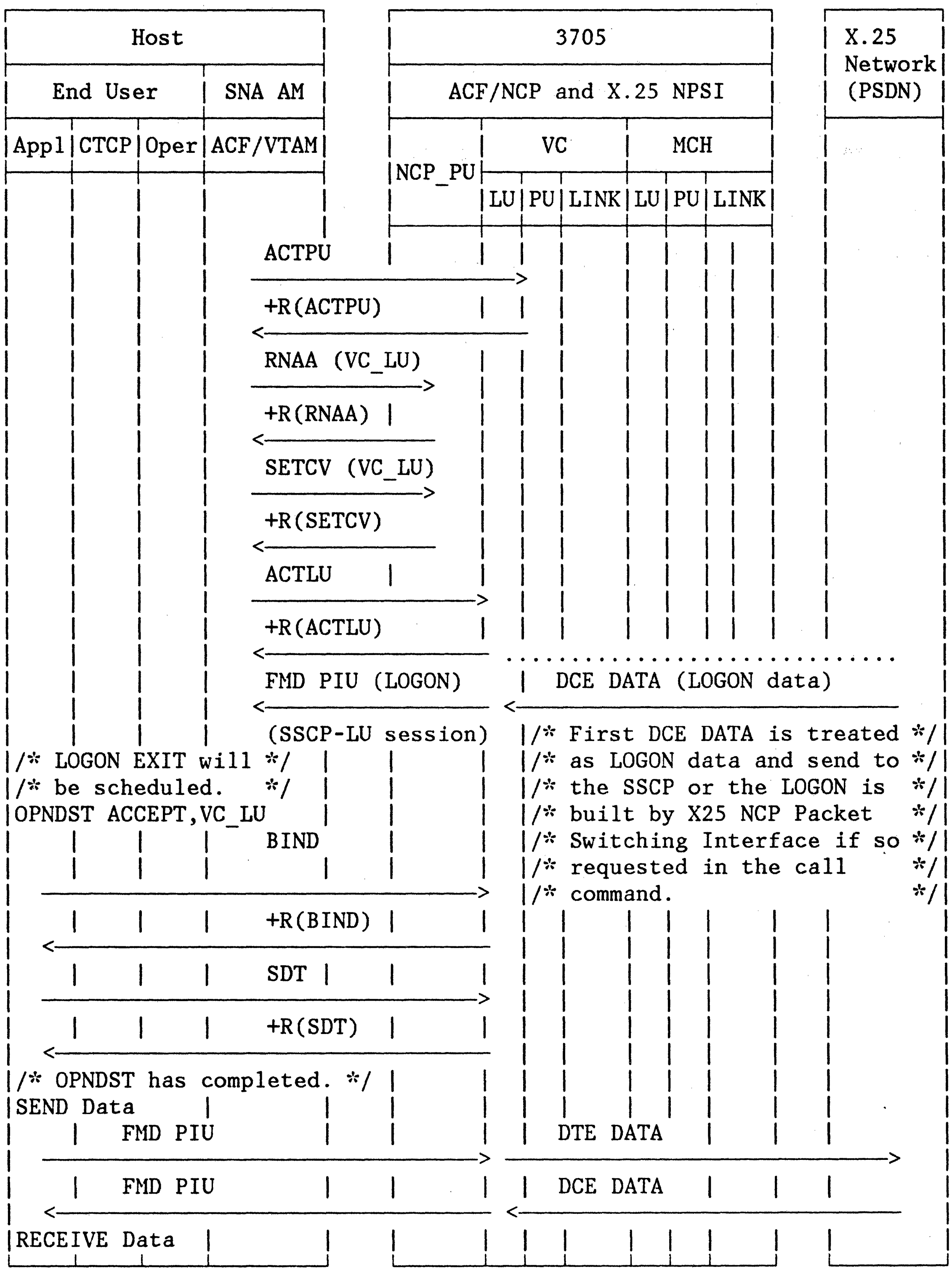


Figure 6-13 (Part 3 of 3). Call Establishment Sequence Type 0 VC (GATE=DEDICAT, Call-Out)

For Call-Out: Type 2 Virtual Circuit

```
+-----------------------+   +----------------------------+  +--------+
|         Host          |   |            3705            |  | X.25   |
+---------------+-------+   +----------------------------+  | Network|
|   End User    |SNA AM |   |    ACF/NCP and X.25 NPSI   |  | (PSDN) |
+----+----+-----+-------+   +-------+----------+---------+  +--------+
|Appl|CTCP|Oper|ACF/VTAM|   |       |    VC    |   MCH   |  |        |
+----+----+----+--------+   |NCP_PU +--+--+----+--+--+---+  |        |
|    |    |    |        |   |       |LU|PU|LINK|LU|PU|LINK|  |        |
|    |    |    |        |   +-------+--+--+----+--+--+---+  |        |
|    |    |    |        |   |       |  |  |    |/* MCH LU in session */|
|    |    |    |        |   |       |  |  |    |/* with CTCP         */|
|    |    |    |        |   |       |  |  |    |/* Link Level of     */|
|    |    |    |        |   |       |  |  |    |/* DTE/DCE interface */|
|    |    |    |        |   |       |  |  |    |/* is active.        */|
|    |    |    |        |   |       |  |  |    |  |  |   |  |        |
|    |    |V NET,ACT,ID=switched major node    |  |  |   |  |        |
|    |    |V NET,ACT,ID=VC_LINK    |  |  |    |  |  |   |  |        |
|    |    |    |        |   |       |  |  |    |  |  |   |  |        |
|    |    |    |  ACTLINK (VC_LINK) |  |  |    |  |  |   |  |        |
|    |    |    | ------------->     |  |  |    |  |  |   |  |        |
|    |    |    |  +R(ACTLINK)       |  |  |    |  |  |   |  |        |
|    |    |    | <-------------     |  |  |    |  |  |   |  |        |
|    |    |    |        |   |       |  |  |    |  |  |   |  |        |
|    |    |    |  ACTCONNIN (VC_LINK)   |  |    |  |  |   |  |        |
|    |    |    | ------------->>----------->   |  |  |   |  |        |
|    |    |    |  +R(ACTCONNIN) |   |  |  |    |  |  |   |  |        |
|    |    |    | <-------------<<-----------   |  |  |   |  |        |
|    |    |    |        |   |       |  |  |    |  |  |   |  |        |
|    |    |    |        |   |       |  |  |    |  |  |   |  |        |
+----+----+----+--------+   +-------+--+--+----+--+--+---+  +--------+
```

Figure 6-14 (Part 1 of 3). Call Establishment Sequence Type 2 VC (GATE=DEDICAT, Call-Out)

Call Sequence - VC - GATE=DEDICAT

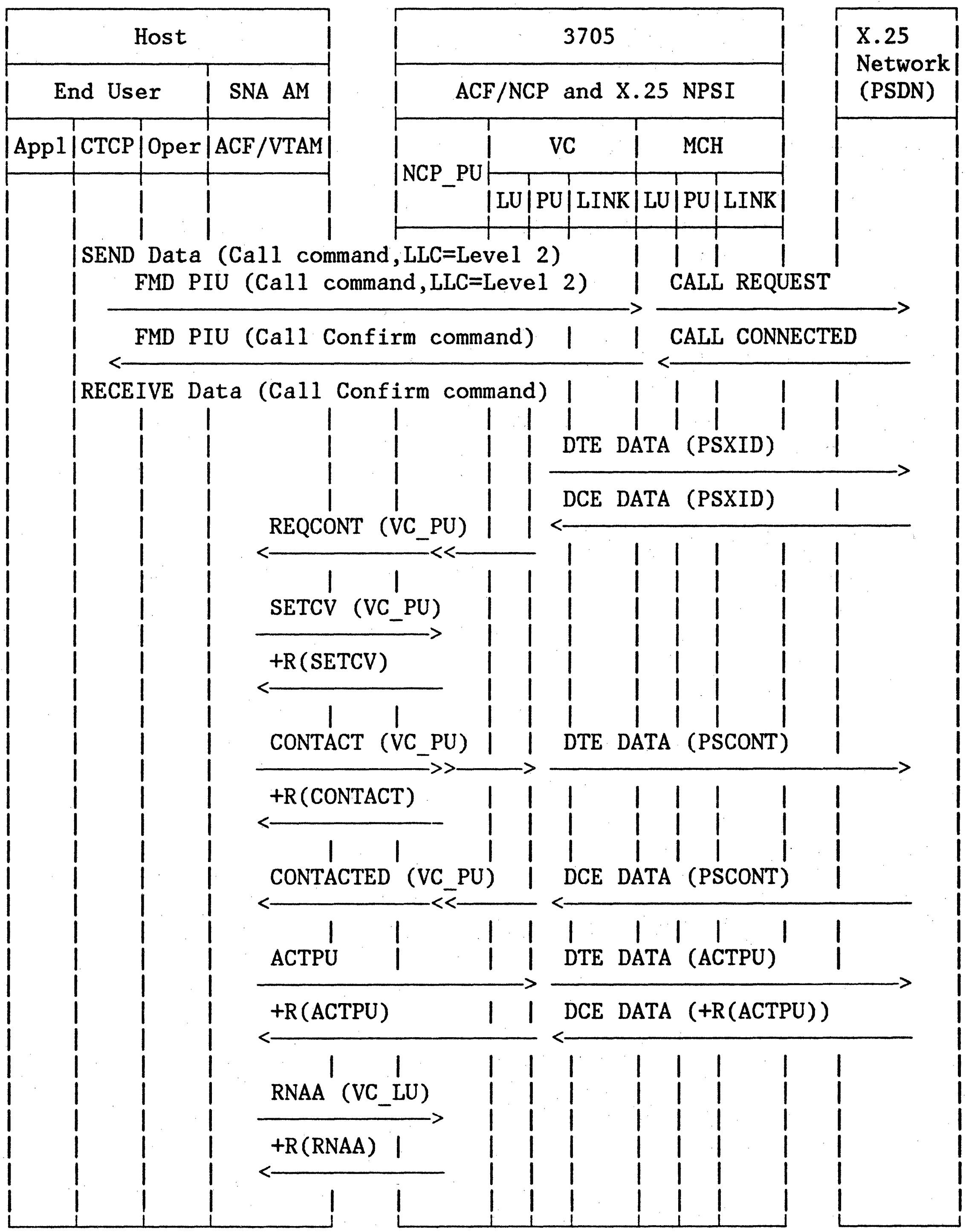


Figure 6-14 (Part 2 of 3). Call Establishment Sequence Type 2 VC (GATE=DEDICAT, Call-Out)

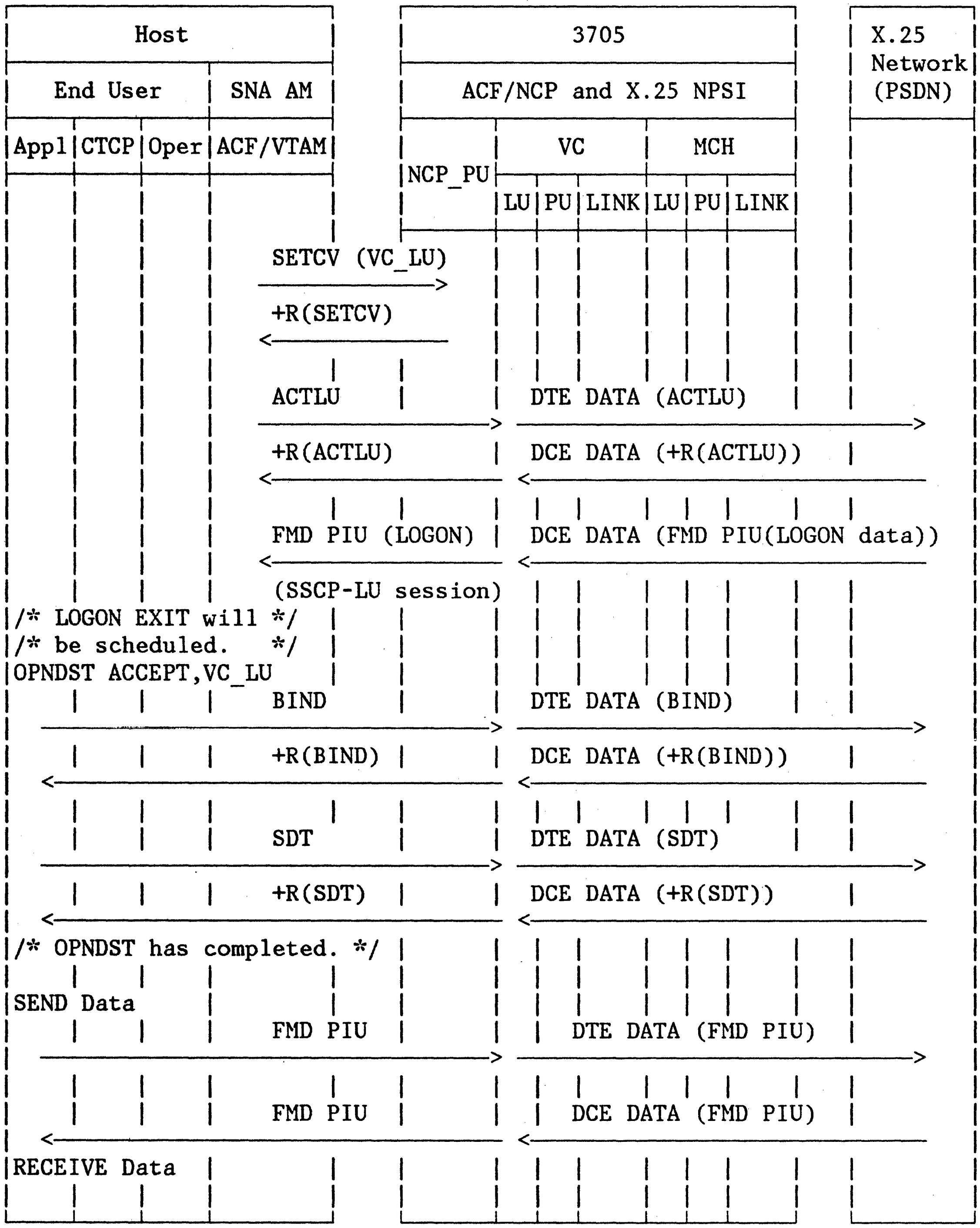


Figure 6-14 (Part 3 of 3). Call Establishment Sequence Type 2 VC (GATE=DEDICAT, Call-Out)

Call Sequence - VC - GATE=DEDICAT

For Call-Out: Type 3 BNN Virtual Circuit

```
┌──────────────────────────────┐  ┌───────────────────────────────────┐  ┌──────────┐
│            Host              │  │               3705                │  │ X.25     │
├────────────────────┬─────────┤  ├───────────────────────────────────┤  │ Network  │
│    End User        │ SNA AM  │  │       ACF/NCP and X.25 NPSI       │  │ (PSDN)   │
├─────┬──────┬───────┼─────────┤  ├────────┬──────────────┬───────────┤  ├──────────┤
│Appl │CTCP  │Oper   │ACF/VTAM │  │        │      VC      │    MCH    │  │          │
├─────┴──────┴───────┴─────────┤  │NCP_PU  ├──┬──┬────────┼──┬──┬─────┤  │          │
│     │      │       │         │  │        │LU│PU│LINK    │LU│PU│LINK │  │          │
│     │      │       │         │  ├────────┴──┴──┴────────┼──┴──┴─────┤  │          │
│     │      │       │         │  │        │  │  │        │/* MCH LU in session */│
│     │      │       │         │  │        │  │  │        │/* with CTCP         */│
│     │      │       │         │  │        │  │  │        │/* Link Level of     */│
│     │      │       │         │  │        │  │  │        │/* DTE/DCE interface */│
│     │      │       │         │  │        │  │  │        │/* is active.        */│
│     │      │       │         │  │        │  │  │        │  │  │     │  │          │
│     │      │V NET,ACT,ID=switched major node             │  │  │     │  │          │
│     │      │V NET,ACT,ID=VC_LINK         │  │  │        │  │  │     │  │          │
│     │      │       │         │  │        │  │  │        │  │  │     │  │          │
│     │      │       │  ACTLINK (VC_LINK)  │  │  │        │  │  │     │  │          │
│     │      │       │ ─────────────────>  │  │  │        │  │  │     │  │          │
│     │      │       │  +R(ACTLINK)        │  │  │        │  │  │     │  │          │
│     │      │       │ <─────────────────  │  │  │        │  │  │     │  │          │
│     │      │       │         │  │        │  │  │        │  │  │     │  │          │
│     │      │       │  ACTCONNIN (VC_LINK)      │        │  │  │     │  │          │
│     │      │       │ ─────────────────>>────────────>   │  │  │     │  │          │
│     │      │       │  +R(ACTCONNIN)      │  │  │        │  │  │     │  │          │
│     │      │       │ <─────────────────<<────────────   │  │  │     │  │          │
│     │      │       │         │  │        │  │  │        │  │  │     │  │          │
│     │      │       │         │  │        │  │  │        │  │  │     │  │          │
└─────┴──────┴───────┴─────────┘  └────────┴──┴──┴────────┴──┴──┴─────┘  └──────────┘
```

Figure 6-15 (Part 1 of 3). Call Establishment Sequence Type 3 BNN VC (GATE=DEDICAT, Call-Out)

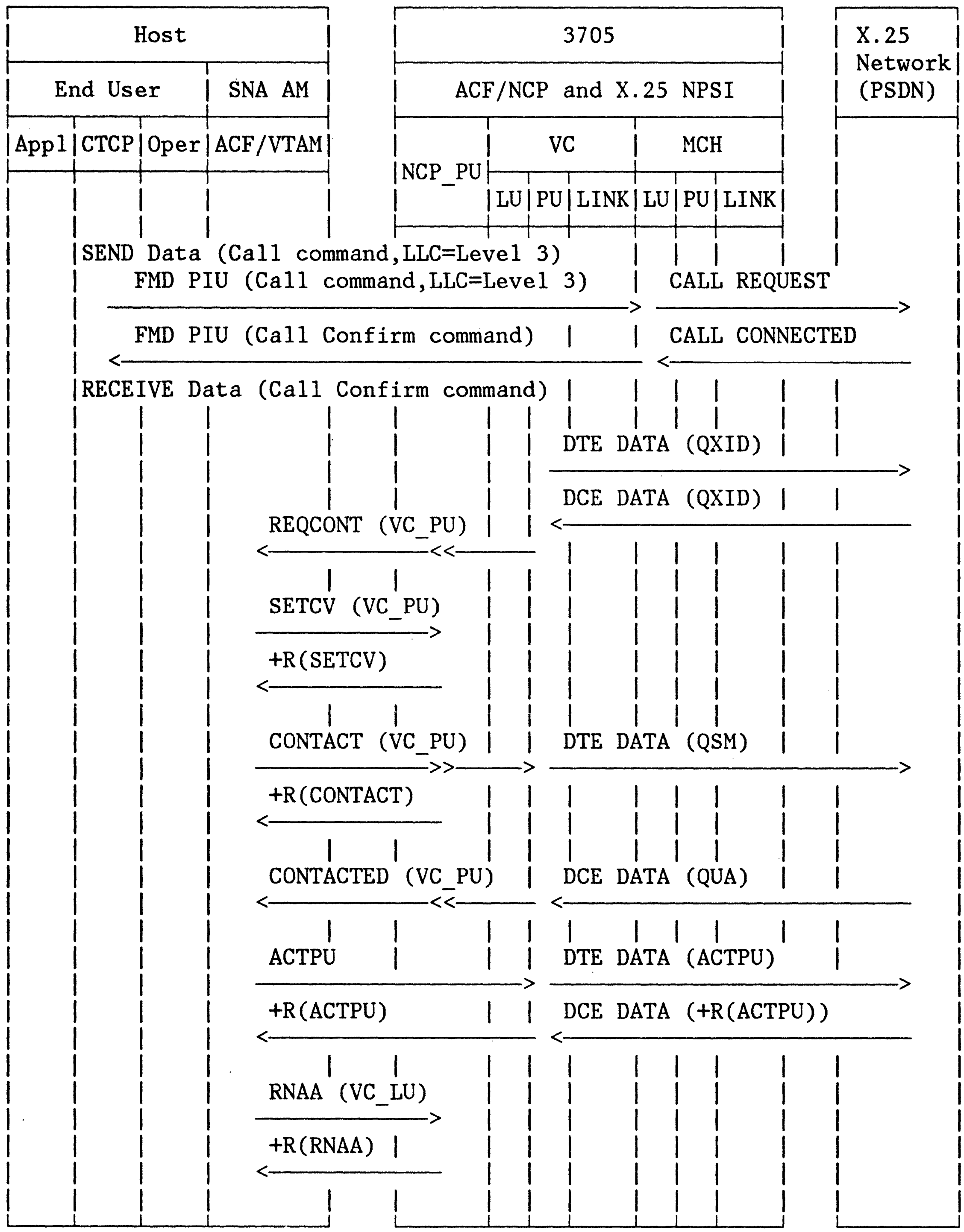


Figure 6-15 (Part 2 of 3). Call Establishment Sequence Type 3 BNN VC (GATE=DEDICAT, Call-Out)

Call Sequence - VC - GATE=DEDICAT

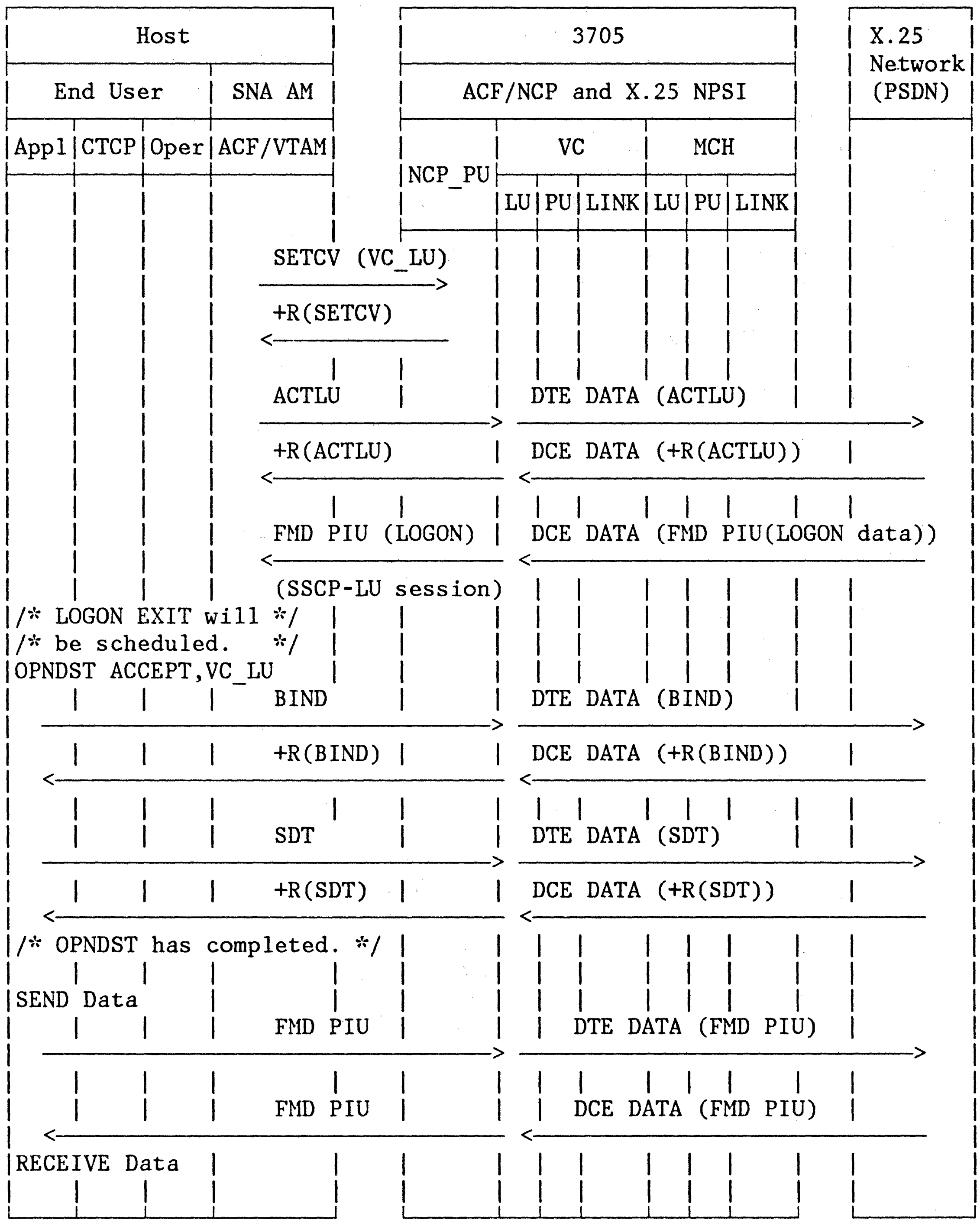


Figure 6-15 (Part 3 of 3). Call Establishment Sequence Type 3 BNN VC (GATE=DEDICAT, Call-Out)

<u>For Call-Out</u>: LLC Level 5 Virtual Circuit

```
┌───────────────────────────┐     ┌─────────────────────────────────┐    ┌─────────┐
|           Host            |     |              3705               |    | X.25    |
├─────────────────┬─────────┤     ├─────────────────────────────────┤    | Network |
|    End User     | SNA AM  |     |      ACF/NCP and X.25 NPSI      |    | (PSDN)  |
├─────┬─────┬─────┼─────────┤     ├───────┬────────────┬────────────┤    ├─────────┤
|Appl |CTCP |Oper |ACF/VTAM |     |       |     VC     |    MCH     |    |         |
├─────┼─────┼─────┼─────────┤     |NCP_PU ├──┬──┬──────┼──┬──┬──────┤    |         |
|     |     |     |         |     |       |LU|PU|LINK  |LU|PU|LINK  |    |         |
|     |     |     |         |     ├───────┼──┼──┼──────┼──┼──┼──────┤    |         |
|     |     |     |         |     |       |  |  |      |/* Link Level of     */|
|     |     |     |         |     |       |  |  |      |/* DTE/DCE interface */|
|     |     |     |         |     |       |  |  |      |/* is active.        */|
|     |     |     |         |     |       |  |  |      |/* and MCH-LU in     */|
|     |     |     |         |     |       |  |  |      |/* session with CTCP */|
|     |     |     |         |     |       |  |  |      |  |  |      |    |         |
|     |     |     |         |     |       |  |  |      |  |  |      |    |         |
|     |     |     |         |     |       |  |  |      |  |  |      |    |         |
|     |     |V NET,ACT,ID=switched major node            |  |  |      |    |         |
|     |     |V NET,ACT,ID=VC_LINK         |  |  |      |  |  |      |    |         |
|     |     |     |         |     |       |  |  |      |  |  |      |    |         |
|     |     |     |  ACTLINK (VC_LINK)    |  |  |      |  |  |      |    |         |
|     |     |     |  ------------------>  |  |  |      |  |  |      |    |         |
|     |     |     |  +R(ACTLINK)          |  |  |      |  |  |      |    |         |
|     |     |     |  <------------------  |  |  |      |  |  |      |    |         |
|     |     |     |         |     |       |  |  |      |  |  |      |    |         |
|     |     |     |  ACTCONNIN (VC_LINK)        |      |  |  |      |    |         |
|     |     |     |  ------------------>>---------->   |  |  |      |    |         |
|     |     |     |  +R(ACTCONNIN)        |  |  |      |  |  |      |    |         |
|     |     |     |  <------------------<<-----------  |  |  |      |    |         |
|     |     |     |         |     |       |  |  |      |  |  |      |    |         |
|     |     |     |         |     |       |  |  |      |  |  |      |    |         |
|     |     |     |         |     |       |  |  |      |  |  |      |    |         |
└─────┴─────┴─────┴─────────┘     └───────┴──┴──┴──────┴──┴──┴──────┘    └─────────┘
```

Figure 6-16 (Part 1 of 3). Call Establishment Sequence Type 5 Virtual Circuit (GATE=DEDICAT, Call-Out)

Call Sequence - VC - GATE=DEDICAT

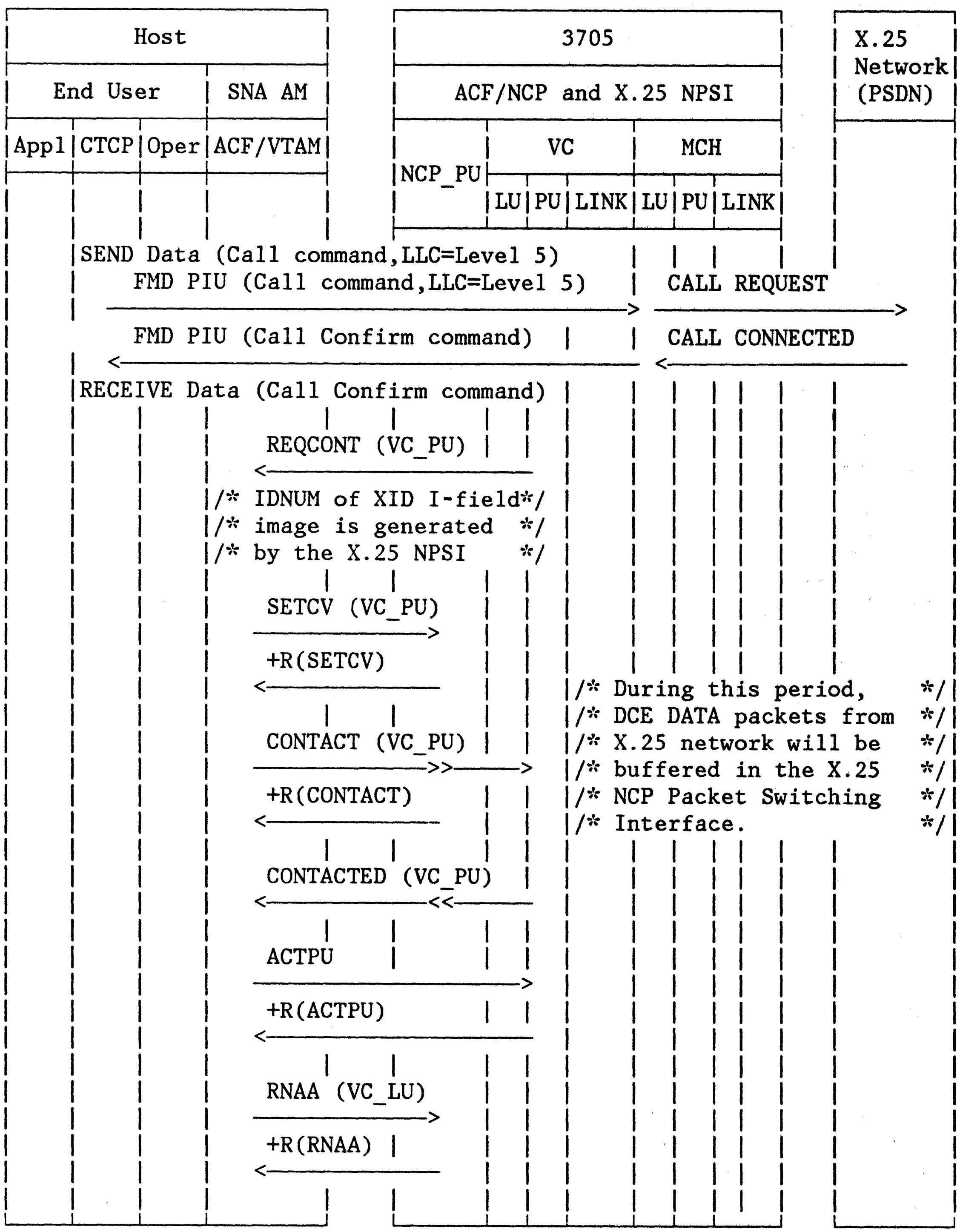


Figure 6-16 (Part 2 of 3). Call Establishment Sequence Type 5 Virtual Circuit (GATE=DEDICAT, Call-Out)

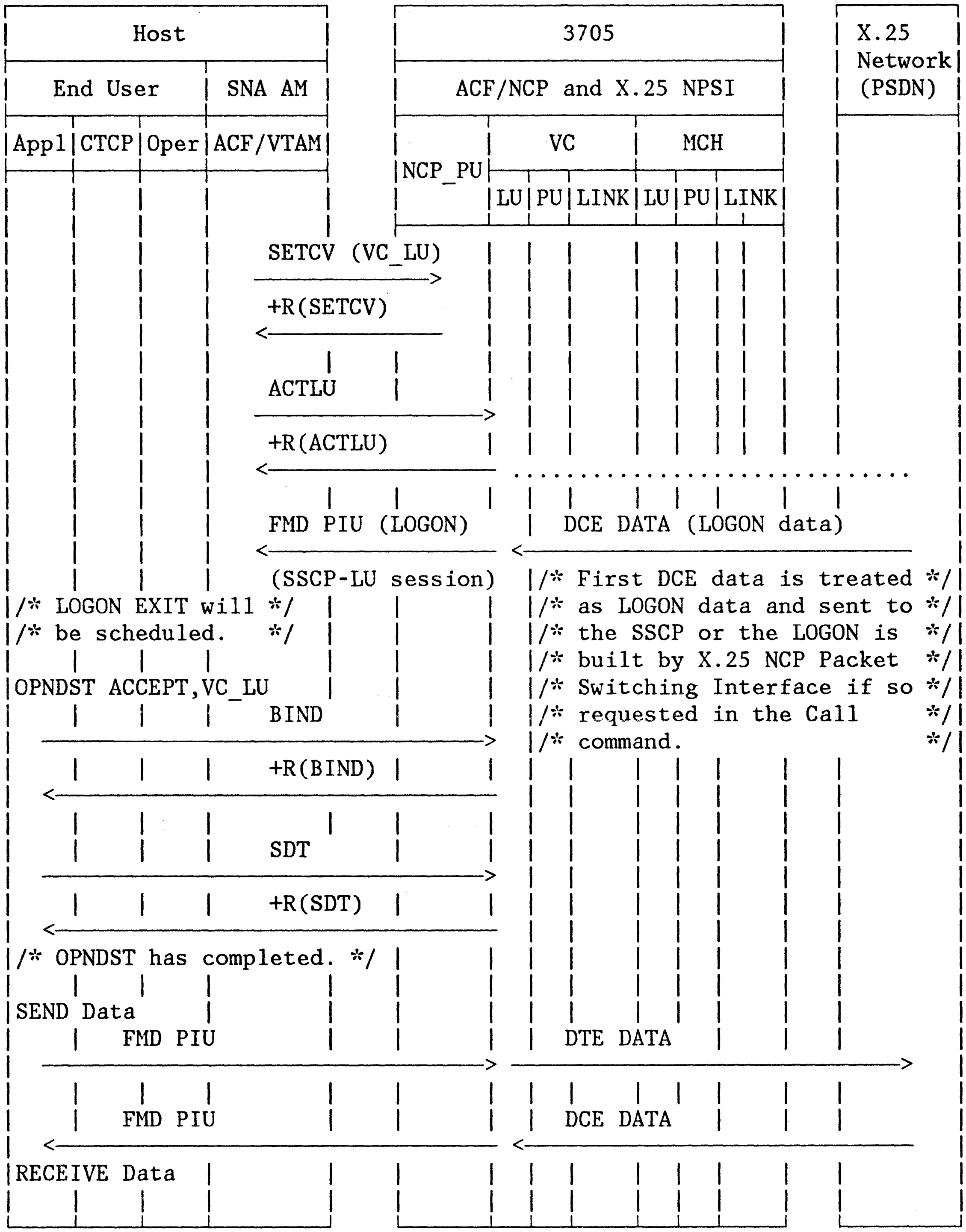


Figure 6-16 (Part 3 of 3). Call Establishment Sequence Type 5 Virtual Circuit (GATE=DEDICAT, Call-Out)

Call Sequence - VC - GATE=DEDICAT

For Call-In: Type 0 Virtual Circuit

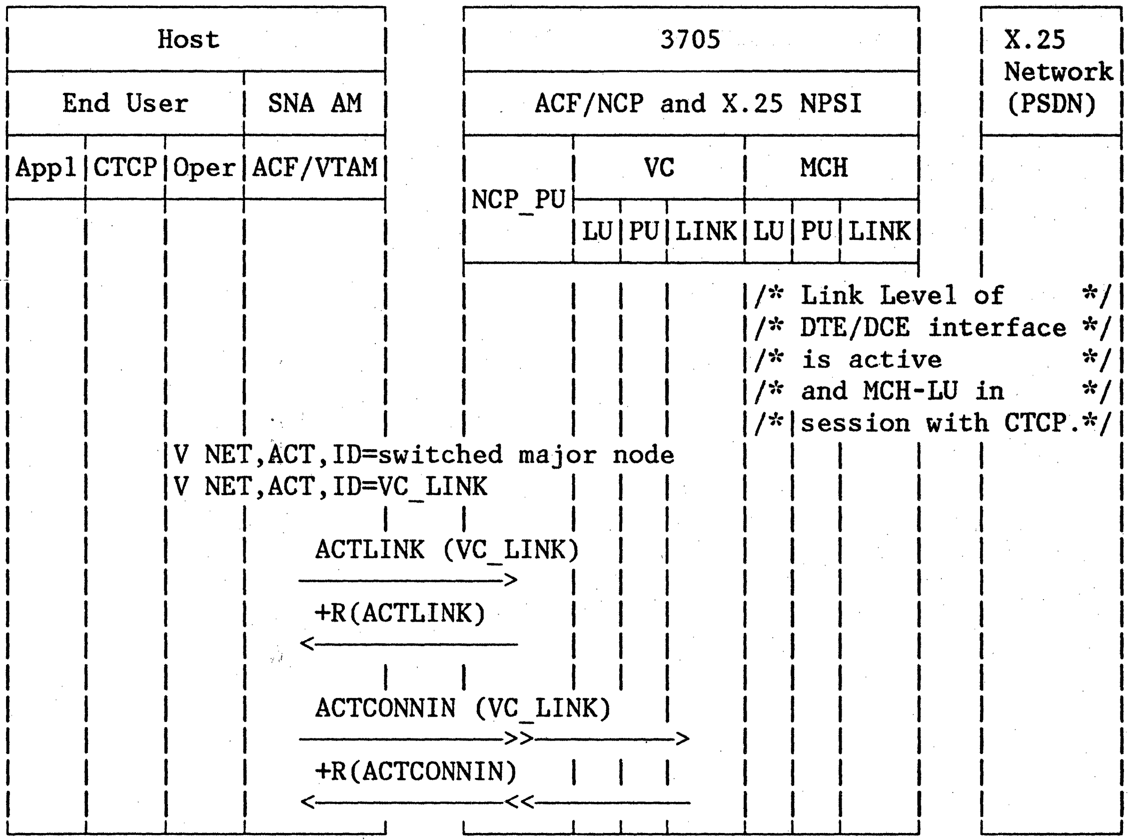


Figure 6-17 (Part 1 of 3). Call Establishment Sequence Type 0 VC (GATE=DEDICAT, Call-In)

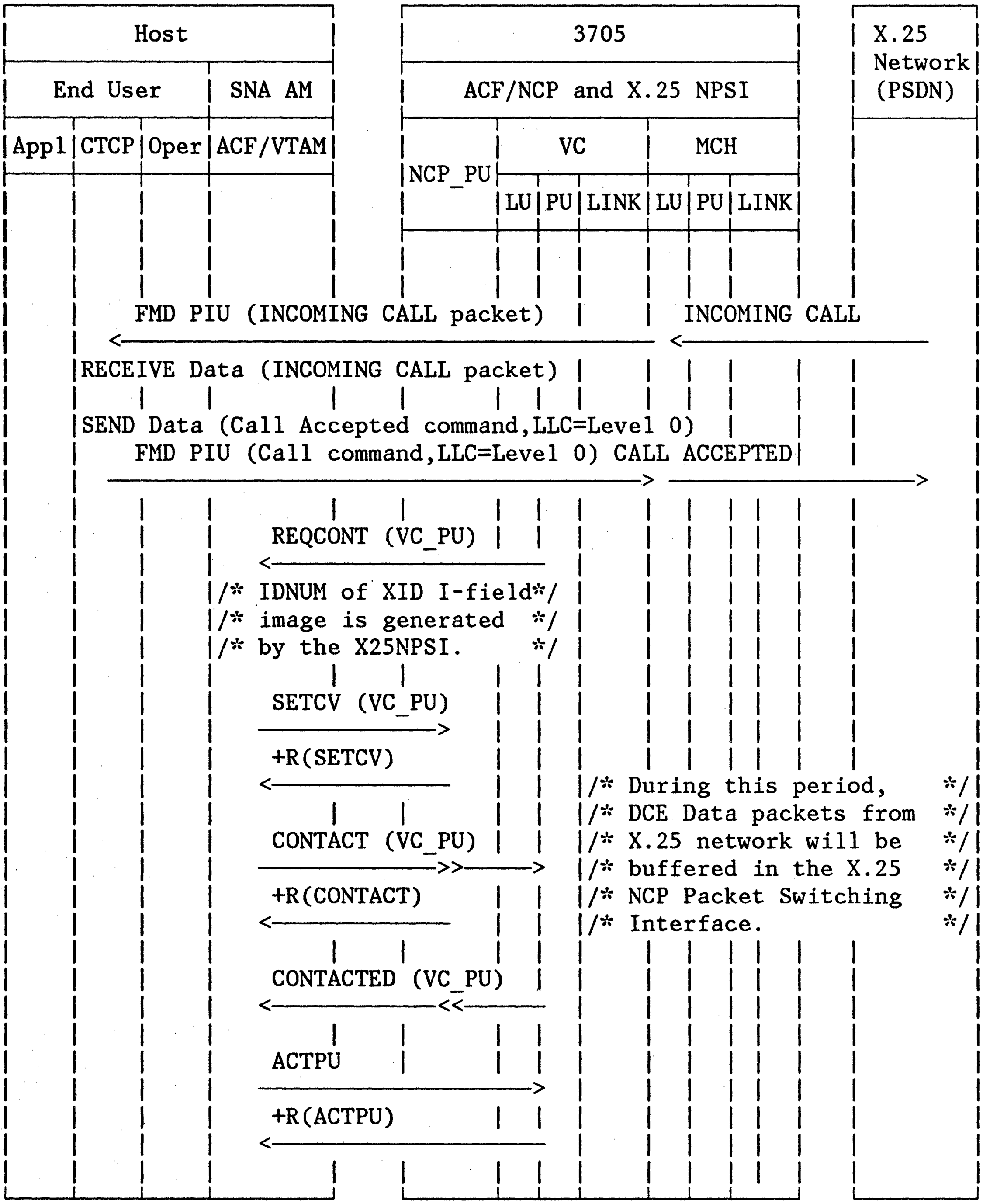


Figure 6-17 (Part 2 of 3). Call Establishment Sequence Type 0 VC (GATE=DEDICAT, Call-In)

Call Sequence - VC - GATE=DEDICAT

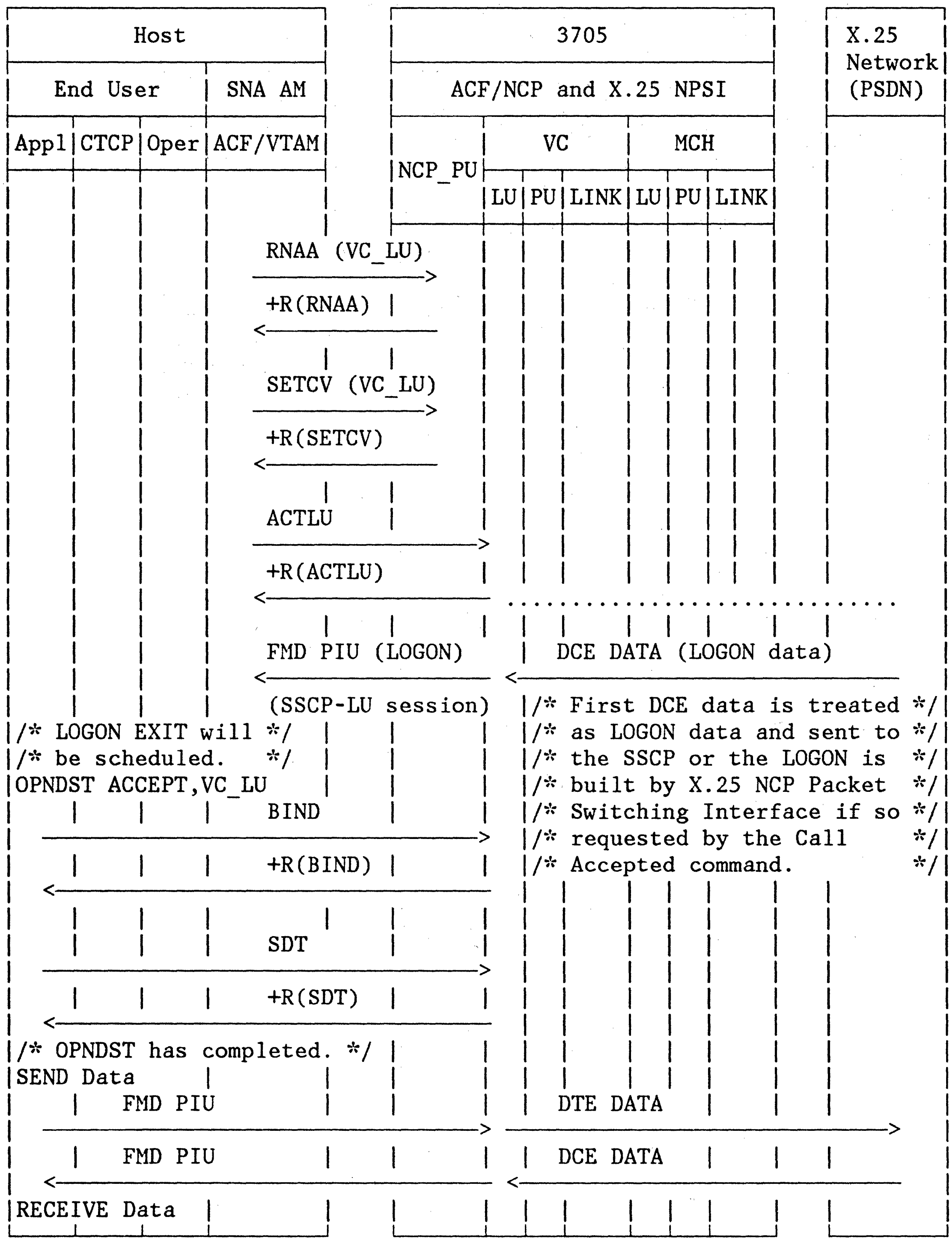


Figure 6-17 (Part 3 of 3). Call Establishment Sequence Type 0 VC (GATE=DEDICAT, Call-In)

For Call-In: Type 2 Virtual Circuit

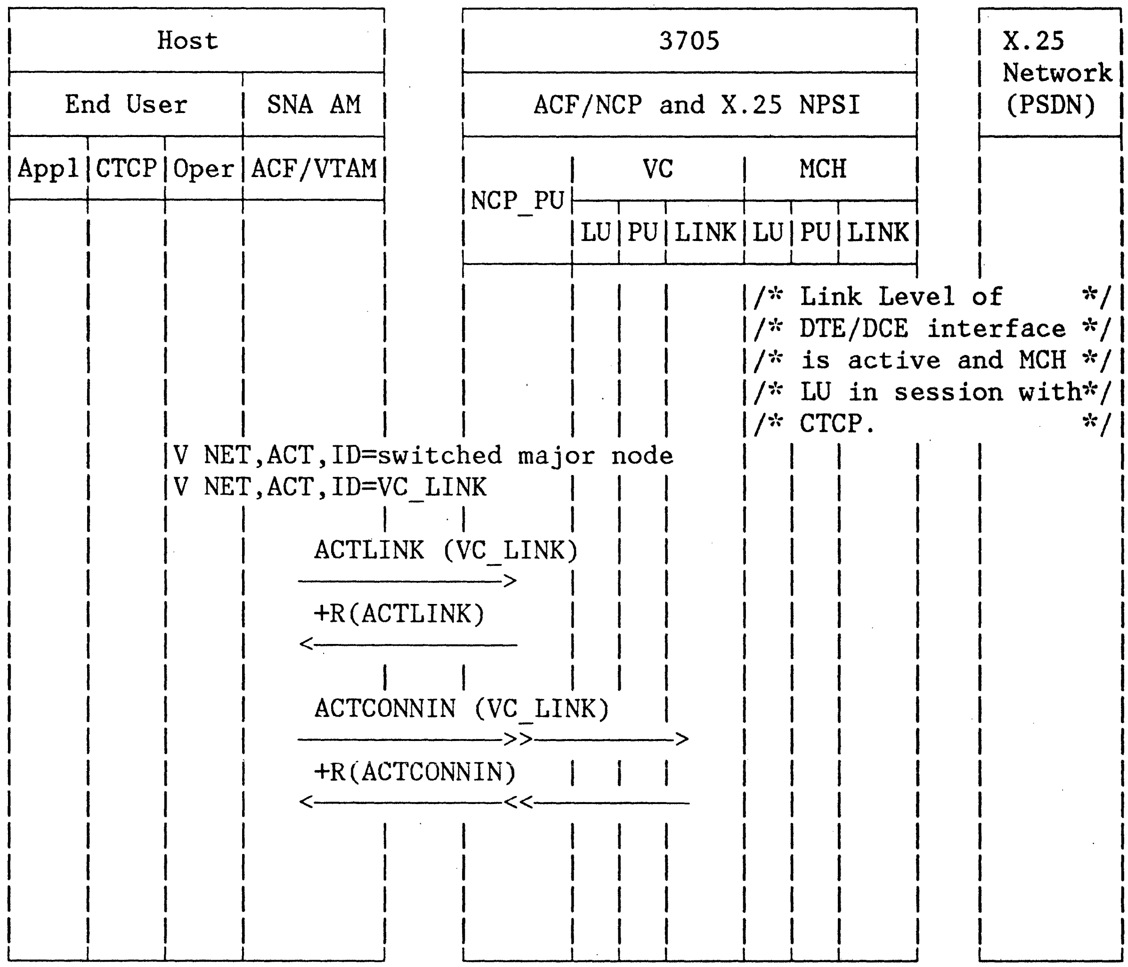


Figure 6-18 (Part 1 of 3). Call Establishment Sequence Type 2 Virtual Circuit (GATE=DEDICAT, Call-In)

Call Sequence - VC - GATE=DEDICAT

```
┌──────────────────────────┐   ┌──────────────────────────────┐   ┌────────┐
|          Host            |   |            3705              |   | X.25   |
|──────────────────────────|   |──────────────────────────────|   | Network|
|   End User       | SNA AM|   |     ACF/NCP and X.25 NPSI    |   | (PSDN) |
|──────────────────────────|   |──────────────────────────────|   |────────|
|Appl|CTCP|Oper|ACF/VTAM|   |       |     VC     |     MCH     |   |        |
|────|────|────|────────|   |NCP_PU |────────────|─────────────|   |        |
|    |    |    |        |   |       |LU|PU|LINK |LU|PU|LINK   |   |        |
|    |    FMD PIU (INCOMING CALL packet)  |     |  INCOMING CALL         |
|    |  <──────────────────────────────────────  <──────────────────     |
|    |RECEIVE Data (INCOMING CALL packet) |     |  |  |        |   |     |
|    |SEND Data (Call Accepted command,LLC=Level 2)  |        |   |     |
|    |    FMD PIU (Call command, LLC=Level 2) CALL ACCEPTED       |     |
|    |  ──────────────────────────────────────>  ──────────────────>    |
|    |    |    |                    |  |  DTE DATA (PSXID)       |     |
|    |    |    |                    |  |  ────────────────────────>    |
|    |    |    |                    |  |  DCE DATA (PSXID)       |     |
|    |    |    |  REQCONT (VC_PU)   |  |  <────────────────────────    |
|    |    |    |  <──────────<<──────                                  |
|    |    |    |  SETCV (VC_PU)     |  |                               |
|    |    |    |  ──────────────>   |  |                               |
|    |    |    |  +R(SETCV)         |  |                               |
|    |    |    |  <──────────────   |  |                               |
|    |    |    |  CONTACT (VC_PU)   |  |  DTE DATA (PSCONT)      |     |
|    |    |    |  ──────────>>─────>   ────────────────────────>     |
|    |    |    |  +R(CONTACT)       |  |                               |
|    |    |    |  <──────────────   |  |                               |
|    |    |    |  CONTACTED (VC_PU)    |  DCE DATA (PSCONT)      |     |
|    |    |    |  <──────────<<──────  <────────────────────────      |
|    |    |    |  ACTPU             |  |  DTE DATA (ACTPU)       |     |
|    |    |    |  ──────────────────>  ────────────────────────>     |
|    |    |    |  +R(ACTPU)         |  |  DCE DATA (+R(ACTPU))         |
|    |    |    |  <──────────────────  <────────────────────────      |
|    |    |    |  RNAA (VC_LU)      |  |                               |
|    |    |    |  ──────────────>   |  |                               |
|    |    |    |  +R(RNAA) |        |  |                               |
|    |    |    |  <──────────────   |  |                               |
└────┴────┴────┴────────┘   └──────────────────────────────┘   └────────┘
```

Figure 6-18 (Part 2 of 3). Call Establishment Sequence Type 2 Virtual Circuit (GATE=DEDICAT, Call-In)

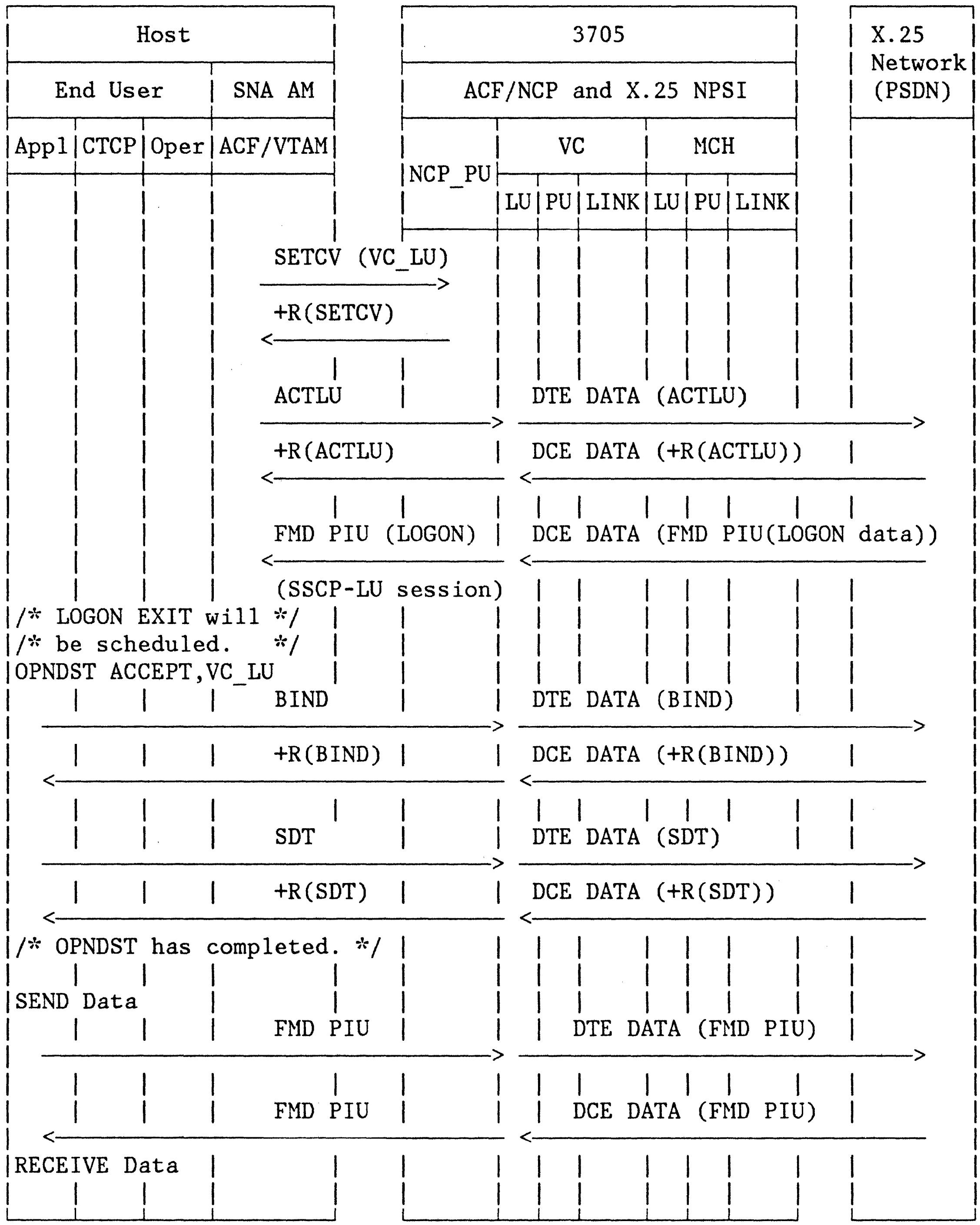


Figure 6-18 (Part 3 of 3). Call Establishment Sequence Type 2 Virtual Circuit (GATE=DEDICAT, Call-In)

Call Sequence - VC - GATE=DEDICAT

For Call-In: Type 3 Virtual Circuit

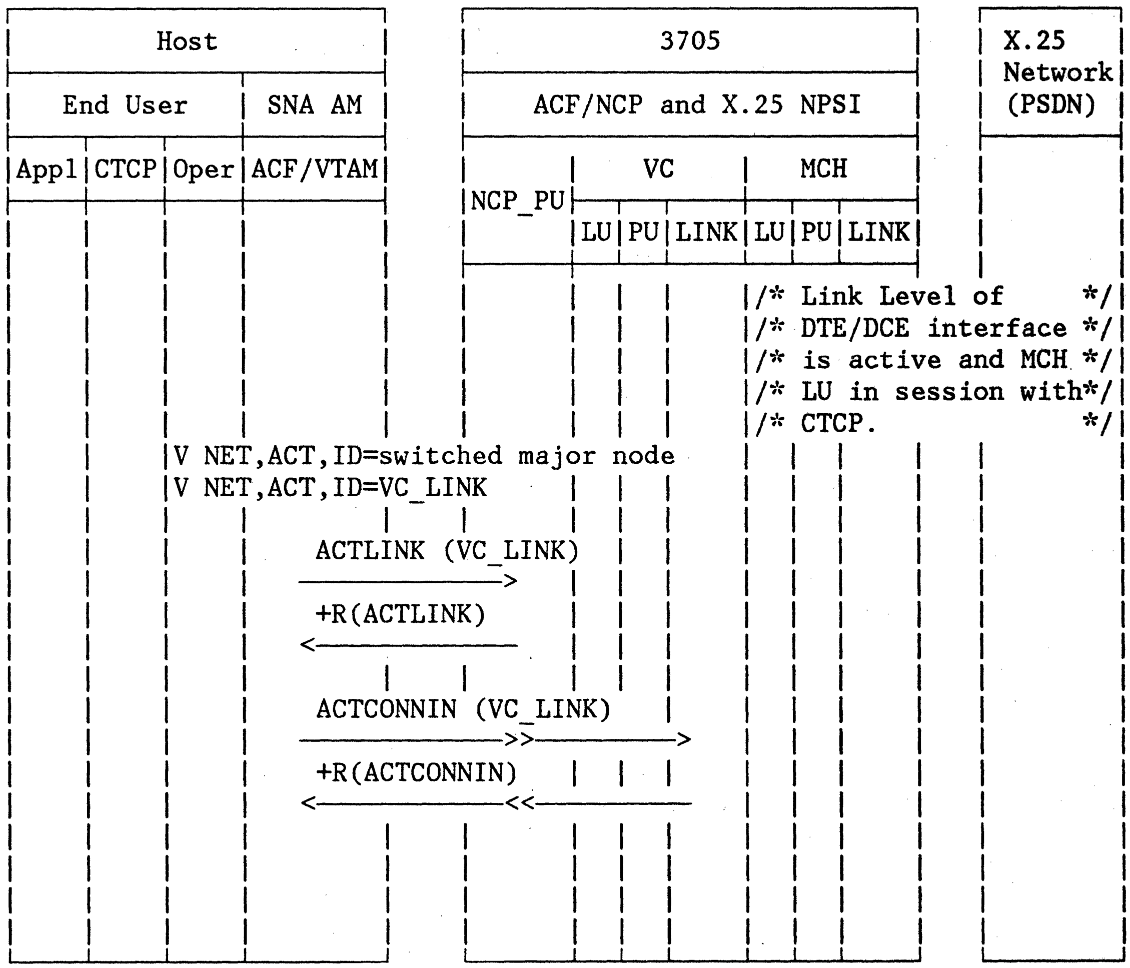


Figure 6-19 (Part 1 of 3). Call Establishment Sequence Type 3 BNN Virtual Circuit (GATE=DEDICAT, Call-In)

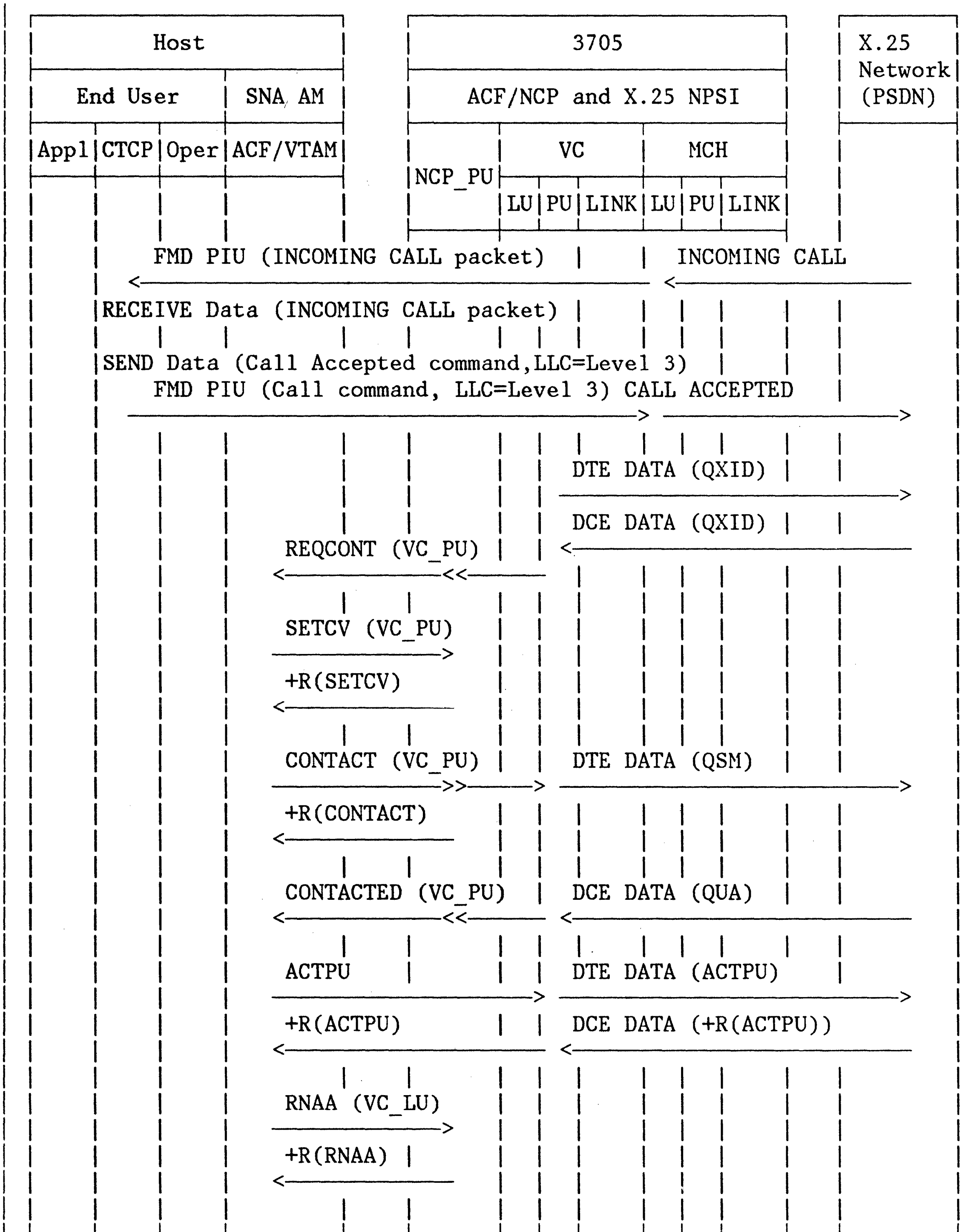


Figure 6-19 (Part 2 of 3). Call Establishment Sequence Type 3 BNN Virtual Circuit (GATE=DEDICAT, Call-In)

Call Sequence - VC - GATE=DEDICAT

```
┌──────────────────────────────┐   ┌────────────────────────────────────┐   ┌──────────┐
|             Host             |   |                3705                |   | X.25     |
├──────────────────┬───────────┤   ├────────────────────────────────────┤   | Network  |
|    End User      | SNA AM    |   |       ACF/NCP and X.25 NPSI        |   | (PSDN)   |
├────┬─────┬───────┼───────────┤   ├────────┬─────────────┬─────────────┤   ├──────────┤
|Appl|CTCP |Oper   |ACF/VTAM   |   |        |     VC      |     MCH     |   |          |
├────┴─────┴───────┴───────────┤   |NCP_PU  ├──┬──┬───────┼──┬──┬───────┤   |          |
|    |     |       |           |   |        |LU|PU|LINK   |LU|PU|LINK   |   |          |
|    |     |       |           |   └────────┴──┴──┴───────┴──┴──┴───────┘   |          |
|    |     |       |   SETCV (VC_LU)        |  |  |       |  |  |       |   |          |
|    |     |       |  ──────────────>       |  |  |       |  |  |       |   |          |
|    |     |       |   +R(SETCV)            |  |  |       |  |  |       |   |          |
|    |     |       |  <──────────────       |  |  |       |  |  |       |   |          |
|    |     |       |        |     |         |  |  |       |  |  |       |   |          |
|    |     |       |   ACTLU      |         |  DTE DATA (ACTLU)         |   |          |
|    |     |       |  ──────────────────────> ──────────────────────────────────>       |
|    |     |       |   +R(ACTLU)            |  DCE DATA (+R(ACTLU))         |          |
|    |     |       |  <────────────────────── <──────────────────────────────────       |
|    |     |       |        |     |         |  |  |       |  |  |       |   |          |
|    |     |       |   FMD PIU (LOGON)      |  DCE DATA (FMD PIU(LOGON data))          |
|    |     |       |  <────────────────────── <──────────────────────────────────       |
|    |     |       |   (SSCP-LU session)       |  |       |  |  |       |   |          |
|/* LOGON EXIT will */  |     |             |  |  |       |  |  |       |   |          |
|/* be scheduled.   */  |     |             |  |  |       |  |  |       |   |          |
|OPNDST ACCEPT,VC_LU    |     |             |  |  |       |  |  |       |   |          |
|    |     |       |   BIND       |         |  DTE DATA (BIND)          |   |          |
|  ──────────────────────────────────────────> ──────────────────────────────────>      |
|    |     |       |   +R(BIND)   |         |  DCE DATA (+R(BIND))          |          |
|  <────────────────────────────────────────── <──────────────────────────────────      |
|    |     |       |        |     |         |  |  |       |  |  |       |   |          |
|    |     |       |   SDT        |         |  DTE DATA (SDT)           |   |          |
|  ──────────────────────────────────────────> ──────────────────────────────────>      |
|    |     |       |   +R(SDT)    |         |  DCE DATA (+R(SDT))           |          |
|  <────────────────────────────────────────── <──────────────────────────────────      |
|/* OPNDST has completed. */      |         |  |  |       |  |  |       |   |          |
|    |     |       |        |     |         |  |  |       |  |  |       |   |          |
|SEND Data         |        |     |         |  |  |       |  |  |       |   |          |
|    |     |       |   FMD PIU    |         |  |  DTE DATA (FMD PIU)        |          |
|  ──────────────────────────────────────────> ──────────────────────────────────>      |
|    |     |       |        |     |         |  |  |       |  |  |       |   |          |
|    |     |       |   FMD PIU    |         |  |  DCE DATA (FMD PIU)        |          |
|  <────────────────────────────────────────── <──────────────────────────────────      |
|RECEIVE Data      |        |     |         |  |  |       |  |  |       |   |          |
|    |     |       |        |     |         |  |  |       |  |  |       |   |          |
└────┴─────┴───────┴────────┘     └─────────┴──┴──┴───────┴──┴──┴───────┘   └──────────┘
```

Figure 6-19 (Part 3 of 3). Call Establishment Sequence Type 3 BNN Virtual Circuit (GATE=DEDICAT, Call-In)

<u>For Call-In</u>: Type 5 Virtual Circuit

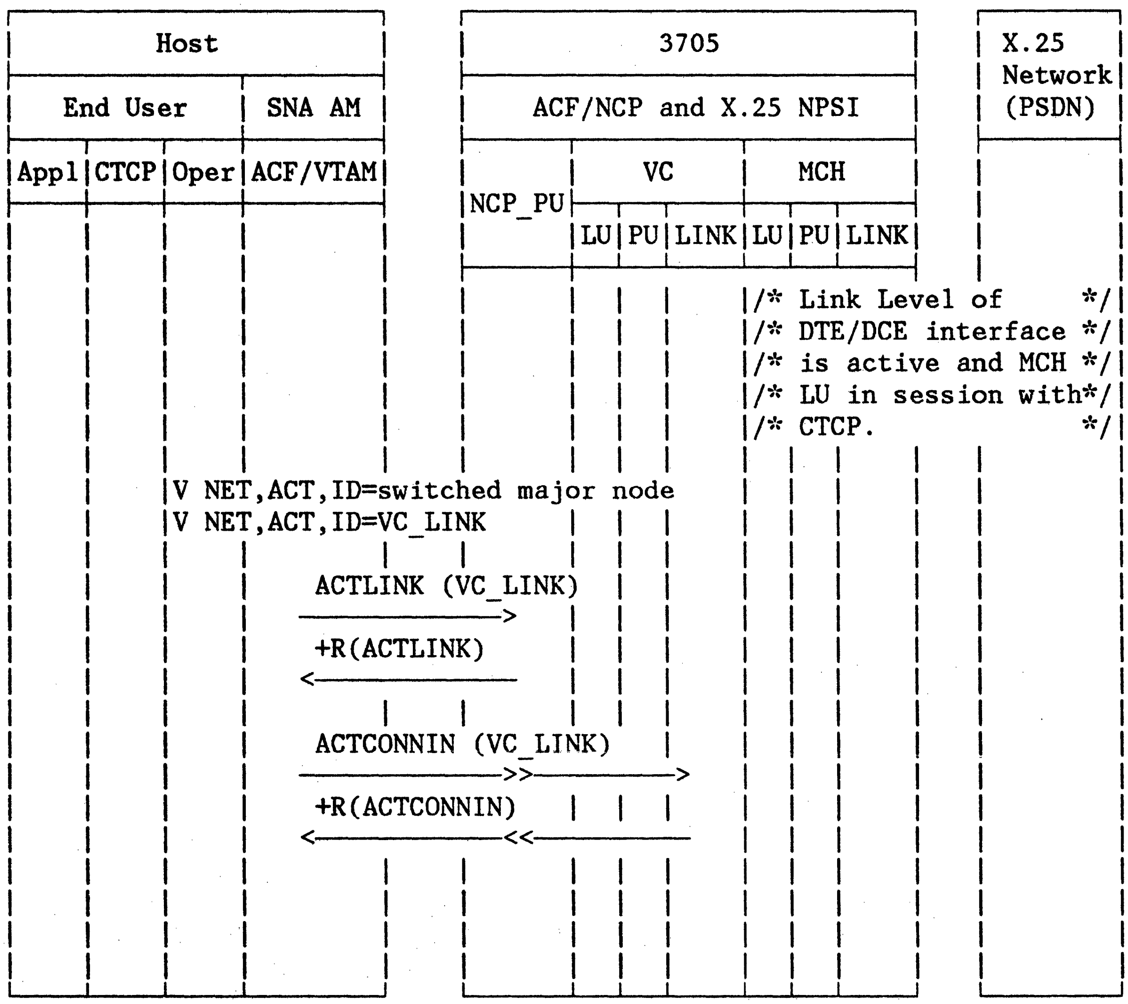


Figure 6-20 (Part 1 of 3). Call Establishment Sequence Type 5 Virtual Circuit (GATE=DEDICAT, Call-In)

Call Sequence - VC - GATE=DEDICAT

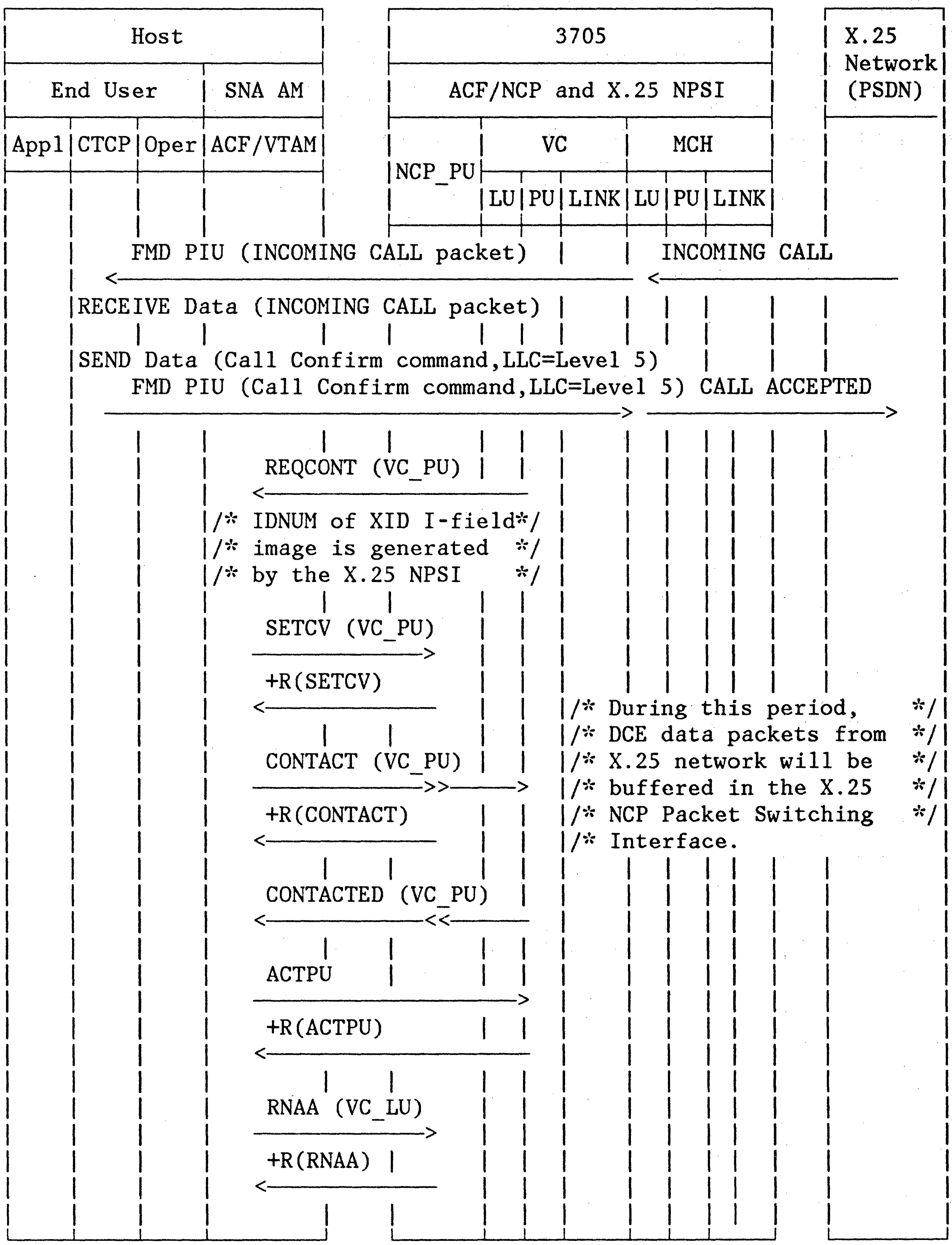


Figure 6-20 (Part 2 of 3). Call Establishment Sequence Type 5 Virtual Circuit (GATE=DEDICAT, Call-In)

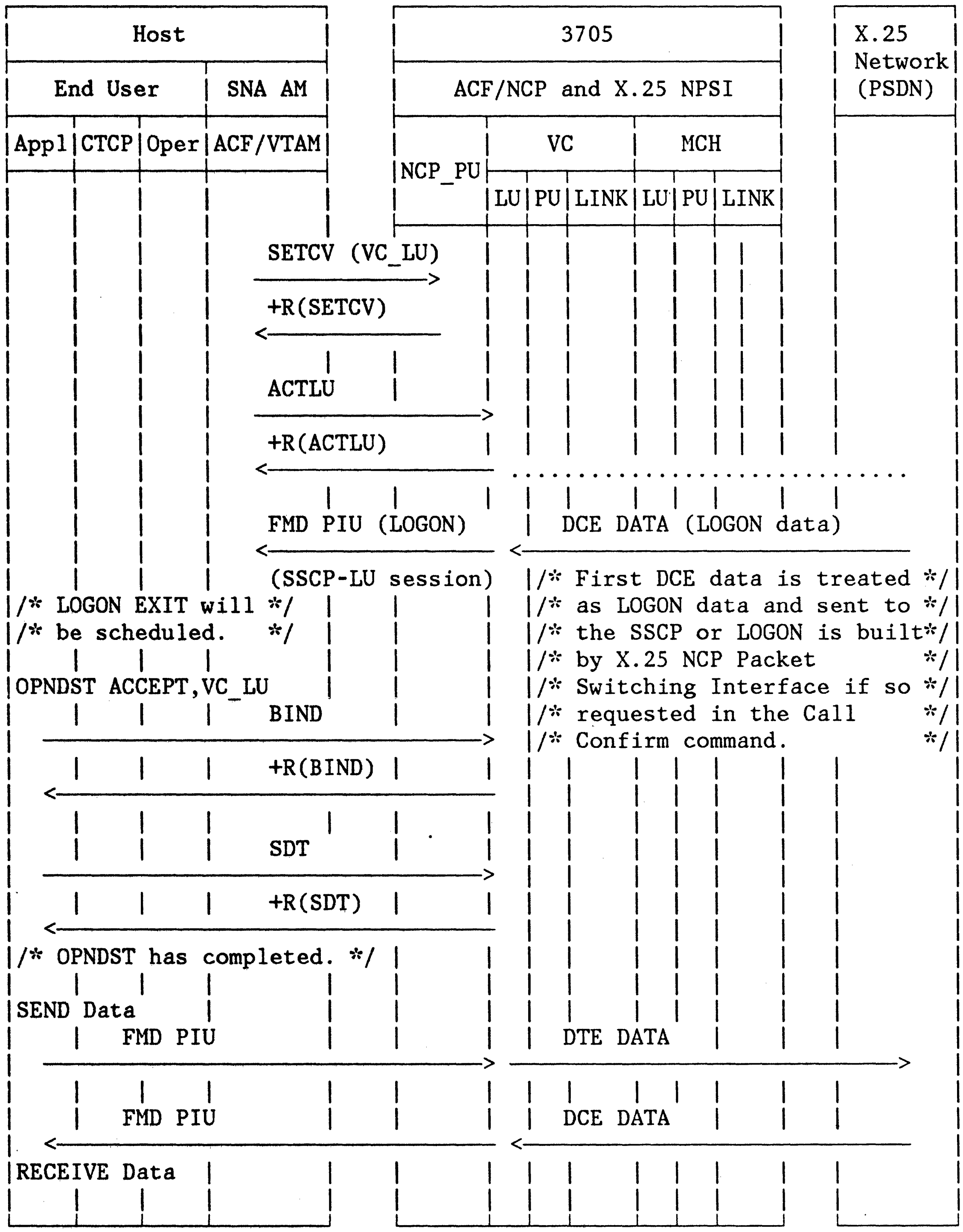


Figure 6-20 (Part 3 of 3). Call Establishment Sequence Type 5 Virtual Circuit (GATE=DEDICAT, Call-In)

Clearing Sequence - VC - GATE=NO

Virtual Call Clearing Sequence

GATE=NO

DTE Initiated Clearing: Type 0 and 5 Virtual Circuit

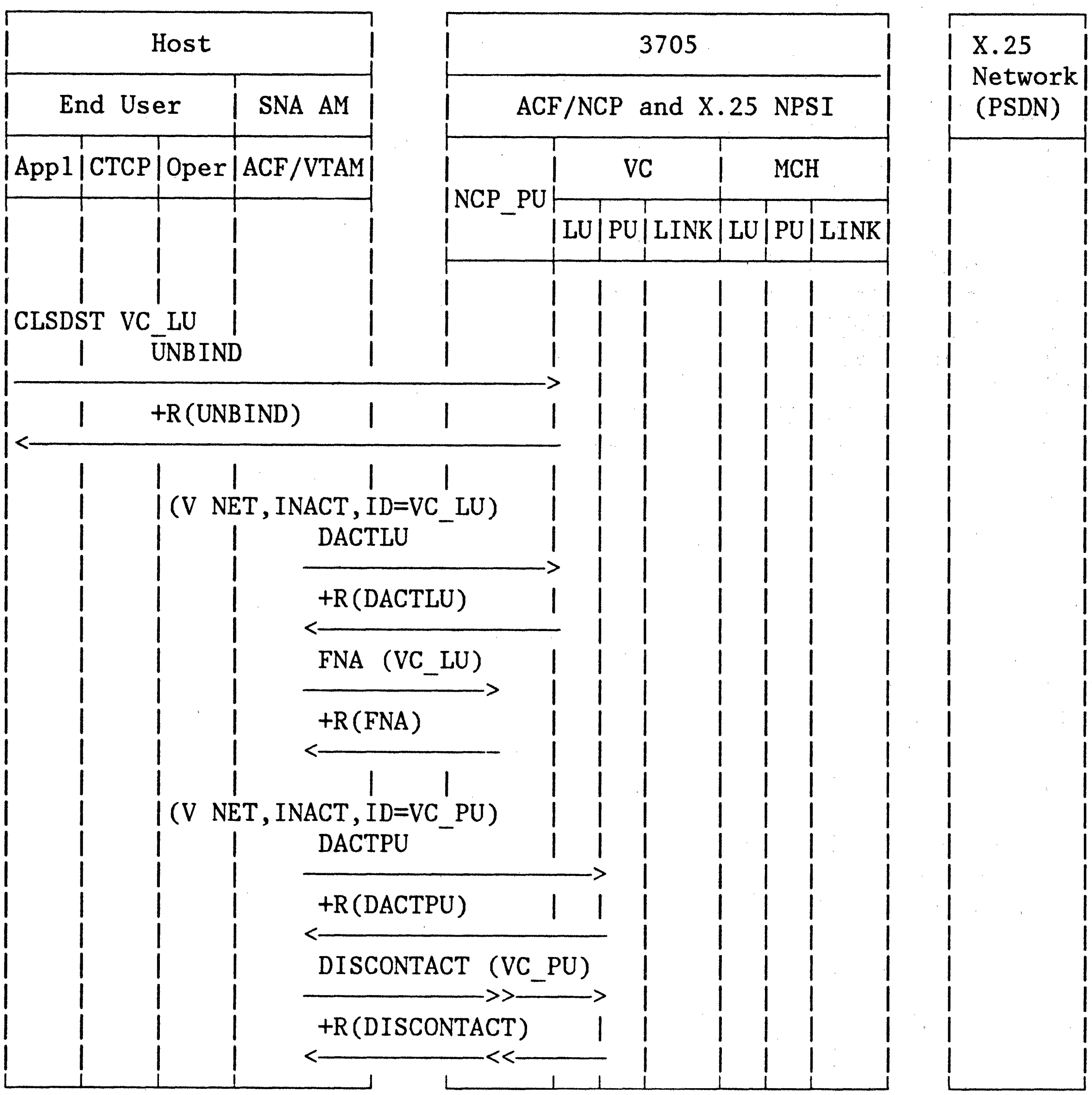


Figure 6-21 (Part 1 of 2). DTE Initiated Clearing Sequence for Type 0 and 5 Virtual Circuit(GATE=NO)

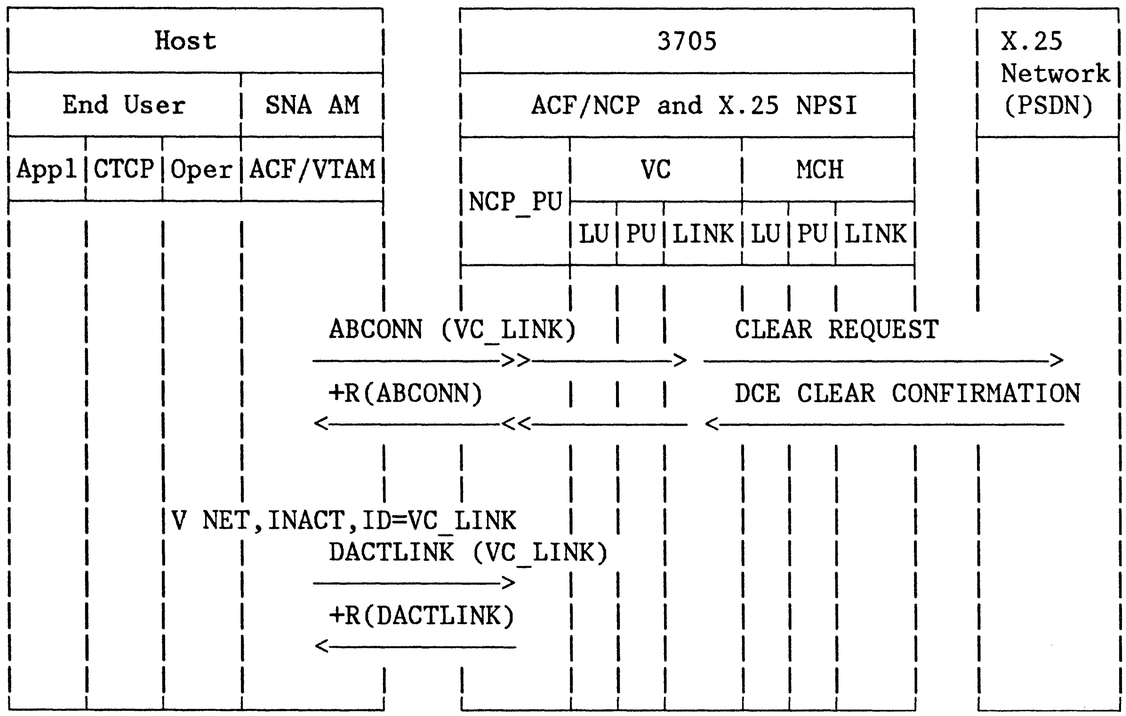


Figure 6-21 (Part 2 of 2). DTE Initiated Clearing Sequence for Type 0 and 5 Virtual Circuit(GATE=NO)

Clearing Sequence - VC - GATE=NO

DTE Initiated Clearing: Type 2 Virtual Circuit

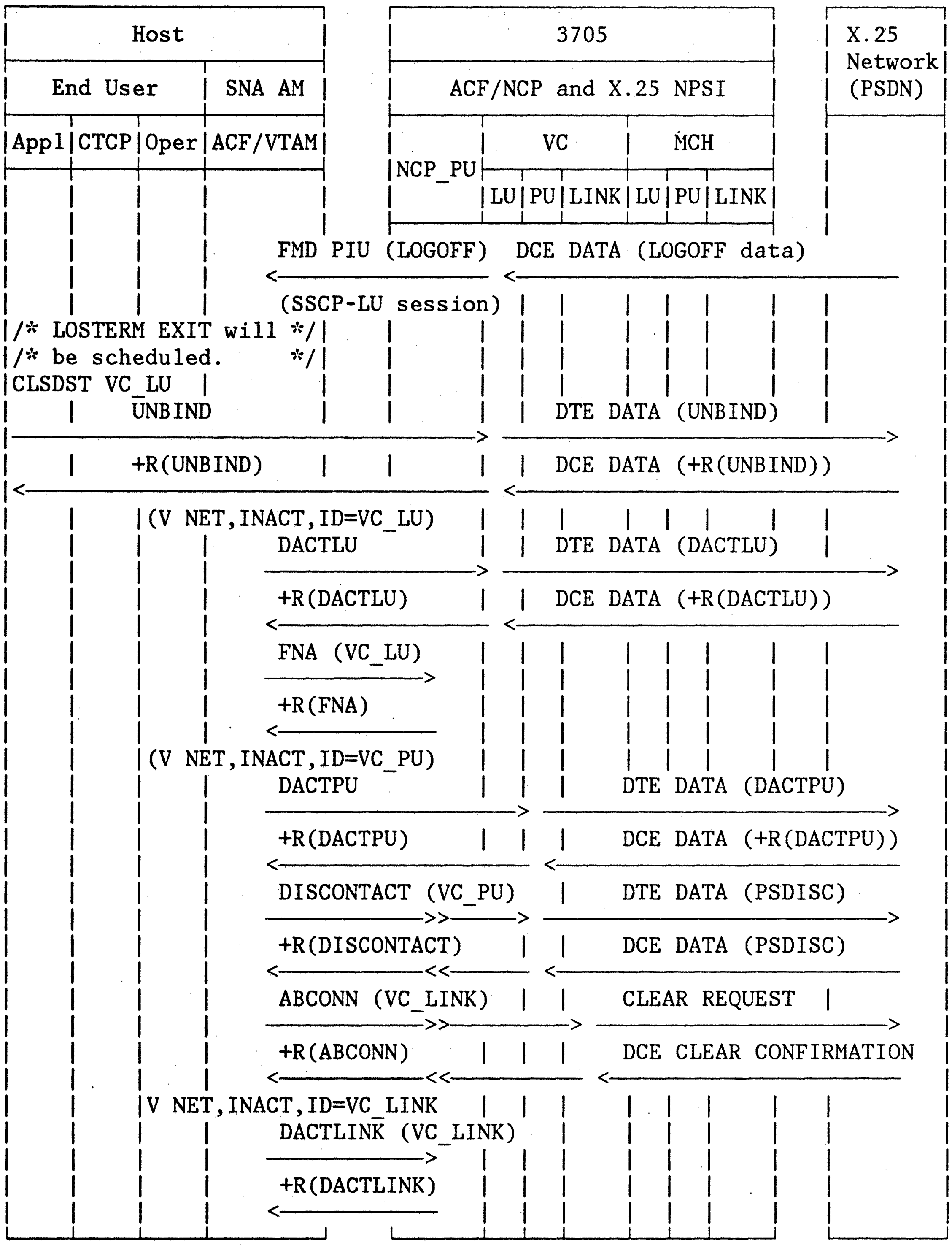


Figure 6-22. DTE Initiated Clearing Sequence for Type 2 Virtual Circuit (GATE=NO)

DTE Initiated Clearing: Type 3 Virtual Circuit

```
┌───────────────────────────────┐     ┌───────────────────────────────────┐   ┌──────────┐
│             Host              │     │               3705                │   │ X.25     │
├─────────────────────┬─────────┤     ├───────────────────────────────────┤   │ Network  │
│      End User       │ SNA AM  │     │       ACF/NCP and X.25 NPSI       │   │ (PSDN)   │
├──────┬──────┬──────┬┴─────────┤     ├────────┬─────────────┬────────────┤   ├──────────┤
│Appl  │CTCP  │Oper  │ACF/VTAM  │     │        │     VC      │    MCH     │   │          │
├──────┼──────┼──────┼──────────┤     │NCP_PU  ├──┬──┬───────┼──┬──┬──────┤   │          │
│      │      │      │          │     │        │LU│PU│LINK   │LU│PU│LINK  │   │          │
│      │      │      │          │     ├────────┴──┴──┴───────┴──┴──┴──────┘   │          │
│      │      │      │   FMD PIU (LOGOFF)  DCE DATA (LOGOFF data)                        │
│      │      │      │  <──────────────── <────────────────────────────────              │
│      │      │      │   (SSCP-LU session) │  │     │  │  │     │   │                    │
│/* LOSTERM EXIT will */│     │        │  │  │     │  │  │     │   │                    │
│/* be scheduled.    */│     │        │  │  │     │  │  │     │   │                    │
│CLSDST VC_LU  │        │     │        │  │  │     │  │  │     │   │                    │
│      │   UNBIND       │     │        │  │ DTE DATA (UNBIND)   │                        │
│──────────────────────────────────────> ──────────────────────────────────>             │
│      │  +R(UNBIND)    │     │        │  │ DCE DATA (+R(UNBIND))                        │
│<────────────────────────────────────── <──────────────────────────────────             │
│      │      │(V NET,INACT,ID=VC_LU)   │  │  │     │  │  │     │   │                      │
│      │      │      │   DACTLU │        │  │ DTE DATA (DACTLU)    │                      │
│      │      │      │  ───────────────> ──────────────────────────────────>             │
│      │      │      │   +R(DACTLU)     │  │ DCE DATA (+R(DACTLU))                        │
│      │      │      │  <─────────────── <──────────────────────────────────             │
│      │      │      │   FNA (VC_LU)    │  │  │     │  │  │     │   │                      │
│      │      │      │  ─────────────>  │  │  │     │  │  │     │   │                      │
│      │      │      │   +R(FNA) │      │  │  │     │  │  │     │   │                      │
│      │      │      │  <─────────      │  │  │     │  │  │     │   │                      │
│      │      │(V NET,INACT,ID=VC_PU)   │  │  │     │  │  │     │   │                      │
│      │      │      │   DACTPU │       │  │  │  DTE DATA (DACTPU)                         │
│      │      │      │  ───────────────────> ──────────────────────────────>              │
│      │      │      │   +R(DACTPU)    │  │  │  DCE DATA (+R(DACTPU))                      │
│      │      │      │  <─────────────────── <──────────────────────────────              │
│      │      │      │   DISCONTACT (VC_PU) │  DTE DATA (QDISC)                           │
│      │      │      │  ─────────>>────────> ──────────────────────────────>              │
│      │      │      │   +R(DISCONTACT)  │  │  DCE DATA (QUA)                             │
│      │      │      │  <─────────<<─────── <──────────────────────────────              │
│      │      │      │   ABCONN (VC_LINK)│  │  CLEAR REQUEST                              │
│      │      │      │  ─────────>>──────────> ───────────────────────────>              │
│      │      │      │   +R(ABCONN)    │  │  │  DCE CLEAR CONFIRMATION                    │
│      │      │      │  <─────────<<────────── <───────────────────────────              │
│      │      │V NET,INACT,ID=VC_LINK  │  │  │     │  │  │     │   │                      │
│      │      │      │   DACTLINK (VC_LINK) │     │  │  │     │   │                      │
│      │      │      │  ─────────────>  │  │  │     │  │  │     │   │                      │
│      │      │      │   +R(DACTLINK)   │  │  │     │  │  │     │   │                      │
│      │      │      │  <─────────────  │  │  │     │  │  │     │   │                      │
└──────┴──────┴──────┴──────────┘     └────────┴──┴──┴───────┴──┴──┴──────┘   └──────────┘
```

Figure 6-23. DTE Initiated Clearing Sequence for Type 3 Virtual Circuit (GATE=NO)

Clearing Sequence - VC - GATE=NO

DCE Initiated Clearing: Type 0, 2, 3, and 5 Virtual Circuits

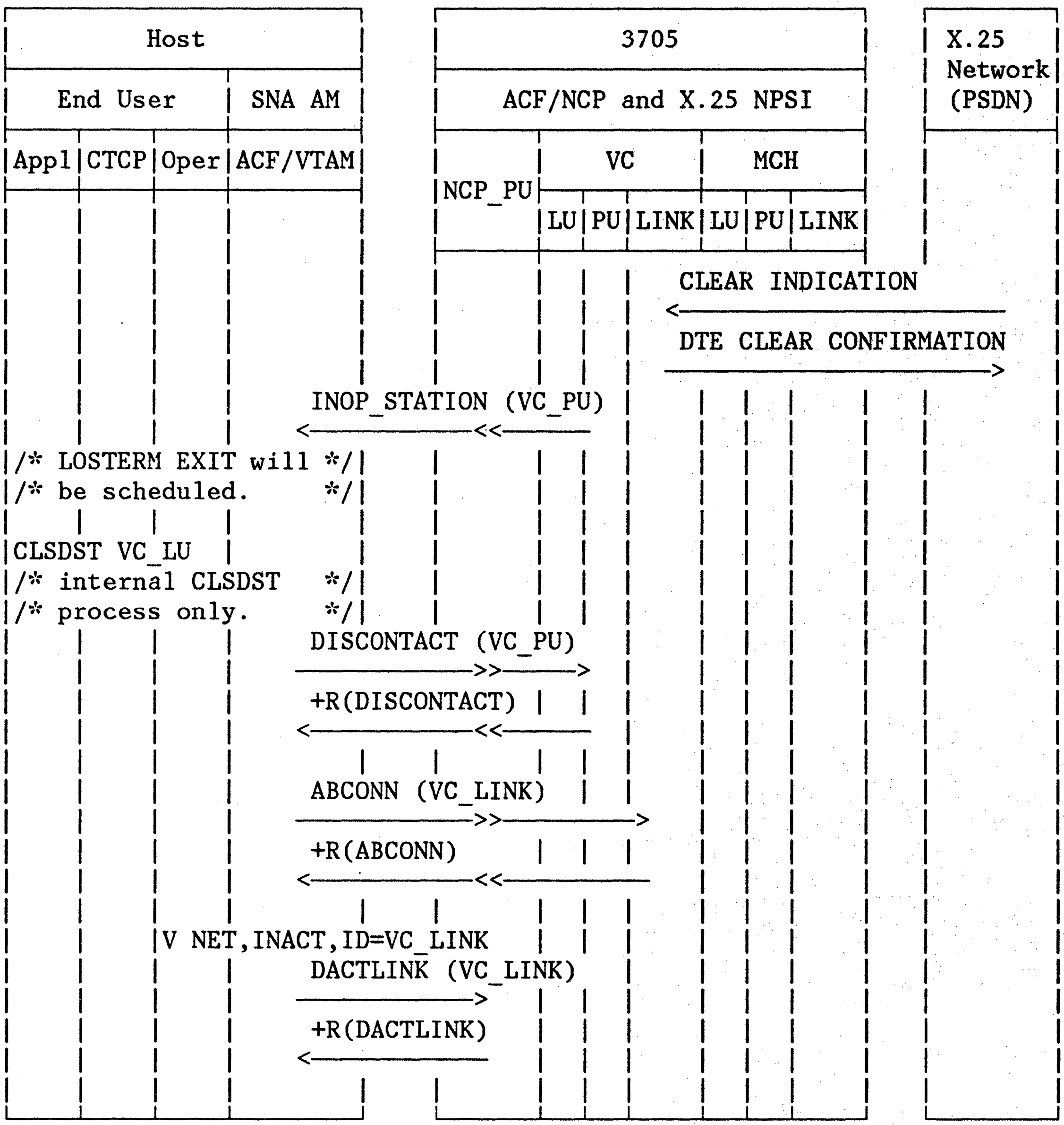


Figure 6-24. DCE Initiated Clearing Sequence for Types 0, 2, 3, and 5 VC (GATE=NO)

DTE Initiated Clearing: Type 4 Virtual Circuit

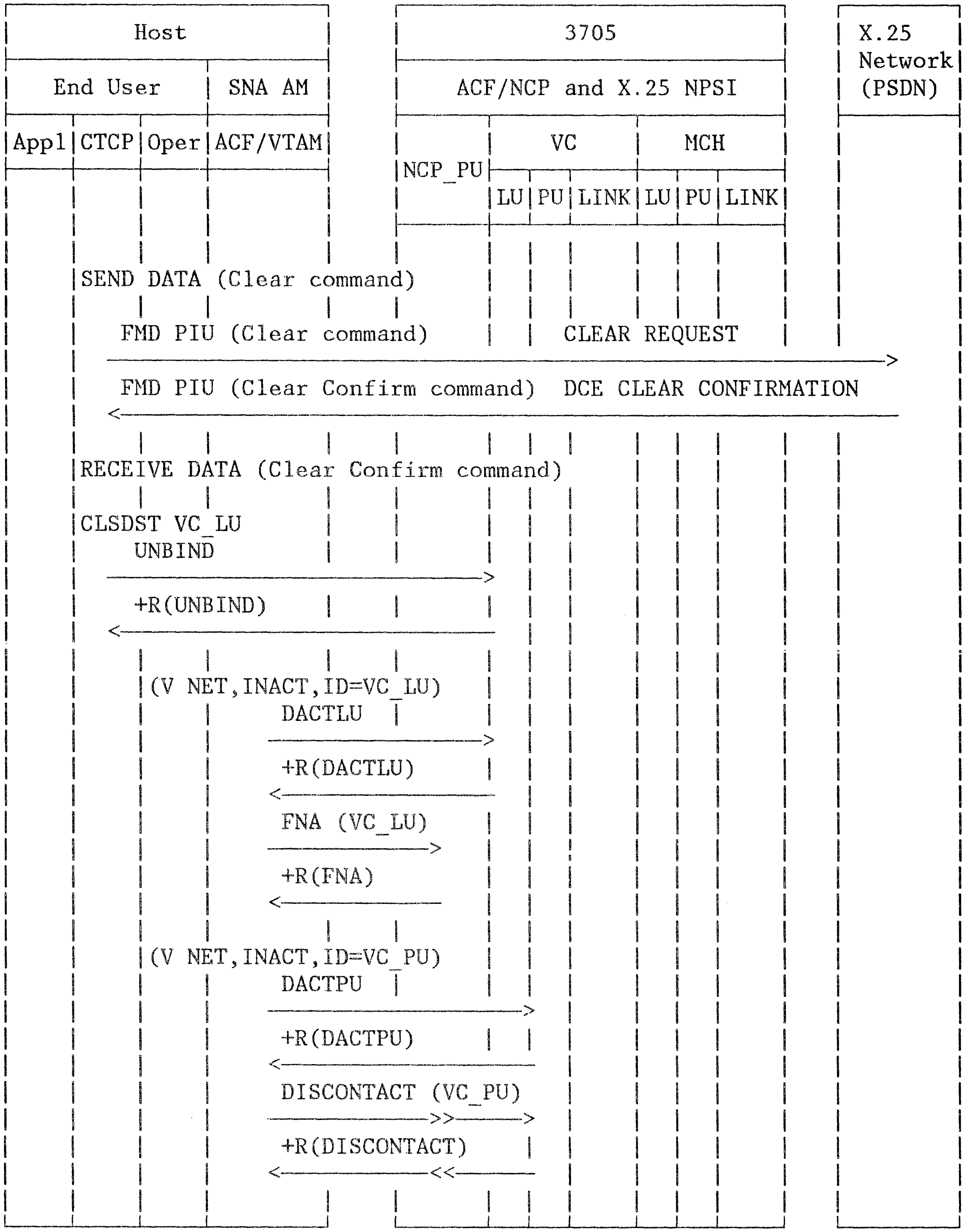


Figure 6-25 (Part 1 of 2). DTE Initiated Clearing Sequence for Type 4 VC (GATE=GENERAL)

Clearing Sequence - VC - GATE=GENERAL

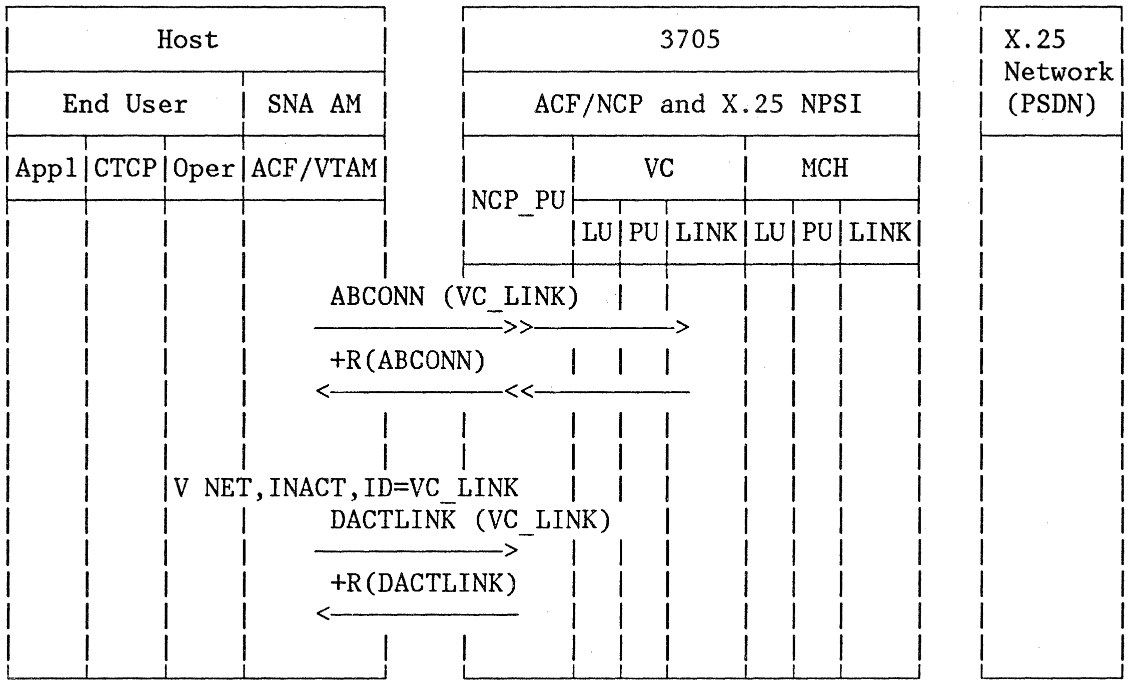


Figure 6-25 (Part 2 of 2). DTE Initiated Clearing Sequence for Type 4 VC (GATE=GENERAL)

DCE Initiated Clearing: Type 4 Virtual Circuit

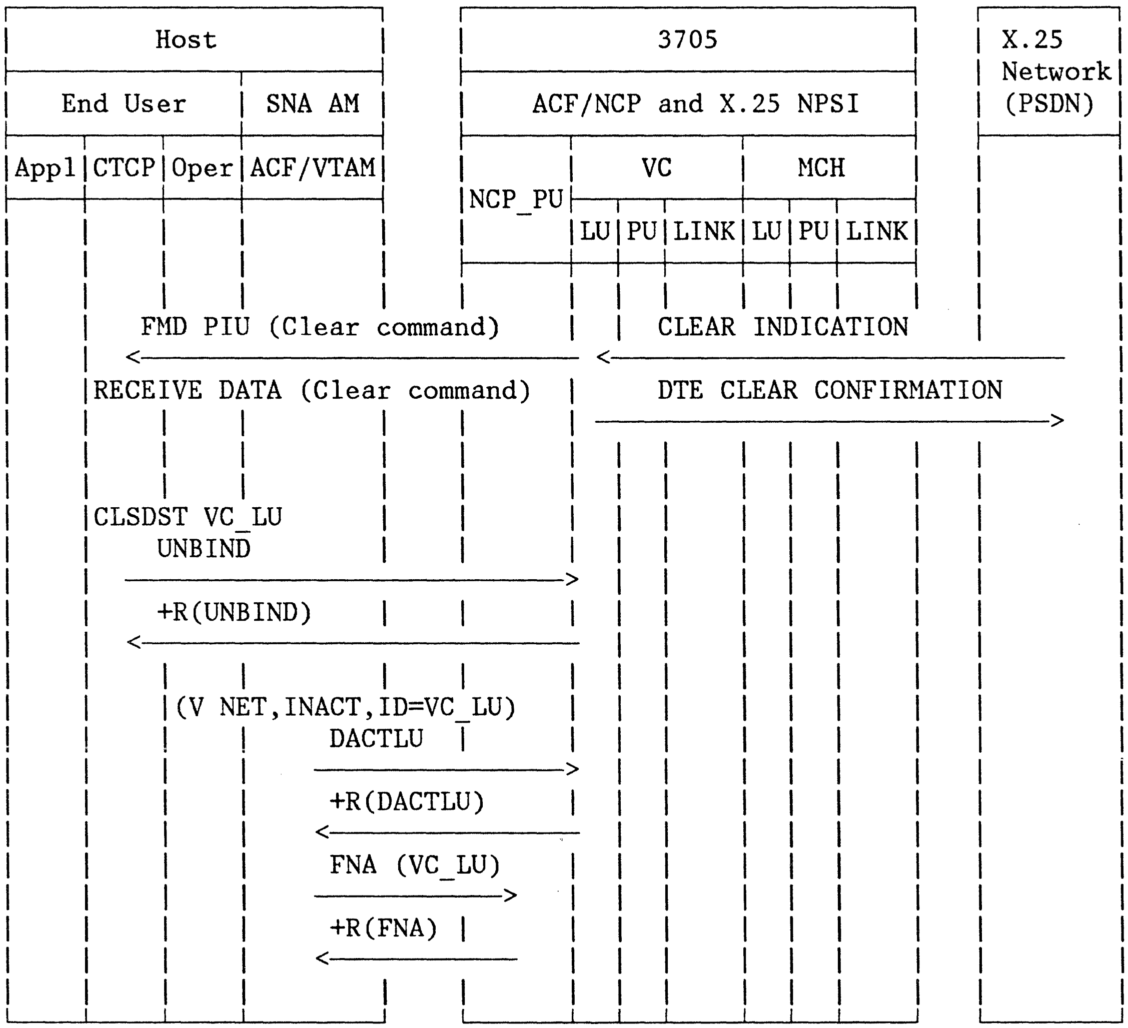


Figure 6-26 (Part 1 of 2). DCE Initiated Clearing Sequence for Type 4 VC (GATE=GENERAL)

Clearing Sequence - VC - GATE=GENERAL

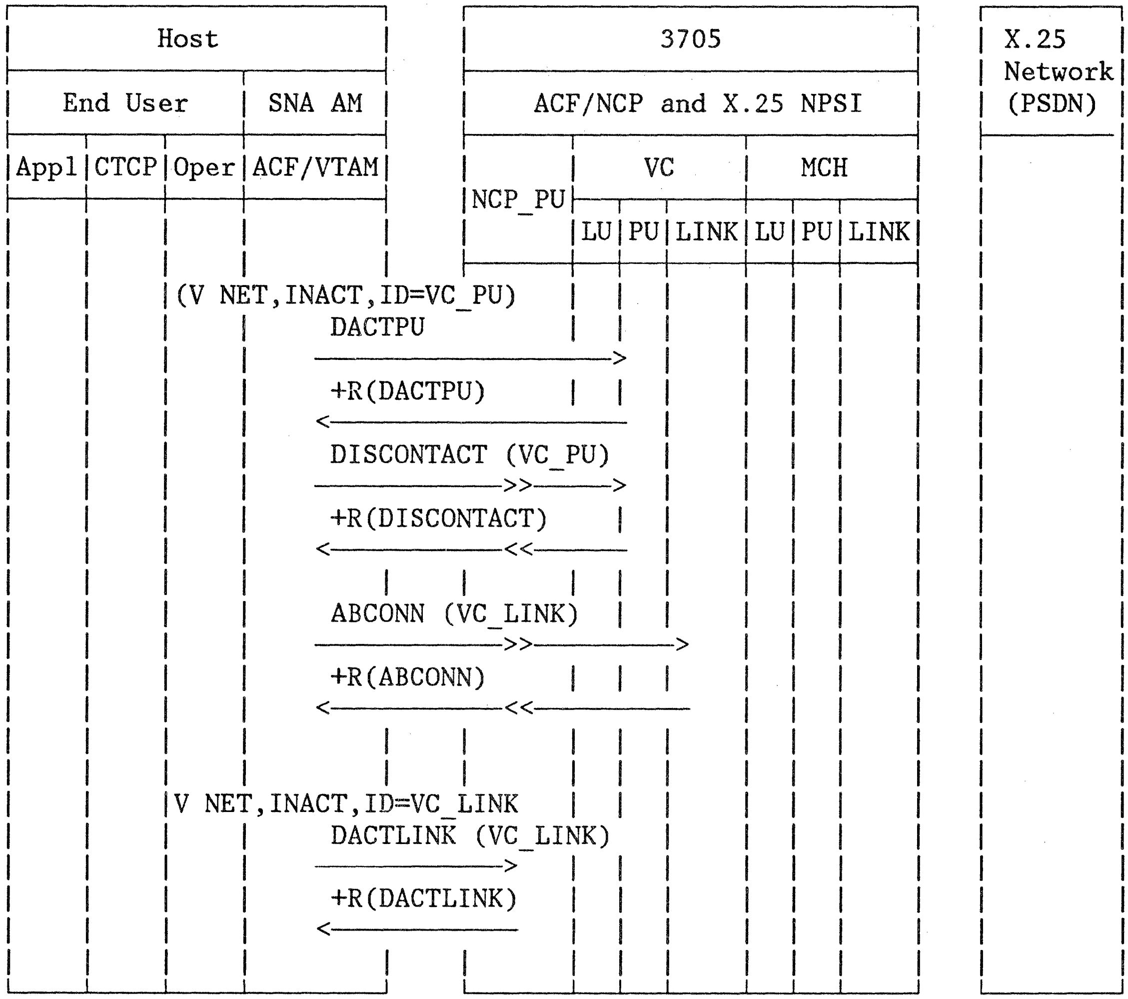


Figure 6-26 (Part 2 of 2). DCE Initiated Clearing Sequence for Type 4 VC (GATE=GENERAL)

GATE=DEDICAT

DTE Initiated Clearing: Type 0, 2, 3, and 5 Virtual Circuit

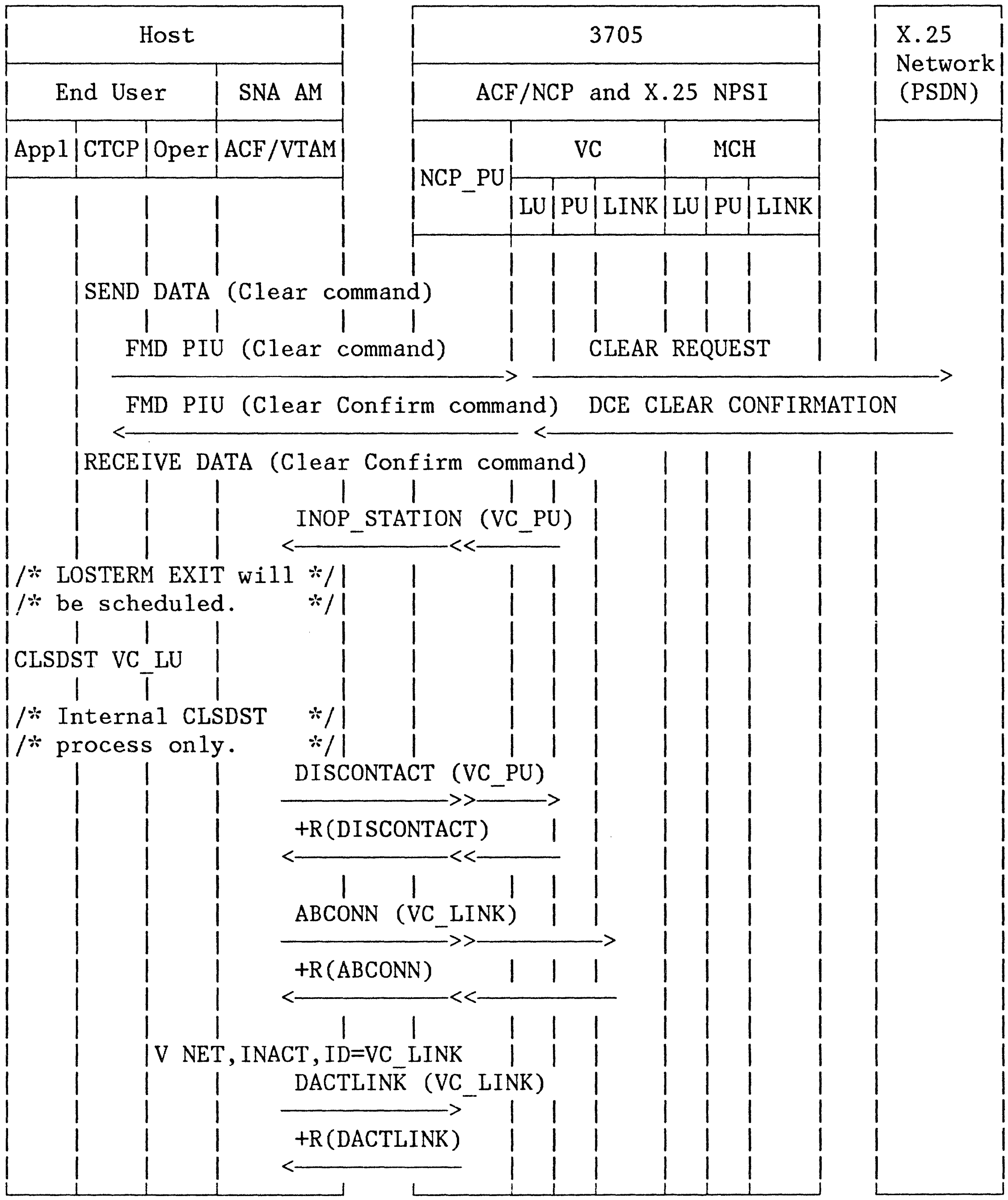


Figure 6-27. DTE Initiated Clearing Sequence, Type 0, 2, 3, and 5 VC (GATE=DEDICAT)

Clearing Sequence - VC - GATE=DEDICAT

DCE Initiated Clearing: Type 0, 2, 3, and 5 Virtual Circuit:

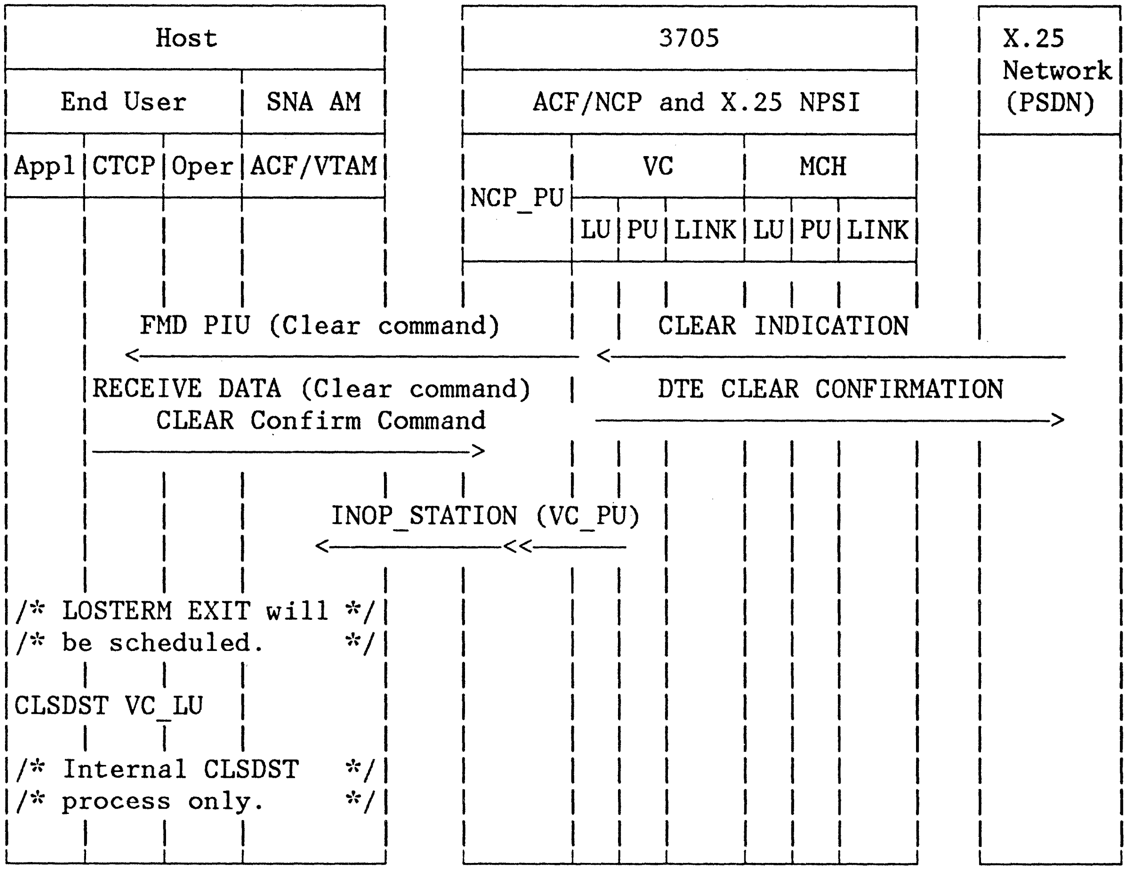


Figure 6-28 (Part 1 of 2). DCE Initiated Clearing Sequence for Types 0, 2, 3, and 5 VC (GATE=DEDICAT).

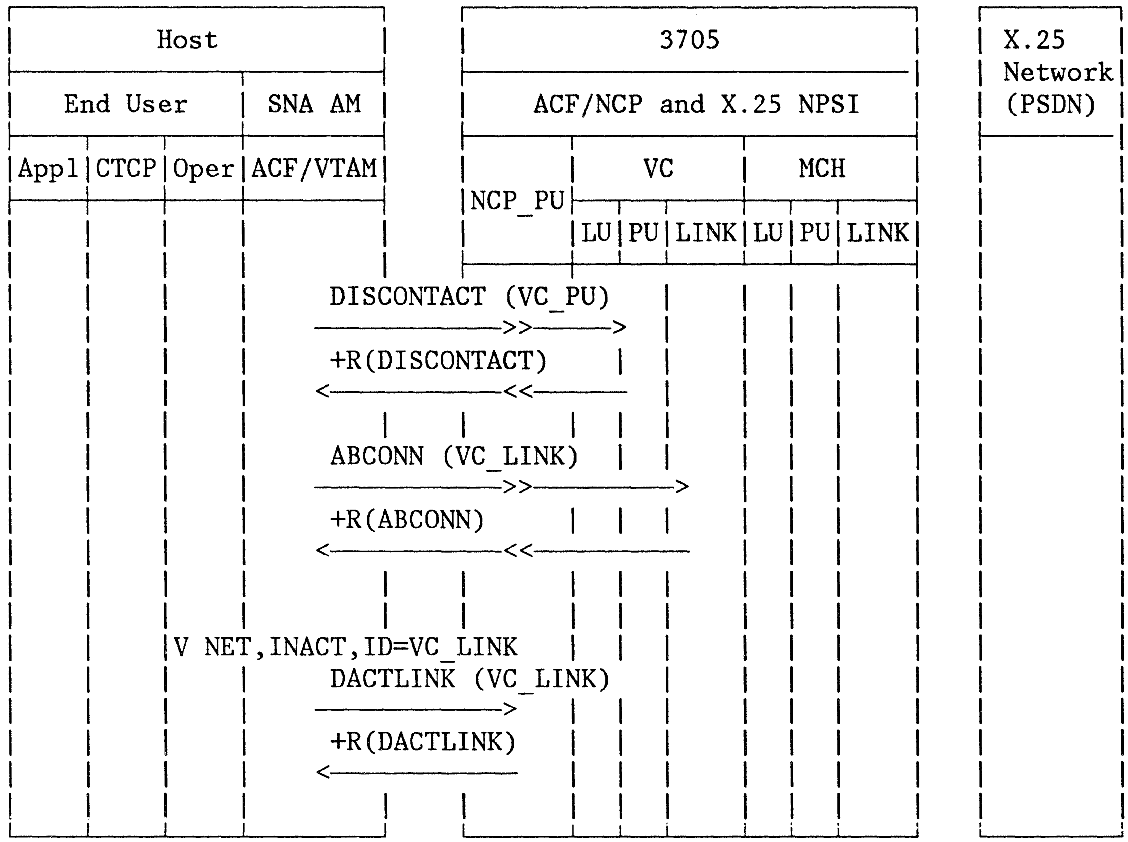


Figure 6-28 (Part 2 of 2). DCE Initiated Clearing Sequence for Types 0, 2, 3, and 5 VC (GATE=DEDICAT).

CHAPTER 7. X.25 NCP PACKET SWITCHING INTERFACE SAMPLE PROGRAMS

X.25 STAGE 1 INPUT

```
***********************************************************************
*                                                                     *
*        X.25 NPSI RELEASE 2 AND 3 GENERATION SAMPLE                  *
*                                                                     *
*        GENERATION OF THE X.25 BLOCKS FOR ACF/NCP/VS UNDER OS        *
*        -1 NETWORK TYPE 1 DEFINED WHICH SENDS DM COMMAND IN LAPB     *
*        -4 PHYSICAL LINKS BETWEEN THE 3705 AND THE PSDN              *
*            -FIRST IS WITHOUT GATE/DATE FUNCTION                     *
*            -SECOND IS WITH DATE                                     *
*            -THIRD IS WITH GATE WITHOUT SUBADDRESSING                *
*            -FOURTH IS WITH GATE WITH SUBADDRESSING                  *
*                                                                     *
***********************************************************************
*
***   STAGE 1 INPUT
*
        COPY  XGENEND            THERE IS OTHER CODE THAN X25 IN NCP
*
NEOGENE X25BUILD MACLIB=MAC720,  X25 STAGE 2 OUTPUT LIBRARY            X
               QUALIFY=NCP72,    QUALIFY FOR MACLIB ->DSN=NCP72.MAC720 X
               JOBCARD=YES,      SINGLE   STAGE 2 JOB                  X
               SRCPRFX=D06,      PREFIX FOR STAGE2 OUTPUT MEMBERS      X
               SRCLO=D06TBL,     NAME FOR HIGH CORE BLOCKS MEMBER      X
               SRCHI=D06BLK,     NAME FOR LOW CORE BLOCKS MEMBER       X
               TYPSYS=OS,        STAGE 2 IS PROVIDED FOR OS            X
               SNAP=YES,         OPTIONAL DIAGNOSIS SNAP INCLUDED      X
               MCHCNT=4,         4 PHYSICAL LINKS                      X
               IDNUMH=01         2 FIRST DIGITS FOR DEFAULT IDNUM
*                                USED FOR NON-SNA SWITCHED CONNECTION
*
*
NETWORK1 X25NET NETTYPE=1,       TYPE 1 NETWORK                        X
               CPHINDX=4,        4 ENTRIES DEFINED FOR VCCPT           X
               OUHINDX=3,        3 ENTRIES FOR OUFT                    X
               DM=YES            NETWORK SEND LAPB DM COMMAND
*
*
*
***********************************************************************
*                                                                     *
*       4 ENTRIES IN VCCPT, 2ND ENTRY IS NOT DEFINED                  *
*       3 ENTRIES IN OUFT TO BUILD CALL REQUEST PACKETS               *
*           -NO FACILITY FIELD, NO USER DATA IN ENTRY ONE             *
*           -ONE FACILITY FIELD, NO USER DATA IN ENTRY TWO            *
```

```
*          -ONE FACILITY FIELD AND USER DATA IN ENTRY THREE            * 00500000
*                                                                      * 00510000
************************************************************************ 00520000
*                                                                        00530000
*                                                                        00540000
*                                                                        00550000
         X25VCCPT INDEX=1,        FIRST ENTRY IN VCCPT                  X00560000
               MAXPKTL=128,       MAX PACKET LENGTH=128                 X00570000
               VWINDOW=3          TRANSMIT/RECEIVE WINDOW SIZE=3         00580000
*                                                                        00590000
*                                 SECOND ENTRY IN VCCPT IS NOT USED      00600000
*                                                                        00610000
         X25VCCPT INDEX=3,        THIRD ENTRY IN VCCPT                  X00620000
               MAXPKTL=128,       MAX PACKET LENGTH=128                 X00630000
               VWINDOW=2          TRANSMIT/RECEIVE WINDOW SIZE=2         00640000
*                                                                        00650000
*                                                                        00660000
*                                                                        00670000
         X25VCCPT INDEX=4,        THIRD ENTRY IN VCCPT                  X00680000
               MAXPKTL=32,        MAX PACKET LENGTH=32                  X00690000
               VWINDOW=5          TRANSMIT/RECEIVE WINDOW SIZE=5         00700000
*                                                                        00710000
*                                                                        00720000
*                                                                        00730000
         X25OUFT INDEX=1          FIRST ENTRY IN OUFT WITH               00740000
*                                 NO FACILITY FIELD IN OUTGOING CALL     00750000
*                                 NO USER DATA FIELD IN OUTGOING CALL    00760000
*                                                                        00770000
         X25OUFT INDEX=2,         SECOND ENTRY IN OUFT                  X00780000
               OPTFACL=0302       FACILITY FIELD FOR OUTGOING CALL       00790000
*                                                                        00800000
*                                                                        00810000
*                                                                        00820000
         X25OUFT INDEX=3,         THIRD ENTRY IN OUFT                   X00830000
               OPTFACL=03021202,  FACILITY FIELD FOR OUTGOING CALL      X00840000
               USRFILD=123456     CALL USER DATA FIELD                   00850000
*                                                                        00860000
*                                                                        00870000
*                                                                        00880000
************************************************************************ 00890000
*                                                                      * 00900000
*        FIRST MCH WORKING WITHOUT GATE LLC OR DATE FUNCTION           * 00910000
*         ONLY THE LOGICAL CHANNEL GROUP 0 IS DEFINED                  * 00920000
*          4 PVCS ARE DEFINED                                          * 00930000
*            -PVC 0 IS USED FOR INN (LLC3). INN SNA LINK               * 00940000
*            -PVC 1 IS USED FOR PSH (LLC2). BNN SNA STATION            * 00950000
*            -PVC 2 IS USED FOR PCNE (LLC0). X25 TERMINAL              * 00960000
*            -PVC 3 IS USED FOR INTEGRATED PAD (LLC5). X28 TERMINAL    * 00970000
*          5 SVCS ARE DEFINED                                          * 00980000
*            -SVCS 4,5 ARE RESERVED FOR INCOMING CALL                  * 00990000
*            -SVCS 6 ACCEPT INCOMING AND OUTGOING CALL                 * 01000000
*            -SVCS 7,8 ARE RESERVED FOR OUGOING CALL                   * 01010000
*                                                                      * 01020000
************************************************************************ 01030000
```

```
*                                                                   01040000
*                                                                   01050000
*                                                                   01060000
         X25MCH CSBTYPE=3,        COMMUNICATION SCANNER TYPE 3     X01070000
               ADDRESS=(032,033), TWO LINE SET ADDRESSES           X01080000
               NCPGRP=XNETOD0,    NAME OF NCP GROUP MACRO FOR THIS LINK X01090000
               LCGDEF=0(8),       HIGHEST LCGN=0, HIGHEST LCN=8    X01100000
               FRMLGTH=131,       MAXIMUM FRAME LENGTH=131         X01110000
               MWINDOW=7,         FRAME WINDOW=7                   X01120000
               STATION=DTE,       THIS PHYSICAL LINK IS A DTE      X01130000
               PROTCOL=LAPB,      X25 LEVEL 2 PROTOCOL IS LAPB (DEFAULT)X01140000
               PKTMODL=8,         X25 LEVEL 3 MODULO=8 (DEFAULT)   X01150000
               TPTIMER=2.5,       X25 T1 TIMER IN SECONDS          X01160000
               TDTIMER=0,         TIMER TO WAIT FOR ND RETRIES     X01170000
               NPRETRY=7,         NUMBER OF RETRIES WHEN TPTIMER ELAPSEDX01180000
               NDRETRY=1,         NUMBER OF (TP*NP) RETRY          X01190000
               PUNAME=XP032,      NAME OF THE PU TYPE 1 OF THIS LINK X01200000
               ANS=CONT,          ANS=CONTINUE FOR NCP PU MACRO    X01210000
               LLCLIST=(LLC0,LLC2,LLC5), PCNE/PSH/PAD ALLOWED ON SVCS X01220000
               GATE=NO,           NO GATE, NO DATE ON THIS LINK    X01230000
               DBIT=NO,           D BIT NOT USED IN PCNE           X01240000
               PAD=INTEG,         INTEGRATED PAD SUPPORTED (X.29 SUBSET) X01250000
               TRAN=NO,           NO TRANSLATION FOR PAD SUPPORT   X01260000
               LCN0=USED,         LCN 0 IS USED AS VC              X01270000
               SPEED=9600         LINE SPEED=9600                   01280000
*                                                                   01290000
*                                                                   01300000
*                                                                   01310000
           X25LCG LCGN=0          LOGICAL CHANNEL GROUP=0           01320000
***                                                                 01330000
****     X25 LINE FOR INN ON PVC ***********************            01340000
***                                                                 01350000
XL032000 X25LINE LCN=0,           LOGICAL CHANNEL NUMBER 0 VC      X01360000
               VCCINDX=1,         THIS VC USES ENTRY 1 IN VCCPT    X01370000
               LLC=LLC3,          THIS VC CONNECTS A SNA INN LINK (QLLC)X01380000
               MONLINK=YES,       MONITOR LINK                     X01390000
               RETVCCT=5,         RETRY COUNT FOR QLLC COMMANDS    X01400000
               RETVCTO=20,        RETRY T.O. BETWEEN QLLC COMMANDS X01410000
               TYPE=P             THIS IS A PERMANENT VIRTUAL CIRCUIT 01420000
XP032000 X25PU PUTYPE=4,          TYPE 4 PU                        X01430000
               TGN=2,             TRANSMISSION GROUP NUMBER=2      X01440000
               ANS=CONT,          THIS IS NOT DISCONTACTED IF ANS  X01450000
               PUDR=NO            NO DYNAMIC RECONFIGURATION ALLOWED 01460000
*                                 NO LU REQUIRED FOR INN LINK       01470000
***                                                                 01480000
****     X25 LINE FOR PSH ON PVC ***********************            01490000
***                                                                 01500000
XL032001 X25LINE LCN=1,           LOGICAL CHANNEL NUMBER 1 VC      X01510000
               VCCINDX=1,         THIS VC USES ENTRY 1 IN VCCPT    X01520000
               LLC=LLC2,          SNA BNN TERMINAL SUPPORTED IN PSH X01530000
               RETVCCT=3,         RETRY COUNT FOR PSH  COMMANDS    X01540000
               RETVCTO=15,        RETRY T.O. BETWEEN PSH  COMMANDS X01550000
               TYPE=P             THIS IS A PERMANENT VIRTUAL CIRCUIT 01560000
XP032001 X25PU PUTYPE=2,          TYPE PU                          X01570000
```

```
               ADDR=01,           SDLC ADDRESS OF SNA STATION          X01580000
               MAXDATA=265,       MAXIMUM DATA TRANSFER SIZE           X01590000
               VPACING=(2,1),     HOST OUTGOING PACING                 X01600000
               PACING=(1,1),      3705 OUTGOING PACING                 X01610000
               PASSLIM=1,                                              X01620000
               BUFLIM=8,                                               X01630000
               MAXOUT=1                                                 01640000
XU032001 X25LU LOCADDR=1          FIRST LU ADDRESS                      01650000
XV032001 X25LU LOCADDR=2          SECOND LU ADDRESS                     01660000
***                                                                     01670000
****       1 PVC                 *************************              01680000
***                                                                     01690000
            X25VC LCN=(2),        LOGICAL CHANNEL NUMBER 2 VC          X01700000
               VCCINDX=3,         THIS VC USES ENTRY 3 IN VCCPT        X01710000
               LLC=LLC0,          X25 NON-SNA TERMINAL SUPPORT (PCNE)  X01720000
               TYPE=P             PERMANENT VIRTUAL CIRCUIT             01730000
***                                                                     01740000
****       1 PVC                 *************************              01750000
***                                                                     01760000
            X25VC LCN=(3),        LOGICAL CHANNEL NUMBER 3 VC          X01770000
               VCCINDX=1,         THIS VC USES ENTRY 1 IN VCCPT        X01780000
               LLC=LLC5,          X28 NON-SNA TERMINAL SUPPORT (PAD)   X01790000
               TYPE=P             PERMANENT VIRTUAL CIRCUIT             01800000
***                                                                     01810000
****       2 SVC'S FOR PCNE/PSH/PAD (SEE LLCLIST IN X25MCH)             01820000
***                                                                     01830000
         X25VC LCN=(4,5),         LOGICAL CHANNEL NUMBER 4 AND 5       X01840000
               VCCINDX=1,         THIS VC USES ENTRY 1 IN VCCPT        X01850000
               OUFINDX=1,         THIS VC USES ENTRY 1 IN OUFT         X01860000
               CALL=IN,           SUPPORT FOR INCOMING CALL ONLY       X01870000
               TYPE=S             SWITCHED VIRTUAL CIRCUIT              01880000
***                                                                     01890000
****       1 SVC   FOR PCNE/PSH/PAD (SEE LLCLIST IN X25MCH)             01900000
***                                                                     01910000
         X25VC LCN=6,             LOGICAL CHANNEL NUMBER 6             X01920000
               VCCINDX=1,         THIS VC USES ENTRY 1 IN VCCPT        X01930000
               OUFINDX=3,         THIS VC USES ENTRY 3 IN OUFT         X01940000
               CALL=INOUT,        SUPPORT FOR INCOMING AND OUTGOING CALLX01950000
               TYPE=S             SWITCHED VIRTUAL CIRCUIT              01960000
***                                                                     01970000
****       2 SVC'S FOR PCNE/PSH/PAD (SEE LLCLIST IN X25MCH)             01980000
***                                                                     01990000
         X25VC LCN=(7,8),         LOGICAL CHANNEL NUMBER 7 AND 8       X02000000
               VCCINDX=1,         THIS VC USES ENTRY 1 IN VCCPT        X02010000
               OUFINDX=3,         THIS VC USES ENTRY 3 IN OUFT         X02020000
               CALL=OUT,          SUPPORT FOR AND OUTGOING CALL ONLY   X02030000
               TYPE=S             SWITCHED VIRTUAL CIRCUIT              02040000
*                                                                       02050000
*                                                                       02060000
*                                                                       02070000
*********************************************************************** 02080000
*                                                                     * 02090000
*        SECOND PHYSICAL LINK WORKING IN DATE                         * 02100000
*         ONLY THE LOGICAL CHANNEL GROUP 0 IS DEFINED                 * 02110000
```

```
*         4 PVCS ARE DEFINED                                           *
*           -PVC 0 IS USED FOR INN (LLC3). INN SNA LINK                *
*           -PVC 1 IS USED FOR PSH (LLC2). BNN SNA STATION             *
*           -PVC 2 IS USED FOR PCNE (LLC0). X25 TERMINAL               *
*           -PVC 3 IS USED FOR PAD (LLC5). X28 TERMINAL                *
*         4 SVCS ARE DEFINED                                           *
*           -SVCS 4,7 ARE TO BE DEFINED WITH CALL=IN FOR ACCESS        *
*            METHOD COMPATIBILITY (SVCS ARE IN ANSWER MODE)            *
*            THOUGH INCOMING AND OUTGOING CALL ARE ALLOWED             *
*            AND ESTABLISHED VIA THE CTCP-DATE LU TO LU SESSION        *
*                                                                      *
************************************************************************
*
*
*
         X25MCH CSBTYPE=2,       COMMUNICATION SCANNER TYPE 2          X
              ADDRESS=(0A8,0A9), TWO LINE SET ADDRESSES                X
              LCGDEF=0(7),       HIGHEST LCGN=0, HIGHEST LCN=7         X
              FRMLGTH=131,       MAXIMUM FRAME LENGTH=131              X
              MWINDOW=7,         FRAME WINDOW=7                        X
              STATION=DTE,       THIS PHYSICAL LINK IS A DTE           X
              PROTCOL=LAP,       X25 LEVEL 2 PROTOCOL IS LAP           X
              PKTMODL=8,         X25 LEVEL 3 MODULO=8 (DEFAULT)        X
              ANS=CONTINUE,      FOR NCP PU MACRO                      X
              TPTIMER=1,         X25 T1 TIMER IN SECOND (DEFAULT)      X
              TDTIMER=0,         TIMER TO WAIT FOR ND RETRIES          X
              NPRETRY=7,         NUMBER OF RETRIES WHEN TPTIMER ELAPSEDX
              NDRETRY=1,         NUMBER OF (TP*NP) RETRY               X
              LLCLIST=(LLC0,LLC2,LLC5), PCNE/PSH/PAD ALLOWED ON SVCS   X
              GATE=DEDICAT,      DATE SUPPORT ON THIS LINK             X
              DBIT=YES,          D-BIT USED IN PCNE                    X
              PAD=TRANSP,        TRANSPARENT PAD SUPPORT (ANY TYPE)    X
              TRAN=ODD,          ODD TRANSLATION FOR PAD SUPPORT       X
              SPEED=9600         LINE SPEED=9600
*
*
*
           X25LCG LCGN=0         LOGICAL CHANNEL GROUP=0
***
****     X25 LINE FOR INN ON PVC  **********************
***
XL0A8000 X25LINE LCN=0,          LOGICAL CHANNEL NUMBER 0 VC           X
              VCCINDX=3,         THIS VC USES ENTRY 3 IN VCCPT         X
              LLC=LLC3,          THIS VC CONNECTS A SNA INN LINK (QLLC)X
              MONLINK=NO,        NO MONITOR                            X
              TYPE=P             THIS IS A PERMANENT VIRTUAL CIRCUIT
XP0A8000 X25PU PUTYPE=4,         TYPE 4 PU                             X
              TGN=3,             TRANSMISSION GROUP NUMBER=3           X
              ANS=CONT,          THIS IS NOT DISCONTACTED IF ANS       X
              PUDR=NO            NO DYNAMIC RECONFIGURATION ALLOWED
*                                NO LU REQUIRED FOR INN LINK
***
```

```
****      X25 LINE FOR PSH ON PVC  ***********************
***
XL0A8001  X25LINE LCN=1,          LOGICAL CHANNEL NUMBER 1 VC            X
               VCCINDX=1,         THIS VC USES ENTRY 1 IN VCCPT          X
               LLC=LLC2,          SNA BNN TERMINAL SUPPORTED IN PSH      X
               TYPE=P             THIS IS A PERMANENT VIRTUAL CIRCUIT
XP0A8001 X25PU PUTYPE=2,          TYPE PU                                X
               ADDR=01,           SDLC ADDRESS OF SNA STATION            X
               MAXDATA=265,       MAXIMUM DATA TRANSFER SIZE             X
               VPACING=(2,1),     HOST OUTGOING PACING                   X
               PACING=(1,1),      3705 OUTGOING PACING                   X
               PASSLIM=1,                                                X
               BUFLIM=8,                                                 X
               MAXOUT=1
XU0A8001 X25LU LOCADDR=1          FIRST LU ADDRESS
XV0A8001 X25LU LOCADDR=2          SECOND LU ADDRESS
***
****      1 PVC IN PCNE         **************************
***
            X25VC LCN=(2),        LOGICAL CHANNEL NUMBER 2 VC            X
               VCCINDX=3,         THIS VC USES ENTRY 3 IN VCCPT          X
               LLC=LLC0,          X25 NON-SNA TERMINAL SUPPORT (PCNE)    X
               TYPE=P             PERMANENT VIRTUAL CIRCUIT
***
****      1 PVC IN PAD          **************************
***
            X25VC LCN=(3),        LOGICAL CHANNEL NUMBER 3 VC            X
               VCCINDX=1,         THIS VC USES ENTRY 1 IN VCCPT          X
               LLC=LLC5,          TRANSPARENT PAD SUPPORT                X
               TYPE=P             PERMANENT VIRTUAL CIRCUIT
***
****      4 SVC'S FOR PCNE/PSH/PAD (SEE LLCLIST IN X25MCH)
***
         X25VC LCN=(4,7),         LOGICAL CHANNEL NUMBER 4 TROUGH 7      X
               VCCINDX=1,         THIS VC USES ENTRY 1 IN VCCPT          X
               OUFINDX=2,         THIS VC USES ENTRY 2 IN OUFT           X
               CALL=IN,           MANDATORY FOR DATE                     X
               TYPE=S             SWITCHED VIRTUAL CIRCUIT
*
*
*
************************************************************************
*                                                                      *
*        THIRD  PHYSICAL LINK ALLOWING GATE LLC WITHOUT SUBADDRESSING *
*         ONLY THE LOGICAL CHANNEL GROUP 0 IS DEFINED                  *
*             -PVC 0 IS NOT USED AS VC                                 *
*          4 PVCS ARE DEFINED                                          *
*             -PVC 1 IS USED FOR PSH (LLC2). BNN SNA STATION           *
*             -PVC 2 IS USED FOR PCNE (LLC0). X25 TERMINAL             *
*             -PVC 3 IS USED FOR GATE (LLC4). X25 TERMINAL             *
*             -PVC 4 IS USED FOR PAD (LLC5). X28 TERMINAL              *
*          5 SVCS ARE DEFINED                                          *
*             -SVCS 5,9 ARE USED FOR INCOMING AND OUTGOING CALL        *
*              WHEN GATE IS THE LLC THEY MUST BE IN ANSWER MODE        *
```

```
*             FOR ACCESS METHOD COMPATIBILITY                          * 03180000
*                                                                      * 03190000
************************************************************************ 03200000
*                                                                        03210000
*                                                                        03220000
*                                                                        03230000
         X25MCH CSBTYPE=3,      COMMUNICATION SCANNER TYPE 3            X03240000
              ADDRESS=(034,035), TWO LINE SET ADDRESSES                 X03250000
              LCGDEF=0(9),      HIGHEST LCGN=0, HIGHEST LCN=9           X03260000
              FRMLGTH=131,      MAXIMUM FRAME LENGTH=131                X03270000
              MWINDOW=7,        FRAME WINDOW=7                          X03280000
              STATION=DTE,      THIS PHYSICAL LINK IS A DTE             X03290000
              PROTCOL=LAPB,     X25 LEVEL 2 PROTOCOL IS LAPB            X03300000
              PKTMODL=128,      X25 LEVEL 3 MODULO=128                  X03310000
              ANS=STOP,         FOR NCP PU MACRO                        X03320000
              TPTIMER=1.2,      X25 T1 TIMER IN SECOND                  X03330000
              TDTIMER=3,        TIMER TO WAIT FOR ND RETRIES            X03340000
              NPRETRY=5,        NUMBER OF RETRIES WHEN TPTIMER ELAPSEDX03350000
              NDRETRY=3,        NUMBER OF (TP*NP) RETRIES (MAX VALUE) X03360000
              PUNAME=XP034,     NAME OF THE PU TYPE 1 OF THIS LINK      X03370000
              LUNAME=XU034,     NAME OF THE LU TYPE 1 OF THIS LINK      X03380000
              LLCLIST=(LLC2,LLC4,LLC5), PSH/GATE/PAD ALLOWED ON SVCS    X03390000
              GATE=GENERAL,     GATE SUPPORT ON THIS LINK               X03400000
              PAD=INTEG,        INTEGRATED PAD SUPPORT (X28 SUBSET)     X03410000
              TRAN=EVEN,        EVEN TRANSLATION FOR PAD SUPPORT        X03420000
              LCN0=NOTUSED,     LCN 0 IS NOT USED AS VC                 X03430000
              SPEED=4800        LINE SPEED=4800                          03440000
*                                                                        03450000
*                                                                        03460000
*                                                                        03470000
           X25LCG LCGN=0        LOGICAL CHANNEL GROUP=0                  03480000
***                                                                      03490000
****     X25 LINE FOR PSH ON PVC ************************                03500000
***                                                                      03510000
XL034001 X25LINE LCN=1,         LOGICAL CHANNEL NUMBER 1 VC             X03520000
              VCCINDX=1,        THIS VC USES ENTRY 1 IN VCCPT           X03530000
              LLC=LLC2,         SNA BNN TERMINAL SUPPORTED IN PSH       X03540000
              TYPE=P            THIS IS A PERMANENT VIRTUAL CIRCUIT      03550000
XP034001 X25PU PUTYPE=2,        TYPE PU                                 X03560000
              ADDR=01,          SDLC ADDRESS OF SNA STATION             X03570000
              MAXDATA=265,      MAXIMUM DATA TRANSFER SIZE              X03580000
              VPACING=(2,1),    HOST OUTGOING PACING                    X03590000
              PACING=(1,1),     3705 OUTGOING PACING                    X03600000
              PASSLIM=1,                                                X03610000
              BUFLIM=8,                                                 X03620000
              MAXOUT=1                                                   03630000
XU034001 X25LU LOCADDR=1        FIRST LU ADDRESS                         03640000
XV034001 X25LU LOCADDR=2        SECOND LU ADDRESS                        03650000
***                                                                      03660000
****     1 PVC IN PCNE        ***************************                03670000
***                                                                      03680000
           X25VC LCN=(2),       LOGICAL CHANNEL NUMBER 2 VC             X03690000
              VCCINDX=3,        THIS VC USES ENTRY 3 IN VCCPT           X03700000
              LLC=LLC0,         X25 NON-SNA TERMINAL SUPPORT (PCNE)     X03710000
```

```
               TYPE=P            PERMANENT VIRTUAL CIRCUIT             03720000
***                                                                    03730000
****     1 PVC IN GATE          ***************************            03740000
***                                                                    03750000
            X25VC LCN=(3),       LOGICAL CHANNEL NUMBER 2 VC          X03760000
               VCCINDX=3,        THIS VC USES ENTRY 3 IN VCCPT        X03770000
               LLC=LLC4,         NON-SNA TERMINAL SUPPORT (GATE)      X03780000
               TYPE=P            PERMANENT VIRTUAL CIRCUIT             03790000
***                                                                    03800000
****     1 PVC IN PAD           ***************************            03810000
***                                                                    03820000
            X25VC LCN=(4),       LOGICAL CHANNEL NUMBER 3 VC          X03830000
               VCCINDX=1,        THIS VC USES ENTRY 1 IN VCCPT        X03840000
               LLC=LLC5,         X28 NON-SNA TERMINAL SUPPORT (PAD)   X03850000
               TYPE=P            PERMANENT VIRTUAL CIRCUIT             03860000
***                                                                    03870000
****     5 SVC'S FOR PSH/GATE/PAD (SEE LCCLIST IN X25MCH)              03880000
***                                                                    03890000
         X25VC LCN=(5,9),        LOGICAL CHANNEL NUMBER 5 THROUGH 9   X03900000
               VCCINDX=1,        THIS VC USES ENTRY 1 IN VCCPT        X03910000
               OUFINDX=3,        THIS VC USES ENTRY 3 IN OUFT         X03920000
               CALL=INOUT,       INCOMING AND OUTGOING CALL ALLOWED   X03930000
               TYPE=S            SWITCHED VIRTUAL CIRCUIT              03940000
*                                                                      03950000
*                                                                      03960000
*                                                                      03970000
*********************************************************************** 03980000
*                                                                     * 03990000
*       FOURTH  PHYSICAL LINK ALLOWING GATE LLC WITH SUBADDRESSING    * 04000000
*         ONLY THE LOGICAL CHANNEL GROUP 1 IS DEFINED                 * 04010000
*            -PVC 0 IS NOT USED AS VC                                 * 04020000
*          9 SVCS ARE DEFINED                                         * 04030000
*            -SVCS 1,9 ARE USED FOR INCOMING AND OUTGOING CALL        * 04040000
*             CALL=IN IS REQUIRED TO ESTABLISH SESSIONS IN GATE LLC   * 04050000
*             VIA THE CTCP-GATE LU TO LU SESSION EITHER WITH          * 04060000
*             CALL REQUEST PACKET OR INCOMING PACKET                  * 04070000
*             CALL=INOUT ALLOW OUTGOING CALL FROM ACCESS METHOD AND   * 04080000
*             INCOMING CALL FOR OTHER LLCS THAN GATE                  * 04090000
*                                                                     * 04100000
*********************************************************************** 04110000
*                                                                      04120000
*                                                                      04130000
*                                                                      04140000
          X25MCH CSBTYPE=3,      COMMUNICATION SCANNER TYPE 3         X04150000
               ADDRESS=(036,037), TWO LINE SET ADDRESSES              X04160000
               LCGDEF=1(9),      HIGHEST LCGN=1, HIGHEST LCN=9        X04170000
               FRMLGTH=131,      MAXIMUM FRAME LENGTH=131             X04180000
               MWINDOW=7,        FRAME WINDOW=7                       X04190000
               STATION=DTE,      THIS PHYSICAL LINK IS A DTE          X04200000
               PROTCOL=LAPB,     X25 LEVEL 2 PROTOCOL IS LAPB         X04210000
               PKTMODL=128,      X25 LEVEL 3 MODULO=128               X04220000
               LLC0=0,           0 IS THE SUBADDRESSING DIGIT FOR PCNE X04230000
               LLC2=2,           2 IS THE SUBADDRESSING DIGIT FOR PSH X04240000
               LLC4=9,           9 IS THE SUBADDRESSING DIGIT FOR GATE X04250000
```

```
               GATE=GENERAL,      GATE SUPPORT ON THIS LINK               X
               SUBADDR=YES,       SUBADDRESSING IS USED ON THIS LINK      X
               PAD=NO,            NO PAD ON THIS LINK                     X
               LCN0=NOTUSED,      LCN 0 IS NOT USED AS VC                 X
               SPEED=19200        LINE SPEED=19200
*
         X25LCG LCGN=1            LOGICAL CHANNNEL GROUP=1
***
****    9 SVC'S FOR PCNE/PSH/GATE (SEE LLCX OPERANDS IN X25MCH MACRO)
***
         X25VC LCN=(1,9),         LOGICAL CHANNEL NUMBER 1 THROUGH 9      X
               VCCINDX=1,         THIS VC USES ENTRY 1 IN VCCPT           X
               OUFINDX=1,         THIS VC USES ENTRY 3 IN OUFT            X
               TYPE=S,            SWITCHED VIRTUAL CIRCUIT                X
               CALL=INOUT         CALL=IN REQUIRED FOR GATE
*                                 IN AND OUT CALL ALLOWED FOR OTHER LLCS
***
***
***
         GENEND INIT=USRINIT,     ENTRY POINT FOR NON-X25 USER INIT ROUTX
               INCINIT=USRINI     NAME OF MEMBER IN NCP72.MAC720 CONTAIN
*                                 ING INCLUDE FOR NON-X25 INIT ROUTINE
***
***
***
         X25END INCPRFX=D06,      PREFIX FOR MEMBERS IN MACLIB            X
               NCPSTG1=D06INX25,  MEMBER NAME CONTAINING NCP MACROS       X
               LSTUACB=YES,       X25 WILL GENERATE LAST UACB             X
               X25VTAM=NO         FOR VTAM VERSION 1
*
*
*
         END
/*
```

STAGE 2 GENERATION

```
./ ADD NAME=D06TBL
./     NUMBER       NEW1=10000,INCR=1000
X25$MKB  BAK2INIT AVTN=BAL$AVT,LLCTN=BAL$LLC,SARL=1,MCHCNT=4
NETWORK1 BAK2NET NETTYPE=1,CPTITN=X25N1C,CPTITL=5,OUFTITN=X25N1O,OUFTIT*
               L=4
X25N1C1  BAK2VCPT DATAPTY=LOW,INDEX=1,MAXPKTL=128,PKTSEQ=0,VWINDOW=3,OU*
               TSLOW=0,INSLOWY=2,INSLOWX=16
X25N1C3  BAK2VCPT DATAPTY=LOW,INDEX=3,MAXPKTL=128,PKTSEQ=0,VWINDOW=2,OU*
               TSLOW=0,INSLOWY=2,INSLOWX=16
X25N1C4  BAK2VCPT DATAPTY=LOW,INDEX=4,MAXPKTL=32,PKTSEQ=0,VWINDOW=5,OUT*
               SLOW=0,INSLOWY=2,INSLOWX=16
X25N1O1  BAK2OUFT INDEX=1,FACL=0,DATL=0,VALUE=,VALUE1=,VALUE2=
X25N1O2  BAK2OUFT INDEX=2,FACL=2,DATL=0,VALUE=0302,VALUE1=,VALUE2=
X25N1O3  BAK2OUFT INDEX=3,FACL=4,DATL=3,VALUE=03021202,VALUE1=123456,VA*
               LUE2=
X25KM032 BAK2MCH NRZI=,STATION=DTE,PROTCOL=LAPB,SOTN=XC032,MWINDOW=7,FR*
```

```
                 MLGTH=131,RETRYCT=0,RETRYTO=0,ACBXN=X25A032X,ACBRN=X25A0*
                 32R,LIQN=X25Q032,MCHNO=1,CSBTYPE=3,VCGATL=1,VCGATN=X25KG*
                 032,VCBATN=X25KV032,VCBATL=9,PLPOUEP=BALPLPO,VCMINEP=BAL*
                 VCIE1,GCBN=XNETODO,RLINADD=033,PKTMODL=8,XLINADD=032,VCS*
                 CNB=30,DM=1,LL2IDL=BALL2IDL,LL3IDL=BALL3IDL,TPTIMER=25,N*
                 PRETRY=7,NDRETRY=1,TDTIMER=0,REL2MSK=00001000,LCNO=1,XPA*
                 RENT=0,XUACBRN=X25U032R,XUACBXN=X25U032X,AXBRN=X25X032R,*
                 AXBXN=X25X032X,XSLUBN=,STATSEP=BALNASTA
X25K0320 BAK2LCG LCGN=0,LCCNT=9
XB032000 BAK2VC TYPE=P,DSTNODE=INN,XID=1000,VCCINAM=X25N1C1,RETVCTO=20,*
                 RETVCCT=5,LLC=3,LCN=0,VCCINDX=1,OUFINDX=0,VCMOUEP=BALVCO*
                 F1,LLCOUTK=BALT5OUT,SOTN=XC032000,PLPINAC=BALPLPI1,PLPIN*
                 EP=BALPLPI,VACBN=XA032000,VAXBN=XX032000,GCBN=X25P032A,P*
                 KTMODL=8
XB032001 BAK2VC TYPE=P,DSTNODE=,XID=1000,VCCINAM=X25N1C1,RETVCTO=15,RET*
                 VCCT=3,LLC=2,LCN=1,VCCINDX=1,OUFINDX=0,VCMOUEP=BALVCOF1,*
                 LLCOUTK=BALT5OUT,SOTN=XC032001,PLPINAC=BALPLPI1,PLPINEP=*
                 BALPLPI,VACBN=XA032001,VAXBN=XX032001,GCBN=X25P032A,PKTM*
                 ODL=8
XB032002 BAK2VC TYPE=P,DSTNODE=,XID=1000,VCCINAM=X25N1C3,RETVCTO=30,RET*
                 VCCT=3,LLC=0,LCN=2,VCCINDX=3,OUFINDX=0,VCMOUEP=BALVCOF1,*
                 LLCOUTK=BALT5OUT,SOTN=XC032002,PLPINAC=BALPLPI1,SLUBN=XS*
                 032002,PLPINEP=BALPLPI,VACBN=XA032002,VAXBN=XX032002,GCB*
                 N=X25P032A,PKTMODL=8
XB032003 BAK2VC TYPE=P,DSTNODE=,XID=1000,VCCINAM=X25N1C1,RETVCTO=30,RET*
                 VCCT=3,LLC=5,LCN=3,VCCINDX=1,OUFINDX=0,VCMOUEP=BALVCOF1,*
                 LLCOUTK=BALT5OUT,SOTN=XC032003,PLPINAC=BALPLPI1,SLUBN=XS*
                 032003,PLPINEP=BALPLPI,VACBN=XA032003,VAXBN=XX032003,GCB*
                 N=X25P032A,PKTMODL=8
XB032004 BAK2VC TYPE=S,DSTNODE=,XID=1000,VCCINAM=X25N1C1,OUFINAM=X25N1O*
                 1,CALL=IN,RETVCTO=30,RETVCCT=3,LLC=0,LLCLIST=(0,2,5),LCN*
                 =4,VCCINDX=1,OUFINDX=1,VCMOUEP=BALVCOF1,LLCOUTK=BALT5OUT*
                 ,SOTN=XC032004,PLPINAC=BALPLPI1,SLUBN=XS032004,PLPINEP=B*
                 ALPLPI,VACBN=XA032004,VAXBN=XX032004,GCBN=X25S032B,PKTMO*
                 DL=8
XB032005 BAK2VC TYPE=S,DSTNODE=,XID=1000,VCCINAM=X25N1C1,OUFINAM=X25N1O*
                 1,CALL=IN,RETVCTO=30,RETVCCT=3,LLC=0,LLCLIST=(0,2,5),LCN*
                 =5,VCCINDX=1,OUFINDX=1,VCMOUEP=BALVCOF1,LLCOUTK=BALT5OUT*
                 ,SOTN=XC032005,PLPINAC=BALPLPI1,SLUBN=XS032005,PLPINEP=B*
                 ALPLPI,VACBN=XA032005,VAXBN=XX032005,GCBN=X25S032B,PKTMO*
                 DL=8
XB032006 BAK2VC TYPE=S,DSTNODE=,XID=1000,VCCINAM=X25N1C1,OUFINAM=X25N1O*
                 3,CALL=INOUT,RETVCTO=30,RETVCCT=3,LLC=0,LLCLIST=(0,2,5),*
                 LCN=6,VCCINDX=1,OUFINDX=3,VCMOUEP=BALVCOF1,LLCOUTK=BALT5*
                 OUT,SOTN=XC032006,PLPINAC=BALPLPI1,SLUBN=XS032006,PLPINE*
                 P=BALPLPI,VACBN=XA032006,VAXBN=XX032006,GCBN=X25S032B,PK*
                 TMODL=8
XB032007 BAK2VC TYPE=S,DSTNODE=,XID=1000,VCCINAM=X25N1C1,OUFINAM=X25N1O*
                 3,CALL=OUT,RETVCTO=30,RETVCCT=3,LLC=0,LLCLIST=(0,2,5),LC*
                 N=7,VCCINDX=1,OUFINDX=3,VCMOUEP=BALVCOF1,LLCOUTK=BALT5OU*
                 T,SOTN=XC032007,PLPINAC=BALPLPI1,SLUBN=XS032007,PLPINEP=*
                 BALPLPI,VACBN=XA032007,VAXBN=XX032007,GCBN=X25S032B,PKTM*
                 ODL=8
XB032008 BAK2VC TYPE=S,DSTNODE=,XID=1000,VCCINAM=X25N1C1,OUFINAM=X25N1O*
```

```
                  3,CALL=OUT,RETVCTO=30,RETVCCT=3,LLC=0,LLCLIST=(0,2,5),LC*
                  N=8,VCCINDX=1,OUFINDX=3,VCMOUEP=BALVCOF1,LLCOUTK=BALT5OU*
                  T,SOTN=XC032008,PLPINAC=BALPLPI1,SLUBN=XS032008,PLPINEP=*
                  BALPLPI,VACBN=XA032008,VAXBN=XX032008,GCBN=X25S032B,PKTM*
                  ODL=8
X25KM0A8 BAK2MCH NRZI=,STATION=DTE,PROTCOL=LAP,SOTN=XC0A8,MWINDOW=7,FRM*
                  LGTH=131,RETRYCT=0,RETRYTO=0,ACBXN=X25A0A8X,ACBRN=X25A0A*
                  8R,LIQN=X25Q0A8,MCHNO=2,CSBTYPE=2,VCGATL=1,VCGATN=X25KG0*
                  A8,VCBATN=X25KV0A8,VCBATL=8,PLPOUEP=BALPLPO,VCMINEP=BALV*
                  CIE1,GCBN=XNETOD0,RLINADD=0A9,PKTMODL=8,XLINADD=0A8,VCSC*
                  NB=30,DM=1,LL2IDL=BALL2IDL,LL3IDL=BALL3IDL,TPTIMER=10,NP*
                  RETRY=7,NDRETRY=1,TDTIMER=0,REL2MSK=00110110,LCN0=1,XPAR*
                  ENT=0,XPRTIEP=BALPCMHI,XPRTOEP=BALPCMHO,XUACBRN=X25U0A8R*
                  ,XUACBXN=X25U0A8X,AXBRN=X25X0A8R,AXBXN=X25X0A8X,XSLUBN=X*
                  25KS0A8,STATSEP=BALNASTA
X25K0A80 BAK2LCG LCGN=0,LCCNT=8
XB0A8000 BAK2VC TYPE=P,DSTNODE=INN,XID=1000,VCCINAM=X25N1C3,RETVCTO=30,*
                  RETVCCT=3,LLC=3,LCN=0,VCCINDX=3,OUFINDX=0,VCMOUEP=BALVCO*
                  F1,LLCOUTK=BALT5OUT,SOTN=XC0A8000,PLPINAC=BALPLPI1,PLPIN*
                  EP=BALPLPI,VACBN=XA0A8000,VAXBN=XX0A8000,GCBN=X25P0A8A,P*
                  KTMODL=8
XB0A8001 BAK2VC TYPE=P,DSTNODE=,XID=1000,VCCINAM=X25N1C1,RETVCTO=30,RET*
                  VCCT=3,LLC=2,LCN=1,VCCINDX=1,OUFINDX=0,VCMOUEP=BALVCOF1,*
                  LLCOUTK=BALT5OUT,SOTN=XC0A8001,PLPINAC=BALPLPI1,PLPINEP=*
                  BALPLPI,VACBN=XA0A8001,VAXBN=XX0A8001,GCBN=X25P0A8A,PKTM*
                  ODL=8
XB0A8002 BAK2VC TYPE=P,DSTNODE=,XID=1000,VCCINAM=X25N1C3,RETVCTO=30,RET*
                  VCCT=3,LLC=0,LCN=2,VCCINDX=3,OUFINDX=0,VCMOUEP=BALVCOF1,*
                  LLCOUTK=BALT5OUT,SOTN=XC0A8002,PLPINAC=BALPLPI1,SLUBN=XS*
                  0A8002,PLPINEP=BALPLPI,VACBN=XA0A8002,VAXBN=XX0A8002,GCB*
                  N=X25P0A8A,PKTMODL=8
XB0A8003 BAK2VC TYPE=P,DSTNODE=,XID=1000,VCCINAM=X25N1C1,RETVCTO=30,RET*
                  VCCT=3,LLC=5,LCN=3,VCCINDX=1,OUFINDX=0,VCMOUEP=BALVCOF1,*
                  LLCOUTK=BALT5OUT,SOTN=XC0A8003,PLPINAC=BALPLPI1,SLUBN=XS*
                  0A8003,PLPINEP=BALPLPI,VACBN=XA0A8003,VAXBN=XX0A8003,GCB*
                  N=X25P0A8A,PKTMODL=8
XB0A8004 BAK2VC TYPE=S,DSTNODE=,XID=1000,VCCINAM=X25N1C1,OUFINAM=X25N1O*
                  2,CALL=IN,RETVCTO=30,RETVCCT=3,LLC=0,LLCLIST=(0,2,5),LCN*
                  =4,VCCINDX=1,OUFINDX=2,VCMOUEP=BALVCOF1,LLCOUTK=BALT5OUT*
                  ,SOTN=XC0A8004,PLPINAC=BALPLPI1,SLUBN=XS0A8004,PLPINEP=B*
                  ALPLPI,VACBN=XA0A8004,VAXBN=XX0A8004,GCBN=X25S0A8B,PKTMO*
                  DL=8
XB0A8005 BAK2VC TYPE=S,DSTNODE=,XID=1000,VCCINAM=X25N1C1,OUFINAM=X25N1O*
                  2,CALL=IN,RETVCTO=30,RETVCCT=3,LLC=0,LLCLIST=(0,2,5),LCN*
                  =5,VCCINDX=1,OUFINDX=2,VCMOUEP=BALVCOF1,LLCOUTK=BALT5OUT*
                  ,SOTN=XC0A8005,PLPINAC=BALPLPI1,SLUBN=XS0A8005,PLPINEP=B*
                  ALPLPI,VACBN=XA0A8005,VAXBN=XX0A8005,GCBN=X25S0A8B,PKTMO*
                  DL=8
XB0A8006 BAK2VC TYPE=S,DSTNODE=,XID=1000,VCCINAM=X25N1C1,OUFINAM=X25N1O*
                  2,CALL=IN,RETVCTO=30,RETVCCT=3,LLC=0,LLCLIST=(0,2,5),LCN*
                  =6,VCCINDX=1,OUFINDX=2,VCMOUEP=BALVCOF1,LLCOUTK=BALT5OUT*
                  ,SOTN=XC0A8006,PLPINAC=BALPLPI1,SLUBN=XS0A8006,PLPINEP=B*
                  ALPLPI,VACBN=XA0A8006,VAXBN=XX0A8006,GCBN=X25S0A8B,PKTMO*
```

```
               DL=8
XB0A8007 BAK2VC TYPE=S,DSTNODE=,XID=1000,VCCINAM=X25N1C1,OUFINAM=X25N1O*
               2,CALL=IN,RETVCTO=30,RETVCCT=3,LLC=0,LLCLIST=(0,2,5),LCN*
               =7,VCCINDX=1,OUFINDX=2,VCMOUEP=BALVCOF1,LLCOUTK=BALT5OUT*
               ,SOTN=XC0A8007,PLPINAC=BALPLPI1,SLUBN=XS0A8007,PLPINEP=B*
               ALPLPI,VACBN=XA0A8007,VAXBN=XX0A8007,GCBN=X25S0A8B,PKTMO*
               DL=8
X25KM034 BAK2MCH NRZI=,STATION=DTE,PROTCOL=LAPB,SOTN=XC034,MWINDOW=7,FR*
               MLGTH=131,RETRYCT=0,RETRYTO=0,ACBXN=X25A034X,ACBRN=X25A0*
               34R,LIQN=X25Q034,MCHNO=3,CSBTYPE=3,VCGATL=1,VCGATN=X25KG*
               034,VCBATN=X25KV034,VCBATL=10,PLPOUEP=BALPLPO,VCMINEP=BA*
               LVCIE1,GCBN=XNETODO,RLINADD=035,PKTMODL=128,XLINADD=034,*
               VCSCNB=30,DM=1,LL2IDL=BALL2IDL,LL3IDL=BALL3IDL,TPTIMER=1*
               2,NPRETRY=5,NDRETRY=3,TDTIMER=3,REL2MSK=01001001,LCN0=0,*
               XPARENT=0,XPRTIEP=BALPCMHI,XPRTOEP=BALPCMHO,XUACBRN=X25U*
               034R,XUACBXN=X25U034X,AXBRN=X25X034R,AXBXN=X25X034X,XSLU*
               BN=X25KS034,STATSEP=BALNASTA
X25K0340 BAK2LCG LCGN=0,LCCNT=10
XB034001 BAK2VC TYPE=P,DSTNODE=,XID=1000,VCCINAM=X25N1C1,RETVCTO=30,RET*
               VCCT=3,LLC=2,LCN=1,VCCINDX=1,OUFINDX=0,VCMOUEP=BALVCOF1,*
               LLCOUTK=BALT5OUT,SOTN=XC034001,PLPINAC=BALPLPI1,PLPINEP=*
               BALPLPI,VACBN=XA034001,VAXBN=XX034001,GCBN=X25P034A,PKTM*
               ODL=128
XB034002 BAK2VC TYPE=P,DSTNODE=,XID=1000,VCCINAM=X25N1C3,RETVCTO=30,RET*
               VCCT=3,LLC=0,LCN=2,VCCINDX=3,OUFINDX=0,VCMOUEP=BALVCOF1,*
               LLCOUTK=BALT5OUT,SOTN=XC034002,PLPINAC=BALPLPI1,SLUBN=XS*
               034002,PLPINEP=BALPLPI,VACBN=XA034002,VAXBN=XX034002,GCB*
               N=X25P034A,PKTMODL=128
XB034003 BAK2VC TYPE=P,DSTNODE=,XID=1000,VCCINAM=X25N1C3,RETVCTO=30,RET*
               VCCT=3,LLC=4,LCN=3,VCCINDX=3,OUFINDX=0,VCMOUEP=BALVCOF1,*
               LLCOUTK=BALT5OUT,SOTN=XC034003,PLPINAC=BALPLPI1,SLUBN=XS*
               034003,PLPINEP=BALPLPI,VACBN=XA034003,VAXBN=XX034003,GCB*
               N=X25P034A,PKTMODL=128
XB034004 BAK2VC TYPE=P,DSTNODE=,XID=1000,VCCINAM=X25N1C1,RETVCTO=30,RET*
               VCCT=3,LLC=5,LCN=4,VCCINDX=1,OUFINDX=0,VCMOUEP=BALVCOF1,*
               LLCOUTK=BALT5OUT,SOTN=XC034004,PLPINAC=BALPLPI1,SLUBN=XS*
               034004,PLPINEP=BALPLPI,VACBN=XA034004,VAXBN=XX034004,GCB*
               N=X25P034A,PKTMODL=128
XB034005 BAK2VC TYPE=S,DSTNODE=,XID=1000,VCCINAM=X25N1C1,OUFINAM=X25N1O*
               3,CALL=INOUT,RETVCTO=30,RETVCCT=3,LLC=0,LLCLIST=(2,4,5),*
               LCN=5,VCCINDX=1,OUFINDX=3,VCMOUEP=BALVCOF1,LLCOUTK=BALT5*
               OUT,SOTN=XC034005,PLPINAC=BALPLPI1,SLUBN=XS034005,PLPINE*
               P=BALPLPI,VACBN=XA034005,VAXBN=XX034005,GCBN=X25S034B,PK*
               TMODL=128
XB034006 BAK2VC TYPE=S,DSTNODE=,XID=1000,VCCINAM=X25N1C1,OUFINAM=X25N1O*
               3,CALL=INOUT,RETVCTO=30,RETVCCT=3,LLC=0,LLCLIST=(2,4,5),*
               LCN=6,VCCINDX=1,OUFINDX=3,VCMOUEP=BALVCOF1,LLCOUTK=BALT5*
               OUT,SOTN=XC034006,PLPINAC=BALPLPI1,SLUBN=XS034006,PLPINE*
               P=BALPLPI,VACBN=XA034006,VAXBN=XX034006,GCBN=X25S034B,PK*
               TMODL=128
XB034007 BAK2VC TYPE=S,DSTNODE=,XID=1000,VCCINAM=X25N1C1,OUFINAM=X25N1O*
               3,CALL=INOUT,RETVCTO=30,RETVCCT=3,LLC=0,LLCLIST=(2,4,5),*
               LCN=7,VCCINDX=1,OUFINDX=3,VCMOUEP=BALVCOF1,LLCOUTK=BALT5*
               OUT,SOTN=XC034007,PLPINAC=BALPLPI1,SLUBN=XS034007,PLPINE*
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                  P=BALPLPI,VACBN=XA034007,VAXBN=XX034007,GCBN=X25S034B,PK*
                  TMODL=128
XB034008 BAK2VC TYPE=S,DSTNODE=,XID=1000,VCCINAM=X25N1C1,OUFINAM=X25N10*
                  3,CALL=INOUT,RETVCTO=30,RETVCCT=3,LLC=0,LLCLIST=(2,4,5),*
                  LCN=8,VCCINDX=1,OUFINDX=3,VCMOUEP=BALVCOF1,LLCOUTK=BALT5*
                  OUT,SOTN=XC034008,PLPINAC=BALPLPI1,SLUBN=XS034008,PLPINE*
                  P=BALPLPI,VACBN=XA034008,VAXBN=XX034008,GCBN=X25S034B,PK*
                  TMODL=128
XB034009 BAK2VC TYPE=S,DSTNODE=,XID=1000,VCCINAM=X25N1C1,OUFINAM=X25N10*
                  3,CALL=INOUT,RETVCTO=30,RETVCCT=3,LLC=0,LLCLIST=(2,4,5),*
                  LCN=9,VCCINDX=1,OUFINDX=3,VCMOUEP=BALVCOF1,LLCOUTK=BALT5*
                  OUT,SOTN=XC034009,PLPINAC=BALPLPI1,SLUBN=XS034009,PLPINE*
                  P=BALPLPI,VACBN=XA034009,VAXBN=XX034009,GCBN=X25S034B,PK*
                  TMODL=128
X25KM036 BAK2MCH NRZI=,STATION=DTE,PROTCOL=LAPB,SOTN=XC036,MWINDOW=7,FR*
                  MLGTH=131,RETRYCT=0,RETRYTO=0,ACBXN=X25A036X,ACBRN=X25A0*
                  36R,LIQN=X25Q036,MCHNO=4,CSBTYPE=3,VCGATL=2,VCGATN=X25KG*
                  036,VCBATN=X25KV036,VCBATL=10,PLPOUEP=BALPLPO,VCMINEP=BA*
                  LVCIE1,GCBN=XNETODO,RLINADD=037,PKTMODL=128,XLINADD=036,*
                  VCSCNB=30,DM=1,SUBTABL=C0FFC2FFFFFFFFFFFFC4,LL2IDL=BALL2*
                  IDL,LL3IDL=BALL3IDL,TPTIMER=10,NPRETRY=7,NDRETRY=1,TDTIM*
                  ER=0,REL2MSK=11000000,LCN0=0,XPARENT=0,XPRTIEP=BALPCMHI,*
                  XPRTOEP=BALPCMHO,XUACBRN=X25U036R,XUACBXN=X25U036X,AXBRN*
                  =X25X036R,AXBXN=X25X036X,XSLUBN=X25KS036,STATSEP=BALNAST*
                  A
X25K0361 BAK2LCG LCGN=1,LCCNT=10
XB036101 BAK2VC TYPE=S,DSTNODE=,XID=1000,VCCINAM=X25N1C1,OUFINAM=X25N10*
                  1,CALL=INOUT,RETVCTO=30,RETVCCT=3,LLC=0,LLCLIST=(0,2,4),*
                  LCN=1,VCCINDX=1,OUFINDX=1,VCMOUEP=BALVCOF1,LLCOUTK=BALT5*
                  OUT,SOTN=XC036101,PLPINAC=BALPLPI1,SLUBN=XS036101,PLPINE*
                  P=BALPLPI,VACBN=XA036101,VAXBN=XX036101,GCBN=X25S036A,PK*
                  TMODL=128
XB036102 BAK2VC TYPE=S,DSTNODE=,XID=1000,VCCINAM=X25N1C1,OUFINAM=X25N10*
                  1,CALL=INOUT,RETVCTO=30,RETVCCT=3,LLC=0,LLCLIST=(0,2,4),*
                  LCN=2,VCCINDX=1,OUFINDX=1,VCMOUEP=BALVCOF1,LLCOUTK=BALT5*
                  OUT,SOTN=XC036102,PLPINAC=BALPLPI1,SLUBN=XS036102,PLPINE*
                  P=BALPLPI,VACBN=XA036102,VAXBN=XX036102,GCBN=X25S036A,PK*
                  TMODL=128
XB036103 BAK2VC TYPE=S,DSTNODE=,XID=1000,VCCINAM=X25N1C1,OUFINAM=X25N10*
                  1,CALL=INOUT,RETVCTO=30,RETVCCT=3,LLC=0,LLCLIST=(0,2,4),*
                  LCN=3,VCCINDX=1,OUFINDX=1,VCMOUEP=BALVCOF1,LLCOUTK=BALT5*
                  OUT,SOTN=XC036103,PLPINAC=BALPLPI1,SLUBN=XS036103,PLPINE*
                  P=BALPLPI,VACBN=XA036103,VAXBN=XX036103,GCBN=X25S036A,PK*
                  TMODL=128
XB036104 BAK2VC TYPE=S,DSTNODE=,XID=1000,VCCINAM=X25N1C1,OUFINAM=X25N10*
                  1,CALL=INOUT,RETVCTO=30,RETVCCT=3,LLC=0,LLCLIST=(0,2,4),*
                  LCN=4,VCCINDX=1,OUFINDX=1,VCMOUEP=BALVCOF1,LLCOUTK=BALT5*
                  OUT,SOTN=XC036104,PLPINAC=BALPLPI1,SLUBN=XS036104,PLPINE*
                  P=BALPLPI,VACBN=XA036104,VAXBN=XX036104,GCBN=X25S036A,PK*
                  TMODL=128
XB036105 BAK2VC TYPE=S,DSTNODE=,XID=1000,VCCINAM=X25N1C1,OUFINAM=X25N10*
                  1,CALL=INOUT,RETVCTO=30,RETVCCT=3,LLC=0,LLCLIST=(0,2,4),*
                  LCN=5,VCCINDX=1,OUFINDX=1,VCMOUEP=BALVCOF1,LLCOUTK=BALT5*
                  OUT,SOTN=XC036105,PLPINAC=BALPLPI1,SLUBN=XS036105,PLPINE*
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                 P=BALPLPI,VACBN=XA036105,VAXBN=XX036105,GCBN=X25S036A,PK*
                 TMODL=128
XB036106 BAK2VC TYPE=S,DSTNODE=,XID=1000,VCCINAM=X25N1C1,OUFINAM=X25N1O*
                 1,CALL=INOUT,RETVCTO=30,RETVCCT=3,LLC=0,LLCLIST=(0,2,4),*
                 LCN=6,VCCINDX=1,OUFINDX=1,VCMOUEP=BALVCOF1,LLCOUTK=BALT5*
                 OUT,SOTN=XC036106,PLPINAC=BALPLPI1,SLUBN=XS036106,PLPINE*
                 P=BALPLPI,VACBN=XA036106,VAXBN=XX036106,GCBN=X25S036A,PK*
                 TMODL=128
XB036107 BAK2VC TYPE=S,DSTNODE=,XID=1000,VCCINAM=X25N1C1,OUFINAM=X25N1O*
                 1,CALL=INOUT,RETVCTO=30,RETVCCT=3,LLC=0,LLCLIST=(0,2,4),*
                 LCN=7,VCCINDX=1,OUFINDX=1,VCMOUEP=BALVCOF1,LLCOUTK=BALT5*
                 OUT,SOTN=XC036107,PLPINAC=BALPLPI1,SLUBN=XS036107,PLPINE*
                 P=BALPLPI,VACBN=XA036107,VAXBN=XX036107,GCBN=X25S036A,PK*
                 TMODL=128
XB036108 BAK2VC TYPE=S,DSTNODE=,XID=1000,VCCINAM=X25N1C1,OUFINAM=X25N1O*
                 1,CALL=INOUT,RETVCTO=30,RETVCCT=3,LLC=0,LLCLIST=(0,2,4),*
                 LCN=8,VCCINDX=1,OUFINDX=1,VCMOUEP=BALVCOF1,LLCOUTK=BALT5*
                 OUT,SOTN=XC036108,PLPINAC=BALPLPI1,SLUBN=XS036108,PLPINE*
                 P=BALPLPI,VACBN=XA036108,VAXBN=XX036108,GCBN=X25S036A,PK*
                 TMODL=128
XB036109 BAK2VC TYPE=S,DSTNODE=,XID=1000,VCCINAM=X25N1C1,OUFINAM=X25N1O*
                 1,CALL=INOUT,RETVCTO=30,RETVCCT=3,LLC=0,LLCLIST=(0,2,4),*
                 LCN=9,VCCINDX=1,OUFINDX=1,VCMOUEP=BALVCOF1,LLCOUTK=BALT5*
                 OUT,SOTN=XC036109,PLPINAC=BALPLPI1,SLUBN=XS036109,PLPINE*
                 P=BALPLPI,VACBN=XA036109,VAXBN=XX036109,GCBN=X25S036A,PK*
                 TMODL=128
$SRCLO   CSECT
./ ADD NAME=D06BLK
./     NUMBER      NEW1=10000,INCR=1000
         BAK2END LSTUACB=YES,LLC0EP=(BALPCA0,BALPCA1),LLC2EP=(BALPSHO,B*
                 ALPSHI),LLC3EP=(BALLCONN,BALLCINN),LLC4EP=(BALPCA0,BALGA*
                 TI),LLC5EP=(BALPCA0,BALPADI)
$SRCHI   CSECT
./ ADD NAME=D06LOI
./     NUMBER      NEW1=10000,INCR=1000
  INCLUDE ULIB(BALNASME)
./ ADD NAME=D06HII
./     NUMBER      NEW1=10000,INCR=1000
  INCLUDE ULIB(BALNASM4)
  INCLUDE ULIB(BALL2TMB)
  INCLUDE ULIB(BALSTAS8)
  INCLUDE ULIB(BALVCIM6)
  INCLUDE ULIB(BALVCIMC)
  INCLUDE ULIB(BALVCOMA)
  INCLUDE ULIB(BALPLPL3)
  INCLUDE ULIB(BALPLPOU)
  INCLUDE ULIB(BALPLPI)
  INCLUDE ULIB(BALCTLPR)
  INCLUDE ULIB(BALLCIND)
  INCLUDE ULIB(BALT5OUT)
  INCLUDE ULIB(BAL2BM)
  INCLUDE ULIB(BAL3LAP1)
  INCLUDE ULIB(BAL3LAP2)
  INCLUDE ULIB(BAL3LAPS)
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  INCLUDE ULIB(BAL2B2)
  INCLUDE ULIB(BAL2B3)
  INCLUDE ULIB(BALUSIMF)
  INCLUDE ULIB(BALPCMCH)
  INCLUDE ULIB(BALDATE)
  INCLUDE ULIB(BALGATE)
  INCLUDE ULIB(BALPCNM9)
  INCLUDE ULIB(BALPSHM7)
  INCLUDE ULIB(BALLCINN)
  INCLUDE ULIB(BALLCONN)
  INCLUDE ULIB(BALPAD)
  INCLUDE ULIB(BALXLT)
./ ADD NAME=D06INI
./     NUMBER      NEW1=10000,INCR=1000
  INCLUDE ULIB(BALINIMD)
./ ADD NAME=D06LOO
./     NUMBER      NEW1=10000,INCR=1000
 ORDER BALNASME
./ ADD NAME=D06HIO
./     NUMBER      NEW1=10000,INCR=1000
 ORDER BALTICK
 ORDER BALNASM4
 ORDER BALL2TMB
 ORDER BALSTAM8
 ORDER BALVCIM6
 ORDER BALVCIMC
 ORDER BALVCOMA
 ORDER BALPLPL3
 ORDER BALPLPOU
 ORDER BALPLPI
 ORDER BALCTLPR
 ORDER BALLCIND
 ORDER BALT5OUT
 ORDER BAL2BM
 ORDER BAL3LAP1
 ORDER BAL3LAP2
 ORDER BAL3LAPS
 ORDER BAL2B2
 ORDER BAL2B3
 ORDER BALUS9
 ORDER BALUSA
 ORDER BALUSB
 ORDER BALPCMCH
 ORDER BALDATE
 ORDER BALGATE
 ORDER BALPCNM9
 ORDER BALPSHM7
 ORDER BALLCINN
 ORDER BALLCONN
 ORDER BALPAD
 ORDER BALXLT
./ ADD NAME=D06INO
./     NUMBER      NEW1=10000,INCR=1000
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 ORDER BALINIMD
./ ADD NAME=D06INX25
./      NUMBER       NEW1=10000,INCR=1000
XNETODO  GROUP LNCTL=SDLC,LEVEL2=BALNAML2,LEVEL3=BALNAML3,USERID=(56689*
               81,BALMBDT),LEVEL5=NCP,TYPE=NCP,TIMER=(BALLAP4,BALLAP4,B*
               ALLAP4,BALLAP4),XIO=(BALNAMXL,BALNAMXS,BALNAMXI,BALNAMXK*
               ),DIAL=NO
XL032    LINE  UACB=(X25A032X,X25A032R),ADDRESS=(032,033),SPEED=9600
XC032    SERVICE ORDER=XP032
XP032    PU    ADDR=01,MAXDATA=261,ANS=CONT,PUTYPE=1
XU032    LU    LOCADDR=0,ISTATUS=INACTIVE
XL0A8    LINE  UACB=(X25A0A8X,X25A0A8R),ADDRESS=(0A8,0A9),SPEED=9600
XC0A8    SERVICE ORDER=XP0A8
XP0A8    PU    ADDR=01,MAXDATA=261,ANS=CONTINUE,PUTYPE=1
XU0A8    LU    LOCADDR=0,ISTATUS=ACTIVE
XL034    LINE  UACB=(X25A034X,X25A034R),ADDRESS=(034,035),SPEED=4800
XC034    SERVICE ORDER=XP034
XP034    PU    ADDR=01,MAXDATA=261,ANS=STOP,PUTYPE=1
XU034    LU    LOCADDR=0,ISTATUS=ACTIVE
XL036    LINE  UACB=(X25A036X,X25A036R),ADDRESS=(036,037),SPEED=19200
XC036    SERVICE ORDER=XP036
XP036    PU    ADDR=01,MAXDATA=261,PUTYPE=1
XU036    LU    LOCADDR=0,ISTATUS=ACTIVE
X25P032A GROUP LNCTL=SDLC,LEVEL2=BALNAVL2,LEVEL3=BALNAVL3,LEVEL5=NCP,TY*
               PE=NCP,USERID=(5668981,BALPBDT),TIMER=(BALNATER,BALNATRA*
               ,BALNATST,BALNATLS),XIO=(BALNAVXL,BALNAVXS,BALNAVXI,BALN*
               AVXK),DIAL=NO
XL032000 LINE  MONLINK=YES,ADDRESS=NONE,IPL=NO,UACB=XA032000
XC032000 SERVICE ORDER=XP032000
XP032000 PU    TGN=2,ANS=CONT,PUDR=NO,PUTYPE=4
XL032001 LINE  ADDRESS=NONE,UACB=XA032001
XC032001 SERVICE ORDER=XP032001
XP032001 PU    ADDR=01,MAXDATA=265,MAXOUT=1,PACING=(1,1),PASSLIM=1,BUFL*
               IM=8,VPACING=(2,1),PUTYPE=2
XU032001 LU    LOCADDR=1
XV032001 LU    LOCADDR=2
XL032002 LINE  ADDRESS=NONE,UACB=XA032002
XC032002 SERVICE ORDER=XP032002
XP032002 PU    PUTYPE=1,ADDR=01,MAXDATA=261,VPACING=(2,1),PACING=(1,1)
XU032002 LU    LOCADDR=0
XL032003 LINE  ADDRESS=NONE,UACB=XA032003
XC032003 SERVICE ORDER=XP032003
XP032003 PU    PUTYPE=1,ADDR=01,MAXDATA=261,VPACING=(2,1),PACING=(1,1)
XU032003 LU    LOCADDR=0
X25P0A8A GROUP LNCTL=SDLC,LEVEL2=BALNAVL2,LEVEL3=BALNAVL3,LEVEL5=NCP,TY*
               PE=NCP,USERID=(5668981,BALPBDT),TIMER=(BALNATER,BALNATRA*
               ,BALNATST,BALNATLS),XIO=(BALNAVXL,BALNAVXS,BALNAVXI,BALN*
               AVXK),DIAL=NO
XL0A8000 LINE  MONLINK=NO,ADDRESS=NONE,IPL=NO,UACB=XA0A8000
XC0A8000 SERVICE ORDER=XP0A8000
XP0A8000 PU    TGN=3,ANS=CONT,PUDR=NO,PUTYPE=4
XL0A8001 LINE  ADDRESS=NONE,UACB=XA0A8001
XC0A8001 SERVICE ORDER=XP0A8001
XP0A8001 PU    ADDR=01,MAXDATA=265,MAXOUT=1,PACING=(1,1),PASSLIM=1,BUFL*
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                  IM=8,VPACING=(2,1),PUTYPE=2
XU0A8001 LU       LOCADDR=1
XV0A8001 LU       LOCADDR=2
XL0A8002 LINE     ADDRESS=NONE,UACB=XA0A8002
XC0A8002 SERVICE ORDER=XP0A8002
XP0A8002 PU       PUTYPE=1,ADDR=01,MAXDATA=261,VPACING=(2,1),PACING=(1,1)
XU0A8002 LU       LOCADDR=0
XL0A8003 LINE     ADDRESS=NONE,UACB=XA0A8003
XC0A8003 SERVICE ORDER=XP0A8003
XP0A8003 PU       PUTYPE=1,ADDR=01,MAXDATA=261,VPACING=(2,1),PACING=(1,1)
XU0A8003 LU       LOCADDR=0
X25P034A GROUP LNCTL=SDLC,LEVEL2=BALNAVL2,LEVEL3=BALNAVL3,LEVEL5=NCP,TY*
                  PE=NCP,USERID=(5668981,BALPBDT),TIMER=(BALNATER,BALNATRA*
                  ,BALNATST,BALNATLS),XIO=(BALNAVXL,BALNAVXS,BALNAVXI,BALN*
                  AVXK),DIAL=NO
XL034001 LINE     ADDRESS=NONE,UACB=XA034001
XC034001 SERVICE ORDER=XP034001
XP034001 PU       ADDR=01,MAXDATA=265,MAXOUT=1,PACING=(1,1),PASSLIM=1,BUFL*
                  IM=8,VPACING=(2,1),PUTYPE=2
XU034001 LU       LOCADDR=1
XV034001 LU       LOCADDR=2
XL034002 LINE     ADDRESS=NONE,UACB=XA034002
XC034002 SERVICE ORDER=XP034002
XP034002 PU       PUTYPE=1,ADDR=01,MAXDATA=261,VPACING=(2,1),PACING=(1,1)
XU034002 LU       LOCADDR=0
XL034003 LINE     ADDRESS=NONE,UACB=XA034003
XC034003 SERVICE ORDER=XP034003
XP034003 PU       PUTYPE=1,ADDR=01,MAXDATA=261,VPACING=(2,1),PACING=(1,1)
XU034003 LU       LOCADDR=0
XL034004 LINE     ADDRESS=NONE,UACB=XA034004
XC034004 SERVICE ORDER=XP034004
XP034004 PU       PUTYPE=1,ADDR=01,MAXDATA=261,VPACING=(2,1),PACING=(1,1)
XU034004 LU       LOCADDR=0
X25S036A GROUP LNCTL=SDLC,LEVEL2=BALNAVL2,LEVEL3=BALNAVL3,LEVEL5=NCP,TY*
                  PE=NCP,USERID=(5668981,BALSBDT),TIMER=(BALNATER,BALNATRA*
                  ,BALNATST,BALNATLS),XIO=(BALNAVXL,BALNAVXS,BALNAVXI,BALN*
                  AVXK),DIAL=YES
XL036109 LINE     CALL=INOUT,ADDRESS=NONE,AUTO=YES,UACB=XA036109
XP036109 PU       PUTYPE=(1,2),MAXLU=3
XL036108 LINE     CALL=INOUT,ADDRESS=NONE,AUTO=YES,UACB=XA036108
XP036108 PU       PUTYPE=(1,2),MAXLU=3
XL036107 LINE     CALL=INOUT,ADDRESS=NONE,AUTO=YES,UACB=XA036107
XP036107 PU       PUTYPE=(1,2),MAXLU=3
XL036106 LINE     CALL=INOUT,ADDRESS=NONE,AUTO=YES,UACB=XA036106
XP036106 PU       PUTYPE=(1,2),MAXLU=3
XL036105 LINE     CALL=INOUT,ADDRESS=NONE,AUTO=YES,UACB=XA036105
XP036105 PU       PUTYPE=(1,2),MAXLU=3
XL036104 LINE     CALL=INOUT,ADDRESS=NONE,AUTO=YES,UACB=XA036104
XP036104 PU       PUTYPE=(1,2),MAXLU=3
XL036103 LINE     CALL=INOUT,ADDRESS=NONE,AUTO=YES,UACB=XA036103
XP036103 PU       PUTYPE=(1,2),MAXLU=3
XL036102 LINE     CALL=INOUT,ADDRESS=NONE,AUTO=YES,UACB=XA036102
XP036102 PU       PUTYPE=(1,2),MAXLU=3
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XL036101 LINE   CALL=INOUT,ADDRESS=NONE,AUTO=YES,UACB=XA036101
XP036101 PU     PUTYPE=(1,2),MAXLU=3
X25S034B GROUP LNCTL=SDLC,LEVEL2=BALNAVL2,LEVEL3=BALNAVL3,LEVEL5=NCP,TY*
               PE=NCP,USERID=(5668981,BALSBDT),TIMER=(BALNATER,BALNATRA*
               ,BALNATST,BALNATLS),XIO=(BALNAVXL,BALNAVXS,BALNAVXI,BALN*
               AVXK),DIAL=YES
XL034009 LINE   CALL=INOUT,ADDRESS=NONE,AUTO=YES,UACB=XA034009
XP034009 PU     PUTYPE=(1,2),MAXLU=3
XL034008 LINE   CALL=INOUT,ADDRESS=NONE,AUTO=YES,UACB=XA034008
XP034008 PU     PUTYPE=(1,2),MAXLU=3
XL034007 LINE   CALL=INOUT,ADDRESS=NONE,AUTO=YES,UACB=XA034007
XP034007 PU     PUTYPE=(1,2),MAXLU=3
XL034006 LINE   CALL=INOUT,ADDRESS=NONE,AUTO=YES,UACB=XA034006
XP034006 PU     PUTYPE=(1,2),MAXLU=3
XL034005 LINE   CALL=INOUT,ADDRESS=NONE,AUTO=YES,UACB=XA034005
XP034005 PU     PUTYPE=(1,2),MAXLU=3
X25S0A8B GROUP LNCTL=SDLC,LEVEL2=BALNAVL2,LEVEL3=BALNAVL3,LEVEL5=NCP,TY*
               PE=NCP,USERID=(5668981,BALSBDT),TIMER=(BALNATER,BALNATRA*
               ,BALNATST,BALNATLS),XIO=(BALNAVXL,BALNAVXS,BALNAVXI,BALN*
               AVXK),DIAL=YES
XL0A8007 LINE   CALL=IN,ADDRESS=NONE,AUTO=YES,UACB=XA0A8007
XP0A8007 PU     PUTYPE=(1,2),MAXLU=3
XL0A8006 LINE   CALL=IN,ADDRESS=NONE,AUTO=YES,UACB=XA0A8006
XP0A8006 PU     PUTYPE=(1,2),MAXLU=3
XL0A8005 LINE   CALL=IN,ADDRESS=NONE,AUTO=YES,UACB=XA0A8005
XP0A8005 PU     PUTYPE=(1,2),MAXLU=3
XL0A8004 LINE   CALL=IN,ADDRESS=NONE,AUTO=YES,UACB=XA0A8004
XP0A8004 PU     PUTYPE=(1,2),MAXLU=3
X25S032B GROUP LNCTL=SDLC,LEVEL2=BALNAVL2,LEVEL3=BALNAVL3,LEVEL5=NCP,TY*
               PE=NCP,USERID=(5668981,BALSBDT),TIMER=(BALNATER,BALNATRA*
               ,BALNATST,BALNATLS),XIO=(BALNAVXL,BALNAVXS,BALNAVXI,BALN*
               AVXK),DIAL=YES
XL032008 LINE   CALL=OUT,ADDRESS=NONE,AUTO=YES,UACB=XA032008
XP032008 PU     PUTYPE=(1,2),MAXLU=3
XL032007 LINE   CALL=OUT,ADDRESS=NONE,AUTO=YES,UACB=XA032007
XP032007 PU     PUTYPE=(1,2),MAXLU=3
XL032006 LINE   CALL=INOUT,ADDRESS=NONE,AUTO=YES,UACB=XA032006
XP032006 PU     PUTYPE=(1,2),MAXLU=3
XL032005 LINE   CALL=IN,ADDRESS=NONE,AUTO=YES,UACB=XA032005
XP032005 PU     PUTYPE=(1,2),MAXLU=3
XL032004 LINE   CALL=IN,ADDRESS=NONE,AUTO=YES,UACB=XA032004
XP032004 PU     PUTYPE=(1,2),MAXLU=3
         GENEND INIT=(USRINIT,BALINIMD),SRCHI=D06BLK,SRCLO=D06TBL,INCL2*
               LO=D06LOI,ORDL2LO=D06LOO,INCL2HI=D06HII,ORDL2HI=D06HIO,I*
               NCINIT=(USRINI,D06INI),ORDINIT=D06INO,TMRTICK=BALTICK
./ ENDUP
/*
```

CHAPTER 8. X.25 NCP PACKET SWITCHING INTERFACE MACRO INSTRUCTIONS

This chapter presents the X.25 NCP Packet Switching Interface macros in alphabetic sequence. Macro instructions are described in the standard macro format (described under the heading "Macro Formats") and each macro begins on a new page. Following the macro name is a description of the functions of the macro.

The description is followed by a chart of the macro instruction that includes for each operand the format and default value. Following the chart is a description of each operand and a series of notes pertaining to that operand.

MACRO FORMATS

A format illustration accompanies each macro instruction in this publication. The illustrations indicate the operands that must be coded exactly as shown, those that are required, and those that are optional. The required operands are listed first in alphabetic order, and then the optional operands are listed in alphabetic order. The operand descriptions following the format are listed in the same order as the operands in the format. The operand conventions are:

1. Keyword operands are described by a three-part structure that consists of the (uppercase) keyword, followed by an equal sign (both of which must be coded), followed by a lowercase variable or an uppercase fixed value to be specified by the user.

   Examples: KEYWORD=value, METHOD=NORMAL

2. Uppercase letters and punctuation marks (except as described in these conventions) represent information that must be coded exactly as shown.

3. Lowercase letters and terms represent information that must be supplied by the programmer. Restrictions (such as the maximum value that may be specified) are stated in the description of the operand under the macro description.

4. An ellipsis (a comma followed by three periods) indicates that a variable number of items may be included.

5. {A} Information contained within a vertical stack of
   {B} braces represents alternatives, one of which must be chosen by you when coding the operand in which the braces appear.

6. [A] Information contained within brackets represents an option that can be included or omitted, depending on the requirements of the program.

```
[{A}]  If more than one alternative is included within a
 {B}   single set of brackets, either of the alternatives may be
chosen, or the operand may be omitted (that is, none of the
alternatives need be chosen).
```

7. Operands that are not enclosed within brackets are required.

```
8.  [{A}]  Underlined elements represent default values.
     {B}
     {C}
```

OTHER CONVENTIONS USED IN THIS BOOK

The X.25 NCP Packet Switching Interface is coded using the basic assembler language. All coding examples included in this book use assembler-language coding conventions.

X.25 NCP PACKET SWITCHING INTERFACE MACROS

The stage 1 user macros describe the X.25 NCP Packet Switching Interface network. They are:

```
X25BUILD

  X25NET         One for each network.
  X25VCCPT       One for each filled VCCPTIT entry.
  X25OUFT        One for each filled OUFTIT entry
                 (one VCCPTIT and one OUFTIT per
                 network).
    X25MCH       One per MCH and at least one per
                 network
      X25LCG     One per logical channel group, and
                 at least one per MCH.
         X25VC   At least one per logical channel
                 group.
           or
         [X25LINE]    One per virtual circuit.
         [X25PU  ]    One per virtual circuit.
         [X25LU  ]    At least one per permanent VC.
                      (LU not required for INN.)

X25END
```

These macros generate input for the NCP generation.

X25BUILD Macro Instruction

This macro starts the generation process for the X.25 NCP Packet Switching Interface control blocks. Among its operands, five are the same as those of the NCP BUILD macro: JOBCARD, MACLIB, OUTPUT, QUALIFY, TYPSYS.

Name	Operation	Operands
[symbol]	X25BUILD	[IDNUMH={0x}] {<u>00</u>} [,JOBCARD={NO }] {MULTI} {<u>YES</u> } [,MACLIB=dsname] (OS only) [,MAXPIU={length} {<u>64K</u> } [,MCHCNT={count}] {<u>1</u> } [,OUTPUT=iebupdte] (OS only) [,QUALIFY={NONE }] (OS only) {symbol} {<u>SYS1</u> } [,SNAP={YES}] {<u>NO</u> }] [,SRCHI={name }] {<u>X25BLK</u>}] [,SRCLO={name }] {<u>X25TBL</u>}] [,SRCPRFX={prefix}] {<u>X25</u> } [,TYPSYS={DOS}] {<u>OS</u>}]

<u>symbol</u>

Is an optional label.

IDNUMH=0x/00

Specifies the first two of the five hexadigits of the ID which will be used for non-SNA switched support when the default ID is used. The valid range is from X'00' to X'0F', the default value is X'00'.

JOBCARD=YES/NO/MULTI

Specifies whether the program generation procedure is to provide a job card for the stage 2 input stream, and whether the input stream consists of more than one job.

If you specify JOBCARD=YES or omit the operand, a single job card is provided and the stage 2 input stream consists of a single job.

If you specify JOBCARD=MULTI, a job card is provided for each step and the stage 2 input stream consists of multiple jobs:

- one each for the members of the stage 2 output library containing the X.25 NCP Packet Switching Interface tables and control blocks, as specified by the SRCLO and SRCHI operands.

- three for the macro library members specified by the INCL2LO, INCL2HI, and INCINIT operands of the X25END macro in OS/VS and DOS/VSE

- three for the macro library members specified by the ORDL2LO, ORDL2HI, and ORDINIT operands of the X25END macro in OS/VS only.

- one for the NCP stage 1 input.

See "Generating the X.25 NCP Packet Switching Interface" to find out how to supply a JOB card different from the default JOB card used in OS/VS.

MACLIB=dsname

Is the name (OS/VS only) of the output library for the X.25 NCP Packet Switching Interface stage 2. This operand is required if the OUTPUT operand is not coded. It is ignored if the OUTPUT operand is coded. The data set may or may not be qualified depending on the QUALIFY operand of this macro. This data set must be cataloged and must be specified in the first suboperand in the MACLIB operand of the NCP BUILD macro.

It is recommended that a library other than MAC3705X (which contains X.25 macros used during NCP stage 2) be used and that the BLKSIZE of this library be equal to the BLKSIZE of MAC3705X.

Programming Note (OS/VS only):

- The MACLIB operand of the X25BUILD macro accepts only one dsname.

- The MACLIB operand of the ACF/NCP BUILD macro accepts up to five dsnames. The first of these dsnames names the library in which the members prepared by stage 1 of the X.25 NCP Packet Switching Interface generation process are stored. The other dsnames can be used to specify the libraries in which the user macros required for the first assembly step of stage 2 of the NCP are stored.

  These dsnames are concatenated in the MACLIB DD card for the first assembly of stage 2 of the NCP. In the final linkedit, only the first dsname is used to search for the INCLUDE and ORDER control cards.

MAXPIU=length

Specifies the longest PIU that is allowed to flow in the network and that may be exported to any host. The length may be coded in kilobytes, in which case the range is from 2K to 64K; or the length may be coded in bytes, in which case the range is from 1296 to 65535. The default value is 64K.

MCHCNT=count

Specifies the number of physical circuits (MCHs) defined in this X.25 NCP Packet Switching Interface generation deck. The default value is 1.

OUTPUT=(iebupdte)

Specifies the name (OS/VS only) of a cataloged procedure used in lieu of the normally generated JCL when performing an X.25 NCP Packet Switching Interface generation.

QUALIFY=symbol/NONE/SYS1

This operand, which is for OS/VS only, indicates the first-level qualifier for OS/VS data sets specified by the MACLIB operand of this macro and of the corresponding NCP BUILD macro. SYS1 is the default value. This operand is ignored when the OUTPUT operand is coded.

Programming Note (OS/VS only):

- In both the BUILD (ACF/NCP) and X25BUILD macros, the QUALIFY operand must be coded the same or omitted (the default value is then SYS1). If the qualifier is not SYS1 (if it is X25 for example), the two libraries SYS1.MAC3705X and SYS1.OBJ3705X must be renamed X25.MAC3705X and X25.OBJ3705X respectively, and cataloged.

SNAP=YES/NO

Specifies whether the SNAP facility is active in the actual generation. The default value is NO and means that the internal SNAP facility is not active. See the X.25 NCP Packet Switching Interface Diagnosis Guide for more information.

SRCHI=X25BLK/name

Specifies the name of the member of the stage 2 output library (specified by the MACLIB operand, OS only) to be used to store the X.25 NCP Packet Switching Interface control blocks. The default name is X25BLK when SCRPRFX is not coded. When SRCPRFX is coded, the default name is prefixed by the user-supplied prefix.

SRCLO=X25TBL/name

Specifies the name of the member of the stage 2 output library (specified by the MACLIB operand, OS only) to be used to store the X. 25 NCP Packet Switching Interface tables. The default name is X25TBL when SRCPRFX is not coded. When SRCPRFX is coded, the default name is prefixed by the user-supplied prefix.

SRCPRFX=prefix/X25

Specifies the 1 to 5 characters used as prefixes to give names to the members of the stage 2 output library containing the X.25 NCP Packet Switching Interface tables and control blocks. The default value is X25. The first character must be alphabetic, except for $. This operand is ignored when SRCHI and SRCLO are coded. This operand may be used to differentiate several X.25 generations.

TYPSYS=OS/DOS

Specifies whether stage 2 of the X.25 NCP Packet Switching Interface generation procedure is to be run under OS/VS or VSE. The default value is OS.

X25END Macro Instruction

This macro ends the X.25 NCP Packet Switching Interface generation, prepares the JCL to set all the defined members in this macro in the MACLIB, and prepares the information to be used for the NCP Stage 1 generation.

Name	Operation	Operands
[symbol]	X25END	[HSPDSEL=....]
		[,INCL2HI={name }] {X25HII}
		[,INCINIT={name }] {X25INI}
		[,INCL2LO={name }] {X25LOI}
		[,INCPRFX={prefix}] {X25 }]
		[,LSTUACB={NO }] {YES}]
		[,NCPSTG1={name }] {X25NCP}
		[,ORDINIT={name }] (OS/VS only) {X25INO}
		[,ORDL2HI={name }] (OS/VS only) {X25HIO}
		[,ORDL2LO={name }] (OS/VS only) {X25LOO}
		[,SCANCTL=....]
		[,X25VTAM={NO }] {YES}

symbol

Is an optional label.

HSPDSEL=

This operand is optionally coded. Its contents are reproduced without checking in the GENEND statement of the member coded in the NCPSTG1 operand of the X25END macro. For information on this operand, see the description of the GENEND macro in the ACF/NCP Installation manual.

INCPRFX=prefix/X.25

Specifies the 1 to 5 characters used as prefix to give names to the members created by this assembly in the stage 2 output library specified in the MACLIB operand of the X25BUILD macro (OS/VS only). The default value is X25. The first character must be alphabetic, with the exception of $. This operand is ignored if individual names are used.

LSTUACB=NO/YES

Specifies whether the X.25 NCP Packet Switching Interface UACBs inserted in the NCP during the first assembly of the NCP's stage 2 are to be ended by the LASTUACB macro punched by this assembly. When NO is coded, a user other than an X.25 NCP Packet Switching Interface user must supply the LASTUACB macro, in which case this other user must insert his UACBs after those of X.25 NCP Packet Switching Interface. The default value is YES and must be used when no other user code is included in the NCP, through the Customization Facility. Otherwise, only one user must supply the LASTUACB macro instruction.

NCPSTG1=name/X25NCP

Specifies the name of the member stored in the stage 2 output library specified in the MACLIB operand of the X25BUILD macro (OS/VS only) that will contain the NCP macros corresponding to the X.25 NCP Packet Switching Interface generation. The GROUP, LINE, PU, LU, and GENEND macros are punched in this member file. X25NCP is the default name. This operand may be used to differentiate several X.25 generations.

SCANCTL=

This operand is optionally coded. Its contents are reproduced without checking in the GENEND statement of the member coded in the NCPSTG1 operand of the X25END macro. For information on this operand, see the description of the GENEND macro in the ACF/NCP Installation manual.

X25VTAM=NO/YES

Specifies whether VTAM has been modified to accept the LINEADD=NONE and LINEAUT=YES operands of the GROUP macro. If not, the ADDRESS=NONE and AUTO=YES operands are generated in all the LINE macros describing virtual circuits.

Other Operands

All the other operands are the same as in the GENEND macro in the corresponding NCP stage 1 generation. The default names are indicated in capital letters when INCPRFX is not coded. When INCPRFX is coded, the default names are prefixed by the user-supplied prefix.

X25LCG Macro Instruction

This macro instruction begins the description of one LCG. One of these macros must be coded for each LCG defined on a multichannel.

Name	Operation	Operand
	X25LCG	LCGN=number

<u>LCGN=number</u>

Specifies the Logical Channel Group Number (LCGN) for all virtual circuits specified by the subsequent X25VC or X25LINE macros. The valid range of values is from 0 to 15.

Note: If more than one LCG is to be used, the X25LCG macros must be coded with the LCG numbers in ascending order. However, discontinuities are allowed in the ascending sequence.

X25LINE Macro Instruction

This macro instruction describes the characteristics of a single virtual circuit. This macro must be used to define a virtual circuit to another NCP under the control of SNA. It may be used instead of the X25VC macro to define other types of virtual circuits.

X25LINE macros defining virtual circuits associated with the same logical channel group must be arranged in ascending order with respect to their logical channel numbers (as specified via the LCN operand). Each X25LINE macro must be followed by one X25PU macro and at least one X25LU macro (if a permanent virtual circuit is to be used) for other than virtual circuit type 3.

Name	Operation	Operands
symbol	X25LINE	LCN=number, TYPE={SWITCHED,OUFINDX=index}, {PERMANENT,LLC={LLC0} {LLC2} {LLC3} {LLC4} {LLC5} VCCINDX=index [,CALL={OUT }] {IN } {INOUT} [,COMMITO={timeout}] (Releases 3 and 3.1) {4 } [,MONLINK={YES}] (Releases 3 and 3.1) {NO } [,NCPGRP={label}] {NEW } [,RETVCCT={count}] {3 } [,RETVCTO={timeout}] {30 }

Notes:

1. The X.25 level DTE timers cannot be modified by this macro. Their values are as recommended in CCITT 80:

T20=180 seconds	Restart Request
T21=200 seconds	Call Request
T22=180 seconds	Reset Request
T23=180 seconds	Clear Request

If these values do not suit your specific requirements, you must use the DATE function.

2. The MAXLU operand can be specified in the X25PU macro

<u>symbol</u>

This operand is mandatory. It will be the label of the corresponding LINE macro instruction in the NCP deck and, therefore, the symbolic name of this SNA resource.

<u>LCN=number</u>

Specifies the logical channel number of the virtual circuit being defined. This value is coded in decimal notation. Its valid range is from 0 to 255. Some networks do not use the value 0.

<u>TYPE=</u>

SWITCHED/PERMANENT: This operand is required and specifies which type of virtual circuit is being defined. It may be abbreviated S or P. There is no default value for this operand.

OUFINDX=INDEX: For switched virtual circuits, this operand specifies the default index value to be used in the OUFTIT to build the facility field and the end of the call user data field in a Call Request Packet. The specified index must have been defined in a previous X25OUFT macro. This operand is required when TYPE=SWITCHED is coded.

LLC=LLC0/LLC2/LLC3/LLC4/LLC5: For permanent virtual circuits, this operand specifies the type of virtual circuit being defined by this macro, as follows:

- Code LLC0 if the virtual circuit is to a non-SNA DTE and does not require GATE or PAD support (Type 0 virtual circuit)

- Code LLC2 if the virtual circuit is to an SNA peripheral node (Type 2 virtual circuit) attached with PSH protocol

- Code LLC3 if the virtual circuit is to an SNA peripheral node attached with QLLC protocol or to another NCP node (Type 3 virtual circuit).

- Code LLC4 if the virtual circuit requires GATE support (Type 4 virtual circuit)

- Code LLC5 if the virtual circuit is to a terminal requiring PAD support (Type 5 virtual circuit). The type of PAD support (integrated or transparent) is specified via the PAD operand of the X25MCH macro.

This operand is mandatory when TYPE=PERMANENT has been coded.

VCCINDX=index

For permanent virtual circuits, this operand specifies the entry in the virtual circuit connection parameter table that contains the operational characteristics of the virtual circuit defined by this X25LINE macro.

For switched virtual circuits, this operand specifies:

- For an incoming call, the entry in the virtual circuit connection parameter table that contains the operational characteristics of the virtual circuit defined by this X25LINE macro.

- For an outgoing call (call request), the default value of the entry in the virtual circuit connection parameter table that contains the operational characteristics of the virtual circuit. The default value is used when the XX field of the DIALNO operand of the VTAM PATH macro instruction is equal to 00.

The valid range of values is from 1 to 19. The specified entry must have been defined by an X25VCCPT macro.

The packet and window sizes defined in the corresponding entry of the VCCPT must be the same as the values assigned by the network.

CALL=IN/OUT/INOUT

Specifies the manner in which a switched virtual circuit is to be established. CALL=IN means that a virtual circuit is established at the request of a remote DTE, and not by the local X.25 NCP Packet Switching Interface. CALL=OUT means that a virtual circuit is established at the request of the local host access method and X.25 NCP Packet Switching Interface. CALL=INOUT means that a virtual circuit can be established in either of the above ways.

The CALL operand is meaningful only for switched virtual circuits. When GATE=DEDICAT or GATE=GENERAL is coded in the previous X25MCH, CALL=OUT is forbidden. In the case GATE=DEDICAT, the default value (CALL=IN) can be used. In the case GATE=GENERAL, either value (CALL=IN or CALL=INOUT) can be used.

COMMITO=timeout

Specifies the value in seconds of the Idle VC commit timeout. When this timer elapses, buffers which were committed for this VC are decommitted. The valid values are 1, 2, 4, or 8 seconds. The default value is 4 seconds.

MONLINK=YES/NO

Specifies the value given to this operand in the corresponding NCP LINE macro. There is no default value. See the ACF/NCP Installation manual for details.

NCPGRP=label/NEW

This operand is optional. It specifies the label of the NCP GROUP macro where the actual virtual circuit is defined in the NCP stage 1 deck. You usually do not have to specify this value; in this case the name is chosen by the X.25 NCP Packet Switching Interface stage 1 generation. You may code this operand when you want to modify an existing generation without modifying the NCP labels.

If a label is specified, a new NCP GROUP is created with this label as the name of the GROUP macro.

If NEW is specified, a new NCP group is created. The name of this group is automatically built by the X.25 NCP Packet Switching Interface stage 1 generation.

Note: One group for PVCs and one group for SVCs is opened at a time. If this parameter is omitted, the VC being defined will belong to the previously opened, leased, or switched group that has chosen the name.

RETVCCT=

Specifies the number of retransmissions of a physical services command when this virtual circuit is to an SNA intermediate network node or peripheral node. The valid range is from 0 to 15; 3 is the default value.

RETVCTO=

Specifies the timer used between retransmissions of physical services commands when this virtual circuit is to an SNA intermediate network node or peripheral node. The valid range is from 0 to 255 seconds; 30 seconds is the default value.

X25LU Macro Instruction

This macro instruction defines an LU associated with the SNA node located at the other end of this virtual circuit or (if this virtual circuit is to a non-SNA DTE) associated with the virtual circuit itself. The keyword operands are the same as those of the NCP LU macro instruction.

Name	Operation	Operands
symbol	X25LU	Same as in the NCP LU macro (*) See notes below

Symbol provides a resource name for the logical unit and is required.

Code one X25LU macro for each LU that can be reached over this virtual circuit.

A maximum of 800 such macros can be coded in an X.25 stage 1 deck. The sample program in Chapter 7 contains sample X25LU macros for several types of virtual circuits.

For more information on the operands for this macro instruction, refer to the ACF/NCP Installation manual.

Notes:

1. (DOS restriction): Only the first 8 characters of the keyword operand are transmitted to the NCP's system generation. The following message

   IFZ089 SETC OPERAND TOO LONG

   will appear each time a keyword value exceeds 8 characters.

2. Code LUDR=NO

X25MCH Macro Instruction

This macro instruction is used to describe a physical circuit.

Name	Operation	Operands
[symbol]	X25MCH	ADDRESS=(xxx,rrr),
		CSBTYPE={2},
		{3}
		FRMLGTH=length,
		LCGDEF=[(]lcg(lcnhi)[,lcg(lcnhi),...)],
		MWINDOW=window
		[,ANS={CONT }]
		{CONTINUE}
		{STOP }
		[,DBIT={YES}]
		{NO }
		[,GATE={DEDICAT}]
		{GENERAL},SUBADDR={YES},LLC0=i,
		LLC2=j,
		LLC3=k,
		LLC4=l,
		LLC5=m]
		{NO }
		{NO }
		[,LCN0={NOTUSED}]
		{USED }
		[,LLCLIST=(LLC0,LLC2,LLC3,LLC4,LLC5)]
		for SVC only
		[,LUNAME=luname]
		[,MACB=(labelx,labelr)]
		[,NCPGRP={label}]
		{NEW }
		[,NDRETRY=count]
		[,NPRETRY=count]
		[,PAD={INTEG },TRAN={ODD }]
		{TRANSP} {EVEN}
		{NO } {NO }
		[,PKTMODL={128}]
		{8 }
		[,PROTCOL={LAPB}]
		{LAP }
		[,PUNAME=puname]
		[,SPEED={value}]
		{4800 }
		[,STATION={DCE}]
		{DTE}
		[,TPTIMER=timer]
		[,TDTIMER=timer]

symbol

This is an optional label. When coded, it overrides the automatic resource name generation for the corresponding NCP line. See "NCP Stage 1 System Generation" for more details.

ADDRESS=(xxx,rrr)

specifies the TRANSMIT and RECEIVE line interface addresses in 3 hexadecimal digits each.

CSBTYPE=2/3

- Is coded 2 if this physical circuit is attached to the 3705 via a Type 2 scanner.
- Is coded 3 if this physical circuit is attached to the 3705 via a Type 3 scanner.

FRMLGTH=length

Specifies (in bytes) the maximum length of the frames that may flow over the physical circuit (X.25 N1 parameter divided by 8). The valid range of values is from 35 to 4100. This length is equal to the data packet length plus that of the packet header, which is 3 bytes long.

LCGDEF=lcg(lcnhi)

For each logical channel group (lcg), this operand specifies the highest logical channel number (lcnhi). At least one pair of values lcg(lcnhi) must be defined. A maximum of sixteen pairs of values can be coded in any order, between parentheses and separated by commas. Only lcgs that will actually be used should be defined.

MWINDOW=window

Specifies the frame window size to be used by the X.25 Link Access (Level 2) Protocol. The valid range of values is from 1 to 7.

ANS=CONT/CONTINUE/STOP

Specifies the ANS operand which will be copied, as is, in the NCP PU macro of this MCH. CONTINUE can be abbreviated as CONT. You must code ANS=CONTINUE if the same value is coded in the X25PU macros of the dependent VCs.

Note: ANS=CONTINUE is required for an INN link and must be coded in the PU type 4 definition.

DBIT=YES/NO

Specifies whether the Delivery Confirmation bit (D bit) in the packet header of data packets sent to or received from non-SNA DTEs supported by type 0 virtual circuits is to be used to confirm that a packet has been received at its destination. When DBIT=YES is coded:

- The D bit is set in the last packet of a packet sequence built from an outgoing PIU carrying any of the definite response bits.
- The definite response bit is set on in an incoming only-in-chain PIU when the corresponding incoming packet (or the last packet of a packet sequence) has the delivery bit on.

GATE=GENERAL/DEDICAT/NO

Specifies whether the GATE or the DATE function is to be supported on this physical circuit.

- Code GATE=GENERAL if the GATE function is to be used.
- Code GATE=DEDICAT if the DATE function is to be used.
- Code GATE=NO if neither the GATE nor the DATE function is to be used.

The default is GATE=NO.

SUBADDR=YES/NO: Specifies whether subaddressing is used within the Incoming Call packet on this physical circuit to specify what type of DTE is at the other end of the circuit. This operand is valid only when the GATE function is being used for this physical circuit. Subaddressing applies only to switched virtual circuits. Subaddressing should be understood as the rightmost digit of the calling DTE address within the Incoming Call packet.

LLC0=i Specifies the value in the subaddress field of Incoming Call packets that will be used to indicate that the calling DTE is a non-SNA DTE that does not require GATE or PAD support. i is any decimal digit from 0 to 9. This operand is valid only when SUBADDR=YES is coded.

LLC2=j Specifies the value in the subaddress field of Incoming Call packets that will be used to indicate that the calling DTE is an SNA peripheral node attached with PSH protocol. j is any decimal digit from 0 to 9. This operand is valid only when SUBADDR=YES is coded.

LLC3=k Specifies the value in the subaddress field of the Incoming Call packets that will be used to indicate that the calling DTE is an SNA peripheral node attached with the BNN QLLC protocol. k is any decimal digit from 0 to 9. This operand is valid only when SUBADDR=YES is coded.

LLC4=l Specifies the value in the subaddress field of Incoming Call packets that will be used to indicate that the calling DTE requires GATE support. l is any decimal digit from 0 to 9. This operand is valid only when SUBADDR=YES is coded. This operand is mandatory when GATE=GENERAL and SUBADDR=YES are coded.

LLC5=m Specifies the value in the subaddress field of Incoming Call packets that will be used to indicate that the calling DTE requires integrated or transparent PAD support. m is any decimal digit from 0 to 9. This operand is valid only when SUBADDR=YES is coded.

Note: The values i, j, k, l, m coded in the LLC0, LLC2, LLC3, LLC4, LLC5 operands must be different, that is,

$$i \neq j \neq k \neq l \neq m$$

LCN0=NOTUSED/USED

Specifies whether the logical channel number 0 of the logical channel group 0 is to be used to designate a virtual circuit. When NOTUSED is coded, all incoming packets specifying a logical channel number of 0, such as Restart and Diagnostic, are sent to the LU associated with the physical circuit. The CCITT recommendation recommends that logical channel number 0 not be used, but TRANSPAC version 1 uses it. When NETTYPE≠1 is specified in the X25NET macro, this operand has the default value:

LCN0=NOTUSED

When NETTYPE=1 is specified in the X25NET macro, this operand has the default value:

LCN0=USED

LLCLIST=(LLC0,LLC2,LLC3,LLC4,LLC5)

Specifies the types of switched virtual circuit that will be associated with this physical circuit. Code one value for each switched virtual circuit type, as follows:

- Code LLC0 if one or more switched virtual circuits are to a non-SNA DTE and these circuits do not require GATE or PAD support (Type 0 virtual circuit).
- Code LLC2 if one or more switched virtual circuits are to an SNA peripheral node with PSH protocol (Type 2 virtual circuits).
- Code LLC3 if one or more SVC are to an SNA peripheral node with protocol QLLC (Type 3 BNN virtual circuit).
- Code LLC4 if one or more switched virtual circuits require GATE support (Type 4 virtual circuits).

- Code LLC5 if one or more switched virtual circuits require transparent or integrated PAD support (Type 5 virtual circuits).

Note: These operand values are not positional.

This operand is mandatory if any switched virtual circuits are to be associated with this physical circuit. It is not required if only permanent virtual circuits are to be associated with this physical circuit.

LUNAME=label

This operand is optional. It specifies the label of the LU associated with this physical circuit, as chosen by the user to prevent label duplication either inside the same generation, or inside VTAM during node activation. See the chapter titled "Generating the X.25 NCP Packet Switching Interface" for more details on automatic name generation.

MACB=(labelx,labelr)

This operand is optional. It specifies the labels of the user's ACBs (UACBs). These labels are usually chosen by the actual X.25 NCP Packet Switching Interface stage 1 generation. You may code this operand to prevent label duplication with other resource names in the same generation.

If you do not code this operand, the UACB labels will be X25AxxxX and X25AxxxR, where xxx is the first suboperand of the ADDRESS operand.

NCPGRP=label/NEW

Optionally, "label" specifies the label of the NCP GROUP macro that defines the physical circuit in the NCP's stage 1 deck. You usually do not have to specify this value; in this case the name is chosen by the X.25 NCP Packet Switching Interface stage 1 generation. You may code this operand when you modify an existing generation and do not want to modify the NCP labels.

If this operand is omitted, the built-in label is XNETn1 where "n" is the position of the previous X25NET macro within the X.25 NCP Packet Switching Interface generation.

If you specify NEW, a new NCP GROUP macro is created. The name of this new NCP GROUP macro is built using the automatic naming convention.

If you specify a label, a new NCP GROUP macro is created that has the specified name.

NDRETRY=count

Specifies the number of times that the NP/TP sequence will be executed. The valid range is from 1 to 3; the default is 1.

NPRETRY=count

Specifies the total number of transmissions of an I or U-frame in a TP timeout recovery. The valid range is from 3 to 31; the default is 7.

PAD=INTEG/TRANSP/NO

Specifies whether the terminals supported via the PAD network function can be attached through virtual circuits associated with this physical circuit and the type of support that is to be provided by the X.25 NCP Packet Switching Interface:

INTEG means that the X.25 NCP Packet Switching Interface is to provide integrated PAD support; that is, terminals are to be supported in conformance with the X.28/X.29 recommendation. This value may not be specified if GATE=DEDICAT is specified.

TRANSP means transparent PAD support; that is, support is to be provided by a host application program, via qualified packets which are conveyed back and forth by the X.25 NCP Packet Switching Interface from the host to the network PAD support.

NO means that no DTEs supported by a PAD are to be supported on virtual circuits. Consequently, LLC5 may not appear in the LLCLIST operand, no LLC5 operand may be coded in this X25MCH macro, and no LLC=LLC5 operand may appear in an X25VC or X25LINE macro for a permanent virtual circuit associated with this physical circuit.

TRAN=ODD/EVEN/NO: Specifies whether the X.25 NCP Packet Switching Interface is to translate data coming in from a DTE supported by a PAD, from ASCII to EBCDIC, and translate data going out to such a DTE from EBCDIC to ASCII.

ODD: means that such a translation is to be performed and that odd parity is to be used. (See the "USASCII Character Code for TWX with Odd Parity" table in ACF/NCP/VS Program Reference Summary).

EVEN: means that such a translation is to be performed and that even parity is to be used. (See the "USASCII Character Code for TWX with Even Parity" table in ACF/NCP/VS Program Reference Summary).

NO: means that no such translation is to be performed.

This operand is optional with a default of NO.

Note: This operand is valid only if PAD=INTEG or PAD=TRANSP.

PKTMODL=value

Specifies the value of the modulo to be used by the packet protocol. The valid values are 8 or 128. The default value is 8. The specified value must be higher than all the values specified in the VWINDOW operands of the X25VCCPT macros of the same network. That is:

VWINDOW < PKTMODL

PROTCOL=LAPB/LAP

Specifies the link access protocol to be used. The default value is LAPB.

PUNAME=label

This operand is optional. It specifies the name of the PU associated with this physical circuit, as chosen by the user to prevent label duplication either inside the same generation, or inside VTAM during node activation. See the chapter titled "Generating the X.25 NCP Packet Switching Interface" for more details on automatic name generation.

SPEED=value

Specifies the speed of the physical circuit. This value is used to code NCP macros only (GROUP, LINE, or both). The valid range of values is from 1200 to 56000 bps for communication scanner type 3 and is from 1200 to 20400 bps for communication scanner type 2.

STATION=DTE/DCE

Specifies whether this link station (NCP) is to operate as a DTE or a DCE. DTE is the default value and must be used for a normal connection to a network node (usually a DCE).

The only effect of this parameter is to change the primary link address of the interface (it has no effect on packet level protocol).

Note: Full DCE implementation may be used via the DATE mode.

TDTIMER=timer

Specifies the value of the X.25 NCP Packet Switching Interface internal delay timer between the ND retransmissions. The valid values are 1, 2 or 3 seconds, the default value is 1 second.

TPTIMER=timer

Specifies the value of the X.25 T1 timer in seconds. The valid range is from 0.5 to 6 seconds by increment of 0.1 second, the default value is 1.0 second. The X.25 T1 timer represents the maximum delay during which the DTE expects the acknowledgment of a transmitted I or U frame with or without the poll bit set, or of a transmitted S frame with the poll bit set.

X25NET Macro Instruction

This macro is used to specify and start the description of an X.25 network.

Name	Operation	Operands
[symbol]	X25NET	DM={YES}, {NO } NETTYPE=ID [,CPHINDX={index}] {1 } [,OUHINDX={index}] {1 }

symbol

This is an optional label.

DM=YES/NO

Specifies whether the LAPB DM Command is accepted or sent by the network. This command, included in the CCITT recommendation, is not supported by all the networks.

NETTYPE=ID

Specifies the ID number given to this network. The following ID numbers are defined:

ID = 1	TRANSPAC,EURONET
ID = 2	DATAPAC,DATEX-P,NRW

Other networks should be assigned one of these two values according to the following differences.

The differences between a Network Type 1 and a Network Type 2 are the following:

1. Clear Request and Clear Indication packets for Network Type 2 are only 4 bytes long. No diagnostic byte is accepted or provided by a Network Type 2 in these packets. So, no end-to-end information is propagated between DTEs.

2. Reset Request packet: there is no end-to-end DTE information forwarded by a Network Type 2 for this packet. The diagnostic byte in a Reset Request packet, accepted by a Network Type 2, must be equal to X'00'.

3. The meaning of the cause byte in a Reset Indication packet is not always the same:

   - For Type 1 Networks:
     'Remote DTE Operational' condition is specified by a cause byte equal to X'09'.
     'Network Operational' condition is specified by a cause byte equal to X'0F'.

   - For Type 2 Networks:
     The two previous conditions are identified by a single cause byte equal to X'00', which is called 'End of Out-of-Order' condition.

   - In the Call Request and in the Incoming Call packets, the facility: High priority class of traffic is coded X'0102'. In that case, the packet length is forced to 128 bytes.

Note: The DM operand of the X25NET macro and the LCN0 operand of the X25MCH macro are also used to specify behavior of a network.

CPHINDX=index/1

Specifies the highest index value specified via the INDEX operand of an X25VCCPT macro included in this generation deck. The default value is 1.

OUHINDX=index/1

Specifies the highest index value specified via the INDEX operand of an X25OUFT macro included in this generation deck. The default value is 1.

X25OUFT Macro Instruction

This macro is used to specify, the user facilities and Call User Data field that are to be copied in the Call Request packet in the case of Outgoing Call. Refer to the discussion of the ACF/VTAM PATH Macro Instruction for more details on how to use this macro.

From 1 to 19 X25OUFT macros may be coded for each network. One macro is required for each filled entry of the optional user facilities table. Consecutive entries need not be used, but the length of the table is specified by the OUHINDX operand of the X25NET macro. At least one X25OUFT macro is required for each network that has switched virtual circuits. No X25OUFT macro is required when only permanent virtual circuits are in the network.

For Type 4 virtual circuits or virtual circuits using the DATE extension, an entry in the optional user facilities table need not be used. However, you should specify a dummy entry for these virtual circuits by coding:

X25OUFT INDEX=1.

Name	Operation	Operands
	X25OUFT	INDEX=index [,OPTFACL=hexavalue] [,USRFILD=hexavalue] [,USRFIL2=hexavalue]

INDEX=index

Specifies which entry in the optional user facilities table is to be created by this macro. The valid values range from 01 to 19.

OPTFACL=hexavalue

Specifies the hexadecimal configuration to be copied in the optional facility field of a Call Request packet. The 'hexavalue' must contain an even number of digits less than or equal to 126.

USRFILD=hexavalue

Specifies the correct bit configuration to be copied, as is, after the virtual circuit type identification in the Call User Data Field (CUD) of the Call Request packet. The virtual circuit type identification set by the X.25 NCP Packet Switching Interface itself and is:

X'C0' for Type 0 virtual circuits, followed by IDNUM
X'C2' for Type 2 virtual circuits
X'C3010000' for Type 3 BNN virtual circuits
X'pp000000' for Type 5 virtual circuits (pp=01, 41, or 81)

The 'hexavalue' must contain an even number of digits less than or equal to 254.

USRFIL2=hexavalue

Specifies the correct bit configuration to be copied, as is, as the last part of the Call User Data Field (CUD) of the Call Request packet. The 'hexavalue' must contain an even number of digits less than or equal to 254.

Notes:

1. The sum of the digits contained in the operands USRFILD and USRFIL2 must not exceed 256 digits, which is the maximum length of the call user data field in a Call packet for fast select. A normal Call Request has a call user data field not greater than 32 digits (16 bytes).

2. The INDEX operand only is mandatory when no other operands are coded. That is, no facility and no user data is carried in the Call Request packet (outgoing call).

The following is an example of X25OUFT macro instruction:

Name	Operation	Operands	
	X25OUFT	INDEX=1,	X
		OPTFACL=1202431254,	X
		USRFILD=123456789ABC,	X
		USRFIL2=4455	

The corresponding Call Request packet is built as follows assuming that this is a Type 2 virtual circuit, the logical channel number is 4, and the packet modulo is 8:

```
X'10041B...........051202431254C2123456789ABC4455
   >-<  >----------<..>--------<>----------------<
    T    DTE addr.  T facilities  Call User Data
    |               |
 Logical            |
 Channel            └--facility length
 Number
```

X25PU Macro Instruction

This macro instruction defines the PU associated with the SNA node located at the other end of this virtual circuit or (if this virtual circuit is to a non-SNA DTE) associated with the virtual circuit itself. The keyword operands are the same as in the NCP PU macro instruction.

Name	Operation	Operands
symbol	X25PU	Same as in the NCP PU macro (*) See notes below

Symbol provides a resource name for the physical unit and is required.

One X25PU macro instruction must be coded for each X25LINE macro.

A maximum of 300 such macros can be coded in an X.25 stage 1 deck. A SERVICE macro instruction is generated if necessary.

The sample program in Chapter 7 contains sample X25PU macros for several types of virtual circuits.

For more information on the operands for this macro instruction, refer to the ACF/NCP Release 2.1 Installation, SC30-3142, or ACF/NCP Release 3 Installation, SC30-3154.

Notes:

1. (DOS restriction): Only the first 8 characters of the keyword operand are transmitted to the NCP's system generation. The message

   IFZ089 SETC OPERAND TOO LONG

   appears each time a keyword value exceeds 8 characters.

2. Code PUDR=NO.

3. For PU Type 4, code ANS=CONTINUE.

X25VC Macro Instruction

This macro instruction describes the characteristics of virtual circuits associated with a physical circuit and logical channel group defined by the preceding X25MCH and X25LCG macros.

One X25VC macro may describe one or several virtual circuits that have the same characteristics.

Name	Operation	Operands
[symbol]	X25VC	LCN=(number1,number2), TYPE={SWITCHED,OUFINDX=index}, {PERMANENT,{LLC=LLC0} } {LLC2} {LLC3} {LLC4} {LLC5} VCCINDX=index [,CALL={OUT }] {IN } {INOUT} [,COMMITO={timeout}] Release 3 {4 } and 3.1 [,MAXLU=count] SVC only [,NCPGRP={label}] {NEW } [,RETVCCT={count}] {3 } [,RETVCTO={timeout}] {30 }

symbol

This is an optional label.

LCN=(number1,number2)

Specifies that the virtual circuits defined by this X25VC macro are to have sequential logical channel numbers, beginning with number1 and ending number2. These two numbers are in decimal notation. The valid range of values is from 0 to 255. Some networks do not use the value 0. Only one value may be specified as LCN=number1 when defining only one logical channel at a time.

TYPE=SWITCHED/PERMANENT:

This operand is required. It specifies the type of virtual circuit that is being defined. It may be abbreviated S or P. There is no default value given for this operand.

OUFINDX=INDEX: Specifies, for switched virtual circuits, the default index value to be used in the OUFTIT to build the facility field and the end of the call user data field in a Call Request Packet. The specified index must have been defined in a previous X25OUFT macro. This operand is required when TYPE=SWITCHED is coded.

LLC=LLC0/LLC2/LLC3/LLC4/LLC5: For permanent virtual circuits, this operand specifies the type of virtual circuits defined by this macro, as follows:

- Code LLC0 if the virtual circuits are to an non-SNA DTE and does not require GATE or PAD support (Type 0 virtual circuit).
- Code LLC2 if the virtual circuits are to an SNA peripheral node (Type 2 virtual circuit) attached with PSH protocol.
- Code LLC3 if the virtual circuits are to an SNA peripheral node (type 3 virtual circuit) with QLLC protocol.
- Code LLC4 if the virtual circuits require GATE support (Type 4 virtual circuit).
- Code LLC5 if the virtual circuits are to terminals requiring PAD support (Type 5 virtual circuit). The type of PAD support (integrated or transparent) is specified via the PAD operand of the X25MCH macro.

This operand is mandatory when TYPE=PERMANENT has been coded.

VCCINDX=index

For permanent virtual circuits, this parameter specifies the entry in the virtual circuit connection parameter table that contains operational characteristics of the virtual circuits defined by this X25VC macro.

For switched virtual circuits, this parameter specifies:

- For an incoming call, the entry in the virtual circuit connection parameter table that contains the operational characteristics of the virtual circuit
- For an outgoing call (call request), the default value of the entry in the virtual circuit connection parameter table that contains the operational characteristics of the virtual circuit. The default value is used when the XX field of the DIALNO operand of the VTAM PATH macro instruction is equal to 00.

The valid range of values is from 1 to 19. The specified entry must have been defined by an X25VCCPT macro.

The packet and window sizes defined in the corresponding entry of the VCCPT must be the same as the values assigned by the network.

CALL=IN/OUT/INOUT

Specifies the manner in which switched virtual circuits are to be established. CALL=IN means that a virtual circuit is established at the request of a remote DTE, and not by the local X.25 NCP Packet Switching Interface. CALL=OUT means that a virtual circuit is established at the request of the local host access method and X.25 NCP Packet Switching Interface. CALL=INOUT means that a virtual circuit can be established in either of these ways.

The CALL operand is meaningful only for switched virtual circuits. If the DATE or GATE facility is specifed in the previous X25MCH macro, CALL=OUT is prohibited. In the case of DATE, you may use the default value: CALL=IN. In the case of GATE, you may use either: CALL=IN or CALL=INOUT

COMMITO=timeout

Specifies the value in seconds of the Idle VC commit timeout. When this timer elapses, buffers that were committed for this VC are decommitted. The valid values are 1, 2, 4, or 8 seconds. The default value is 4 seconds.

MAXLU=count

This operand is optional and specifies for an SVC the value of the MAXLU operand of the corresponding NCP PU macro instruction. For a non-SNA

PVC, a default value is assigned to the MAXLU operand by NCP generation, as explained in the discussion of the PU macro in the ACF/NCP Installation manual. For a SNA PVC it must be coded in the X25PU macro.

For an SVC, if the value is omitted, the default value is 3.

NCPGRP=label/NEW

This operand is optional and specifies the label of the NCP GROUP macro where the actual virtual circuit is defined in the NCP stage 1 deck. You usually do not have to specify this value; the name is chosen by the X.25 NCP Packet Switching Interface stage 1 generation. You may code this operand when you want to modify an existing generation without modifying the NCP labels.

If a label is specified, a new NCP GROUP is created with this label as the name of the GROUP macro.

If NEW is specified, a new NCP group is created. The name of this group is automatically built by the X.25 NCP Packet Switching Interface stage 1 generation.

Note: One group for PVCs and one group for SVCs is opened at a time. If this parameter is omitted, the VC being defined belongs to the previously opened, nonswitched or switched group that has chosen the name.

RETVCTO=

Specifies the timer used between retransmissions of a physical services command when this virtual circuit is to an SNA subarea or peripheral node. The valid range is from 0 to 255 seconds; 30 seconds is the default value.

RETVCCT=

Specifies the number of retransmissions of physical services commands when this virtual circuit is to an SNA subarea or peripheral node. The valid range is from 0 to 15; 3 is the default value.

X25VCCPT Macro Instruction

This macro instruction describes the connection parameters for one or more virtual circuits. At least one X25VCCPT macro is required, and up to 19 X25VCCPT macros can be coded per network. One macro is required for each filled entry of the virtual circuit connection parameter table. Consecutive entries need not be used. The length of the table is specified by the CPHINDX operand of the X25NET macro.

An entry in the virtual circuit connection parameter table must be used by each virtual circuit defined in the network.

Name	Operation	Operands
	X25VCCPT	INDEX=index, MAXPKTL=size [,INSLOW={(percent1,percent2)}] {(<u>25,0</u>) } [,VWINDOW={value}] {<u>2</u> }

INDEX=index

Specifies the entry of the virtual circuit connection parameter table being initialized by this X25VCCPT macro. For example, if INDEX=3, this X25VCCPT macro initializes the third entry in the VCCPTIT. The valid values for this operand range from 01 to 19.

MAXPKTL=size

Specifies (in bytes) the maximum length of the packets to be sent or received over the virtual circuits using this entry in the virtual circuit connection parameter table. The valid range is from 32 to 4096. There is no default size. This length is the maximum length of data in a packet, excluding the length of the packet header.

Notes:

- Make sure that the number of incoming packets accumulated via the "More Data" bit (MDB) for all LLCs except level 2, and by the Segment Indication (SI) of the LLC level 2, is such that the length of the accumulated PIU does not exceed the maximum length that can be transferred to the host during a READ operation -- that is, it must be less than the product of the values specified on the MAXBFRU and UNITSZ operands of the NCP HOST macro.

- For the outbound flow the X.25 NCP Packet Switching Interface will split the PIU data into packets using the "more data" bit for all LLCs except level 2.

- For LLC level 2, PIUs on the outbound flow are split using Segment Indication. The maximum packet length must be the same as for the remote terminal interface.

INSLOW=(percent1,percent2)

Specifies the percentage of free buffers that must be reached before entering:

- The UNSAFE situation (percent1), or
- The DANGER situation (percent2)

for the virtual circuits using this entry. The valid values are 0, 6, 12, 25, 50, or 100. When this operand is coded, both values must be specified and "percent1" must be greater than or equal to "percent2". The default values are (25,0).

Notes:

1. The "percent1" and "percent2" values are defined in terms of the NCP's "SLOWDOWN=" parameter of the BUILD macro. The default values of "percent1" and "percent2" (25,0) mean that the UNSAFE limit is 25% higher than the NCP SLOWDOWN value, and that the DANGER limit (0%) is equal to the NCP's slowdown value.

2. The virtual call connection parameter table is not used by the LLC4 or DATE for the packet size and the packet window which are chosen by the CTCP. Other operands are used. Therefore, at least one X25VCCPT macro must be coded for compatibility. For example:

```
X25VCCPT INDEX=1,MAXPKTL=128.
```

VWINDOW=value

Specifies the value of the transmit/receive window used by the packet protocol for the VCs using this entry. This value must be less than the packet modulo value used by this protocol, defined in the X25MCH macro.

THE OPTIONAL GENEND MACRO INSTRUCTION

Skip this section if you have no other product inserted in your NCP with the Customization facility, such as the Network Terminal Option (NTO), or an Airlines Control Program.

This macro instruction belongs to the SYS1.GEN3705X library. Its purpose is to punch a GENEND statement for NCP stage 1, during X.25 NCP Packet Switching Interface stage 1. The resulting GENEND statement will contain (in a concatenated format) the parameters you have specified in the GENEND macro instruction for the NTO or the Airlines Control Program, plus those parameters particular to X.25 NCP Packet Switching Interface.

Notes:

1. When coded, the optional GENEND macro must be placed before X25END.

2. Moreover, the first statement of the X.25 stage 1 input deck must be:

   ```
   COPY XGENEND
   ```

Example

If another product such as NTO must be inserted in the X.25 NCP Packet Switching Interface stage 1 generation (see Chapter 3, "Generating the X.25 NCP Packet Switching Interface"), the generation requires the following GENEND macro:

```
GENEND      INIT=USRINIT,INCINIT=USRINI,-----
```

This macro must be inserted in the X.25 stage 1 deck after the last X25VC macro and before the X25END macro:

```
-----
X25VC -----
GENEND INIT=USRINIT,INCINIT=USRINI,
X25END -----
```

Then the resulting GENEND macro will be prepared by the X.25 generation as follows and must be inserted in the NCP deck:

```
GENEND      INIT=(USRINIT,BALINIMDO,INCINIT=(USRINI,DO1INI),---
```

THE IFQALIGN MACRO INSTRUCTION (DOS/VSE ONLY)

The purpose of this macro is to make easier the process of the three link edit steps of the NCP generation. The operator is prompted after the first and second link edit to enter the "HICORE" value given by the previous link edit. This process is used to align the X.25 NCP Packet Switching Interface code on a 2K boundary.

To use this facility, code this macro without any operand after the GENEND macro and before the END Statement in the NCP Stage 1 deck.

See Chapter 3 for details on how to use it.

Summary of Operands for X.25 Macros That Describe the Network

OPERANDS	STAGE 1 MACRO INSTRUCTIONS			
	X25BUILD	X25NET	X25MCH	X25VC,X25LINE
ADDRESS			*	
ANS			*	
CALL				*
COMMITO				*
CSBTYPE	0	0	*	
DBIT			*	
DM		*		
FRMLGTH		0	*	
GATE			*	
LCN				*
LCN0			*	
LCGDEF			*	
LLCLIST		0	*	
LLC		0	0	*
LLC0			*	
LLC2			*	
LLC3			*	
LLC4			*	
LLC5			*	
MACB			*	
MAXLU				*
MAXPIU	*			
MONLINK				*
MWINDOW	0	0	*	
NCPGRP			*	*
NDRETRY			*	
NETTYPE		*		
NPRETRY			*	
OUFINDX			0	*
PAD			*	
PKTMODL		0	*	
PROTCOL		0	*	
RETVCCT		0	0	*
RETVCTO		0	0	*
SPEED	0	0	*	
STATION		0	*	
SUBADDR			*	
TDTIMER			*	
TPTIMER			*	
TRAN			*	
TYPE				*
VACB				*
VCCINDX			0	*

* Indicates macros in which the operand is described.
0 Indicates macros in which the operand can be coded.

APPENDIX A. STORAGE OCCUPATION

The X.25 NCP Packet Switching Interface code requires a minimum of 36.5 K bytes and a maximum of 61 K bytes of storage in addition to that of the prerequisite ACF/NCP. You can figure your storage requirement for X.25 NCP Packet Switching Interface using the following information:

- X.25 NCP Packet Switching Interface basic = 34000 bytes
- BNN/SNA Support (LLC2) = 2150
- BNN/SNA Support (LLC3) = 2500
- INN/SNA Support (LLC3) = 4000
- Basic Non-SNA Support = 5500
  (Including LLC0 support and required for LLC4 and/or LLC5)
- GATE (LLC4) = 5500
- PAD (LLC5) = 2500
- (DATE (if GATE included) = 4500)
- (DATE (GATE not included) = 6500)

EXAMPLES:

- BNN/SNA support only (LLC2) = 34000 + 2150
- BNN/SNA support only (LLC3) = 34000 + 2500
- INN/SNA support only = 34000 + 4000
- INN and BNN (LLC2 and LLC3) SNA support = 34000 + 4000 + 2150 + 2500
- Type 0 VC support only = 34000 + 5500
- Type 4 VC support only = 34000 + 5500 + 5500
- Type 5 VC support only = 34000 + 5500 + 2500
- Type 0, 2, 3 INN, 5 support = 34000 + 2150 + 4000+ 5500 + 2500 without DATE support
- Type 0, 2, 3 BNN, 5 support = 34000 + 2150 + 2500 + 5500 + 2500 + 6500 with DATE support
- Type 0, 2, 4, 5 support = 34000 + 2150 + 5500 + 2500 + 5500

The X.25 NCP Packet Switching Interface uses several new control blocks whose length must be added to the standard NCP blocks for SNA support. Realize that for non-SNA support (type 0, 4, and 5 virtual circuits) a virtual circuit is seen by SNA as a SDLC line with one type 1 PU and one type 1 LU.

X.25 NCP Packet Switching Interface control blocks sizes:

•	AVT	28 bytes	1 per 3705
•	LLCT	72 bytes	1 per 3705
•	MKBAT	8* + 12*K	k=number of multichannel links
•	LIQ	16*(W+5)	W=MWINDOW, 1 per MCH
•	MKB	212	1 per multichannel link
•	MUA	128	2 per multichannel link
•	XUA	48	2 per multichannel link
•	VCGAT	8 + 8*m	1 per multichannel link, m= highest logical channel group number
•	VCBAT	8 + 12*(n+1)	1 per MCH n=highest logical channel number in each locical channel group
•	VCB	204	1 per defined virtual circuit
•	VUA	124	1 per defined virtual circuit
•	SLUB	40	1 per Non-SNA virtual circuit
•	VCCPTIT	8 + 4*(p+1)	1 per Network, p = highest VCCPT index
•	OUFTIT	8 + 4*(q+1)	1 per Network, q = highest OUFT index
•	VCCPT	14*p	1 per Network
•	OUFT	10*q+f+u	1 per Network, f = faciliy field length, u=user data length

The maximum number of physical links and virtual circuits that can be defined within an X.25 NCP Packet Switching Interface is limited by a 3705 Communications Controller requirement. A virtual circuit requires roughly 850 bytes for NCP and X.25 control blocks. Therefore for a configuration dedicated to X.25, a maximum total of about 300 virtual circuits and physical circuits may be defined.

APPENDIX B. X.25 FACILITIES

FLOW CONTROL PARAMETER NEGOTIATION

The X.25 NCP Packet Switching Interface supports the optional "Packet and Window Size Negotiation per Virtual Circuit" mechanism.

The packet length and window size are defined in the facility field of the Call Request packet, the Incoming Call packet, the Call Connected packet, and the Call Accepted packet. The coding of this facility is:

- Packet length

  Facility Code field=X'42'

  Facility Field parameter='0x0y'

  where x=calling DTE packet size code and

  y=called DTE packet size code.

If the packet size code =	then the packet length =
4	16
5	32
6	64
7	128
8	256
9	512
A	1024

- Window Size

  Facility code field = X'43'

  Facility field parameter = 'wwzz',

  where ww = calling DTE window size and

  zz = called DTE window size

  You may define these facility values in the OPTFACL operand of the X25OUFT macro to send them in a Call Request Packet. These facility values are checked in the Incoming Call and Call Connected packets. After checking, the call is accepted by X.25 NCP Packet Switching Interface if the following rules verified:

  x must be defined between X'4' and X'A'

  x must equal y

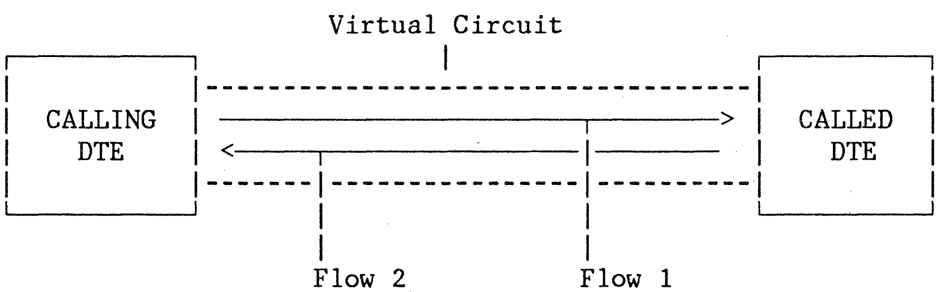
x must be less that the maximum frame length

ww must equal zz

ww must be less than or equal to 7, unless using modulo 128 where it may be greater

THROUGHPUT CLASS NEGOTIATION

With respect to the throughput class, a virtual circuit is characterized by two types of data flow for which the receiving capacity of one end must equal the sending capacity of the other end. A particular capacity does not imply particular packet length and window values. The throughput class is a pricing parameter.



Flow 1 is defined by the throughput class for transmission from the calling DTE.

Flow 2 is defined by the throughput class for transmission from the called DTE.

For switched virtual circuits, if there is a conflict between the throughput classes for the transmission indicated in the Call Request packet and the default throughput classes for reception of the corresponding DTEs, the lowest throughput class value is forced by the network for each flow.

The throughput class mechanism is a characteristic of the network, and the X.25 NCP Packet Switching Interface is not involved in this mechanism except in the case of switched virtual circuits, as far as the "Selection by the calling DTE of the Throughput Classes per Communication" is concerned, as shown in the following table.

FACILITY	X.25 NPSI
Choice of the default throughput classes of the link for each virtual circuit.	NOT INVOLVED
Selection by the calling DTE of the throughput classes per communication.	See note
Throughput class indication to the called DTE	NOT INVOLVED
Choice of the throughput classes per permanent virtual circuit.	NOT INVOLVED

Note: This facility is supported by the X.25 NCP Packet Switching Interface via the OPTFACL operand of the X25OUFT macro instruction, as described in Chapter 8.

The coding for the facility code and parameter fields for the throughput classes in the Call Request packet is:

Facility Code field = X'02'

Facility Parameter field = bits: 0123 4567

The thoughput class for transmission from the calling DTE is indicated in bits 4, 5, 6, and 7. The throughput class for transmission from the called DTE is indicated in bits 0, 1, 2, and 3. Bits 3 and 7 are the low order bits of each throughput class indicator.

ACCEPTANCE OF REVERSE CHARGING CALLS

This option is not checked by the X.25 NCP Packet Switching Interface when receiving an Incoming Call packet. However, you may ask for this option. In this case, the caller's decision is always accepted as far as charging is concerned.

The reverse charging request is provided by the X.25 NCP Packet Switching Interface via the OPTFACL operand of the X25OUFT macro instruction.

The coding for the facility code and parameter fields for reverse charging in the Call Request packet is:

Facility Code field = X'01'

Facility Parameter field = X'00' (Reverse charging not requested)

X'01' (Reverse charging requested)

CLOSED USER GROUP

This option, which allows a specific group of users to communicate with each other but not with any user outside the group, may be used but is not checked by the X.25 NCP Packet Switching Interface; see the OPTFACL operand of the X25OUFT macro.

THE ONE-WAY LOGICAL CHANNEL FACILITY

This user facility limits the use of a logical channel to either incoming or outgoing calls. The switched logical channels are seen by the SNA access method and the NCP as switched SDLC lines. By means of the CALL parameter of the VTAM LINE macro instruction, and of the TCAM

TERMINAL TERM=LINE

macro instruction, the use of a switched logical channel can be reserved for a one-way call only.

HIGH-PRIORITY CLASS OF TRAFFIC (NETWORK TYPE 2)

This option is granted for a period of time to a given permanent virtual circuit, or requested by a DTE for given switched virtual circuit. It applies to type 2 networks only.

It is supported for outgoing and incoming calls and must use packets 128 bytes long. For incoming calls the X.25 NCP Packet Switching Interface checks for high-priority service requests in the facility fields and internally updates the maximum packet size for the duration of the call. For outgoing calls, the X.25 NCP Packet Switching Interface supports this facility by using the OPTFACL operand of the X25OUFT macro instruction associated with a VCCPT entry containing a MAXPKTL parameter coded with a value of 128. Refer to Chapter 8 of this manual.

This support has no impact on the internal scheduling of the NCP.

Facility Code field = X'01'

Facility Parameter field = X'00' (Facility not requested)

X'02' (Facility requested)

GLOSSARY

This glossary contains definitions reprinted from:

(1) The American National Dictionary for Information Processing, copyright 1977 by the Computer and Business Equipment Manufacturers Association, copies of which may be purchased from the American National Standards Institute at 1430 Broadway, New York, New York 10018. These definitions are identified by an asterisk.
(2) The ISO Vocabulary of Data Processing, developed by the International Standards Organization, Technical Committee 97, Subcommittee 1. Definitions from published sections of this vocabulary are identified by the symbol "(ISO)" preceding the definition. Definitions from draft proposals and working papers under development by the ISO/TC97 vocabulary subcommittee are identified by the symbol "(TC97)," indicating that final agreement has not yet been reached among its participating members.
(3) The CCITT Sixth Plenary Assembly Orange Book, Terms and Definitions, and working documents published by the International Telecommunication Union, Geneva, 1978. These are identified by the symbol "(CCITT/ITU)" preceding the definition.

ABM. Asynchronous balanced mode.

abort. A function invoked by a sending primary, secondary, or combined station causing the recipient to discard and ignore all bit sequences transmitted by the sender since the preceding flag sequences. See also frame abortion.

access barred. (CCITT/ITU) The state in which the calling data terminal equipment (DTE) is not permitted to make a call to the DTE identified by the selection signals.

ADM. Asynchronous disconnected mode.

administration. See telecommunication Administration.

ARM. Asynchronous response mode.

asynchronous balanced mode (ABM). An operational mode of a balanced data link in which either combined station can send commands at any time and can initiate transmission of response frames without explicit permission from the other combined station. See also asynchronous response mode, normal response mode.

asynchronous disconnected mode (ADM). A nonoperational mode of a balanced or unbalanced data link in which the secondary or combined station is logically disconnected from the data link and therefore cannot transmit or receive information. See also initialization mode, normal disconnected mode.

asynchronous response mode (ARM). An operational mode of an unbalanced data link in which a secondary station may initiate transmission without explicit permission from the primary station. See also asynchronous balanced mode, normal response mode.

balanced data link. A data link between two participating combined stations; each station can transmit both command frames and response frames and assumes responsibility for the organization of its data flow and for the data link level error recovery operations for the transmissions that it originates. Contrast with unbalanced data link.

balanced station. Synonym for combined station.

bracket. One or more of request units (RUs) and their responses, that are exchanged between two LU-LU half-sessions and that represent a transaction between them. A bracket must be completed before another bracket can be started.

call. (1) (CCITT/ITU) A transmission for the purpose of identifying the transmitting station for which the transmission is intended. (2) (CCITT/ITU) An attempt to reach a user, whether or not successful.

call accepted packet. (CCITT/ITU) A call supervision packet transmitted by a called data terminal equipment (DTE) to inform the data circuit-terminating equipment (DCE) of the acceptance of the call.

call-accepted signal. (TC97) A call control signal that is sent by the called data terminal equipment (DTE) to indicate that it accepts the incoming call.

call collision. (CCITT/ITU) The simultaneous transmission of a call request signal from the data terminal equipment (DTE) and an incoming call signal from the data circuit-terminating equipment (DCE) so that neither equipment receives the expected responses.

call connected packet. (CCITT/ITU) A call supervision packet transmitted by a data circuit-terminating equipment (DCE) to inform a calling data terminal equipment (DTE) of the complete establishment of a call.

call control character. (CCITT/ITU) A character of an alphabet, or a part of it, which is used for call control. It may be used in conjunction with defined signal conditions on other interchange circuits.

call control procedure. (TC97) The implementation of a set of protocols necessary to establish and release a call.

call control signal. (TC97) One of the set of signals necessary to establish, maintain, and release a call.

called party. On a switched line, the location to which a connection is established.

call establishment. (CCITT/ITU) The sequence of events for the establishment of a data connection.

call identifier. (CCITT/ITU) A network utility that is an identifying name assigned by the originating network for each established or partially established virtual call and, when used in conjunction with the calling data terminal equipment (DTE) address, uniquely identifies the virtual call over a period of time.

calling. (TC97) The process of transmitting selection signals in order to establish a connection between data stations.

calling party. On a switched line the location that originates a connection.

calling sequence. (1) * (ISO) An arrangement of instructions and, in some cases, of data also, that is necessary to perform a call. (2) A polling list. See also polling.

call not accepted signal. (TC97) A call control signal sent by the called data terminal equipment (DTE) to indicate that it does not accept the incoming call.

call progress signal. (CCITT/ITU) A call control signal transmitted from the data circuit-terminating equipment (DCE) to the calling data terminal equipment (DTE) to inform it about the progression of a call, the reason why the connection could not be established, or any other network condition. Additionally, for packet services, a control signal:

- for virtual call service, to inform the calling and called DTEs about the reason why the call has been cleared
- for permanent virtual circuit service, to inform the DTEs about the reason why the permanent virtual circuit has been reset
- for datagram service, to inform the source DTE about the delivery or nondelivery of a specific datagram, or general operation of the DTE/DCE interface or service.

call request packet. (CCITT/ITU) A call supervision packet transmitted by a data terminal equipment (DTE) to ask for a call establishment through the network.

call request signal. (CCITT/ITU) A signal in the call establishment phase that alerts the data circuit-terminating equipment (DCE) that the data terminal equipment (DTE) wishes to make a call.

call supervision packet. (CCITT/ITU) A packet used for the establishment or the clearing of a call at the DTE/DCE interface.

centralized control. Control in which all the primary station functions of the data link are centralized in one data station.

centralized multipoint facility. (CCITT/ITU) A multipoint facility that enables a central data terminal equipment (DTE) to transmit data simultaneously to two or more remote DTEs, and to receive data transmitted by the remote DTEs one at a time. Data transmitted by a remote DTE is not delivered to other remote DTEs.

channel. See data communication channel.

character alignment. (CCITT/ITU) The identification of groups of contiguous bits that constitute characters.

circuit. See data circuit.

circuit switched data transmission service. (TC97) A service using circuit switching to establish and maintain a connection before data can be transferred between data terminal equipments (DTEs). See also packet switched data transmission service.

circuit switching. (TC97) A process that, on demand, connects two or more data terminal equipments (DTEs) and permits the exclusive use of a data circuit between them until the connection is released. Synonymous with line switching. See also message switching, packet switching.

class of service. See user class of service.

clear collision. The condition that occurs when a data terminal equipment (DCE) and a data circuit-terminating equipment (DCE) simultaneously transmit a clear request packet and a clear indication packet over the same logical channel.

clear indication packet. (CCITT/ITU) A call supervision packet transmitted by a data circuit-terminating equipment (DCE) to inform a data terminal equipment (DTE) of the clearing of a call.

clear request packet. (CCITT/ITU) A call supervision packet transmitted by a data terminal equipment (DTE) to ask for clearing a call.

closed user group. (TC97) In a group of users, a subgroup that is assigned a facility that enables a member of one subgroup to communicate only with other members of the subgroup. See also bilateral closed user group.

Note: A data terminal equipment (DTE) may belong to more than one closed user group.

closed user group with outgoing access. (CCITT/ITU) A closed user group that has a user assigned a facility which enables that user to communicate with other users of a public data network transmission service, where appropriate, or with users having a data terminal equipment (DTE) connected to any other public switched network to which interworking facilities are available.

collision. See call collision, clear collision, reset collision.

combined station. (1) (TC97) In high level data link control (HDLC), a data station that includes both a primary and a secondary. (2) A data station that supports the combined station control functions of a data link. The combined station generates commands and responses for transmission and interprets received commands and responses. Specific responsibilities assigned to a combined station include:

- initialization of control signal interchange
- organization of data flow
- interpretation of received commands and generation of appropriate responses
- actions regarding error control and error recovery functions at the data link level.

(3) Synonymous with balanced station. See also primary station, secondary station.

command. In data communications, an instruction represented in the control field of a frame and transmitted by a primary or combined station. It causes the addressed secondary/combined station to execute a specific data link control function. See also response.

command frame. A frame transmitted by a primary station or a frame transmitted by a combined station that contains the address of the other combined stations.

communication line. Synonym for telecommunication line.

communication common carrier. In the USA and Canada, a public data transmission service that provides the general public with transmission service facilities; for example, a telephone or telegraph company. See also telecommunication Administration, Post Telephone and Telegraph Administration, public data network, public data transmission service, Recognized Private Operating Agency.

contention mode. A mode of transmission in which a transmitter can send on its own initiative.

controlled slip. (CCITT/ITU) Slip where the number of digits lost or gained is always fixed.

CTCP. Communication and Transmission Control Program.

data channel. A device that connects a processor and main storage with I/O control units. Synonymous with input/output channel, I/O channel. Contrast with data communication channel.

data circuit. (1) (TC97) Associated transmit and receive channels that provide a means of two-way data communication. (2) See also physical circuit, virtual circuit.

Notes:

1. Between data switching exchanges (DSEs), the data circuit may or may not include data circuit-terminating equipment (DCE), depending on the type of interface used at the data switching exchange.

2. Between a data station and a data switching exchange or data concentrator, the data circuit includes the data circuit-terminating equipment at the data station end, and may also include equipment similar to a DCE at the data switching exchange or data concentrator location.

data circuit-terminating equipment (DCE). (TC97) The equipment installed at the user's premises that provides all the functions required to establish, maintain, and terminate a connection, and the signal conversion and coding between the data terminal equipment (DTE) and the line.

Note: The DCE may be separate equipment or an integral part of other equipment.

data circuit transparency. (TC97) The capability of a data circuit to transmit all data without changing the data content or structure.

data communication channel. (1) (TC97) A means of one-way transmission. Contrast with data channel.

Note: A channel may be provided, for example, by frequency or time division multiplexing.

data communication line. Deprecated term for telecommunication line.

data link. (1) * The physical means of connecting one location to another for the purpose of transmitting and receiving data. (2) (TC97) The assembly of parts of two data terminal equipments (DTEs) that are controlled by a link protocol, and that, together with the interconnecting data circuit, enables data to be transferred from a data source to a data sink. (3) The interconnecting data circuit between two or more equipments operating in accordance with a link protocol; it does not include the data source and the data sink. (4) In SNA, synonym for link(3). (5) Contrast with telecommunication line.

Note: A telecommunication line is the physical medium, for example, a telephone wire, a microwave beam. A data link includes the physical medium of transmission, the protocol, and associated devices and programs—it is both logical and physical.

data link level. The conceptual level of control or processing logic existing in the hierarchical structure of a data station (primary, secondary, or combined station) that is responsible for maintaining control of the data link. The data link level functions provide an interface between the data station high level logic and the data link. These functions include transmit bit insertion and receive bit deletion; address/control field interpretation; command/response generation, transmission, and interpretation; and frame check sequence computation and interpretation. See also higher level, packet level, physical level.

data packet. (CCITT/ITU) A packet used for the transmission of user data on a virtual circuit at the DTE/DCE interface.

data phase. (CCITT/ITU) That phase of a data call during which data signals may be transferred between data terminal equipments (DTEs) that are interconnected via the network. See also network control phase.

data signaling rate. Synonym for data transfer rate.

data station. (TC97) The data terminal equipment (DTE), the data circuit-terminating equipment (DCE), and any intermediate equipment. Synonymous with data terminal installation.

Note: The DTE may be connected directly to a data processing system or may be part of it.

data terminal equipment (DTE). (TC97) That part of a data station that serves as a data source, data sink, or both, and provides for the data communication control function according to protocols.

data terminal installation. Synonym for data station.

data transfer. (1) (CCITT/ITU) The result of the transmission of data signals from a data source to a data sink. (2) The movement, or copying, of data from one location and the storage of the data at another location.

data transfer mode. Synonym for data transfer phase.

data transfer phase. That phase of a data call during which data signals may be transferred between data terminal equipments (DTEs) that are interconnected via the network. Synonymous with data transfer mode. See also network control phase.

data transfer rate. (1) (CCITT/ITU) The average number of bits, characters, or blocks per unit of time transferred from a data source to a data sink. The rate is usually expressed as bits, characters, or blocks per second, minute, or hour. (2) Synonymous with data signaling rate.

data transfer state. See data transfer phase.

data transmission line. Synonym for telecommunication line.

DATE. Dedicated Access to X.25 Transport Extension

DCE. Data circuit-terminating equipment.

DCE clear confirmation packet. (CCITT/ITU) A call supervision packet transmitted by a data circuit-terminating equipment (DCE) to confirm the clearing of a call.

DCE/DTE interface. See DTE/DCE interface.

deadlock. (1) Unresolved contention for the use of a resource. (2) An error condition in which processing cannot continue because each of two elements of the process is waiting for an action by or a response from the other.

dedicated channel. A channel that is not switched.

dedicated circuit. A circuit that is not switched.

dedicated connection. Deprecated term for nonswitched connection.

direct call. (CCITT/ITU) A facility which enables the establishment of a call without the need to convey address signals to the network.

discarded packet. (CCITT/ITU) A packet that is destroyed intentionally or by default while being transmitted through the network.

disconnected mode. Synonym for disconnected phase

disconnected phase. A phase entered by a data circuit-terminating equipment (DCE) when it detects error conditions, recovers from a temporary internal malfunction, or receives a DISC command from a data terminal equipment (DTE). In the disconnected phase, the DCE may initiate link setup but can transmit only DM responses to received frames. See also information transfer phase.

DTE. Data terminal equipment.

DTE busy. (CCITT/ITU) The status of a data terminal equipment (DTE) which is unavailable because it cannot accept an additional call.

DTE clear confirmation packet. (CCITT/ITU) A call supervision packet transmitted by data terminal equipment (DTE) to confirm the clearing of a call.

DTE/DCE interface. (CCITT/ITU) The physical interface elements and the link access procedures between data terminal equipment (DTE) and data circuit-terminating equipment (DCE).

echoplex mode. (CCITT/ITU) A mode of operation whereby characters transmitted by data terminal equipment (DTE) are automatically returned to that DTE from some specified network node.

end-to-end control. (CCITT/ITU) A means in which during the data phase of a call, interconnected data terminal equipment (DTE) may exchange control signals without loss of data bit sequence independence.

F sequence. Flag sequence.

fast select. (CCITT/ITU) A facility applicable to virtual calls that allows a data terminal equipment (DTE) to expand the possibility to transmit data in call setup and clearing packets beyond the basic capabilities of a virtual call.

FCS. Frame checking sequence.

first speaker. 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.

flag (F) sequence. The unique sequence of eight bits (01111110) employed to delimit the opening and closing of a frame.

flow control. (1) (TC97) The procedure for controlling the data transfer rate. See also transmit flow control. (2) 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.

frame. (1) In high level data link control (HDLC), the sequence of contiguous bits bracketed by and including opening and closing flag (01111110) sequences. (2) (CCITT/ITU) A set of consecutive digit time slots in which the position of each digit time slot can be identified by reference to a frame alignment signal.

frame checking sequence (FCS). See frame check sequence.

frame check sequence (FCS). The field immediately preceding the closing flag sequence of a frame, containing the bit sequence that provides for the detection of transmission errors by the receiver.

frame level interface. (CCITT/ITU) The level of the DTE/DCE interface in packet mode operation relating to the exchange of packets with local error control, where packets are contained in frames.

GATE. General Access to X.25 Transport Extension.

HDLC. High-level data link control.

high-level data link control (HDLC). (CCITT/ITU) Control of data links by use of a specified series of bits rather than by the control characters of the ISO Standard 7-bit character set for information processing interchange.

I format. Information format.

I frame. Information frame.

IM. Initialization mode.

inactive character. (CCITT/ITU) A character that is sent in the data transfer phase as a filler that does not represent information.

incoming call packet. (CCITT/ITU) A call supervision packet transmitted by a data circuit-terminating equipment (DCE) to inform a called data terminal equipment (DTE) of a call requested by another DTE.

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

information (I) frame. A frame in I format, used for numbered information transfer. See also supervisory frame, unnumbered frame.

information transfer phase. A phase in which a data circuit-terminating equipment (DCE) can accept and transmit information (I) frames and supervisory (S) frames. See also disconnected phase.

initialization mode (IM). A nonoperational mode of a balanced or unbalanced data link in which the remote secondary or combined station data link control program may be initialized or regenerated by the the local primary or combined station, or in which other parameters to be used in the operational mode may be exchanged. See also asynchronous disconnected mode, normal disconnected mode.

leased line. Synonym for nonswitched line.

line switching. Synonym for circuit switching.

link access procedures (LAP, LAPB). The link level elements used for data interchange between a data circuit-terminating equipment (DCE) and a data terminal equipment (DTE) operating in user classes of service 8 to 11, as specified in CCITT Recommendation X.1.

link level. See data link level.

link station. The combination of hardware and software that allows a node to attach to and provide control for a link.

logical channel. (CCITT/ITU) In packet mode operation, a means of two-way simultaneous transmission across a data link, comprising associated send and receive channels.

Notes:

1. A number of logical circuits may be derived from a data link by packet interleaving.

2. Several logical circuits may exist on the same data link.

lower window edge. (CCITT/ITU) The lowest sequence number in a window.

MCH. Multi-Channel link, or physical circuit. MCH is the physical link over which many virtual circuits are established.

message switching. (1) (TC97) In a data network, the process of routing messages by receiving, storing, and forwarding complete messages. (2) The technique of receiving a complete message, storing, and then forwarding it to its destination unaltered.

multiplex interface. (CCITT/ITU) A DTE/DCE interface that conveys the bit stream of a number of subscriber channels by means of time division multiplexing.

multiplex link. (CCITT/ITU) A means of enabling a data terminal equipment (DTE) to have several access channels to the data network over a single circuit. Three likely methods have been identified: packet interleaving, byte interleaving, and bit interleaving.

NDM. Normal disconnected mode.

network control mode. Synonym for network control phase.

network control phase. (CCITT/ITU) A facility that gives the user the ability to reestablish a link with the network during the data transfer phase to obtain a supplementary facility provided by the network. Synonymous with network control mode. See also data transfer phase.

network failure. (CCITT/ITU) A circumstance occurring in a network that prevents a service to be offered because the network is not functioning correctly.

nonoperational modes. See asynchronous disconnected mode, initialization mode, normal disconnected mode. Contrast with operational modes.

nonswitched connection. A connection that does not have to be established by dialing. Contrast with switched connection.

nonswitched line. A telecommunication line on which connections do not have to be established by dialing. Contrast with switched line. Synonymous with leased line.

normal disconnected mode (NDM). A nonoperational mode of an unbalanced data link in which the secondary station is logically disconnected from the data link and therefore cannot transmit or receive information. See also asynchronous disconnected mode, initialization mode.

normal response mode (NRM). An operational mode of an unbalanced data link in which the secondary station initiates transmission only as the result of receiving explicit permission from the primary station. See also asynchronous balanced mode, asynchronous response mode.

NRM. Normal response mode.

*** octet.** (ISO) A byte composed of eight binary elements.

operational modes. See asynchronous balanced mode, asynchronous response mode, normal response mode. Contrast with nonoperational modes.

packet. (TC97) A sequence of binary digits including data and call control signals that is switched as a composite whole. The data, call control signals, and possibly error control information, are arranged in a specific format. See data packet, DCE clear confirmation packet, discarded packet, call accepted packet, call connected packet, call request packet, call supervision packet, clear indication packet, clear request packet, control packet, diagnostic packet, incoming call packet, interrupt packet, permit packet, qualified data packet, reset packet, restart packet.

packet assembly/disassembly (PAD). (CCITT/ITU) A user facility that permits non-packet mode terminals to exchange data in the packet mode.

packet level. The packet format and control procedures for the exchange of packets containing control information and user data between the data terminal equipment (DTE) and the data circuit-terminating equipment (DCE). See also data link level, higher level, physical level.

packet level interface. (CCITT/ITU) The level of the DTE/DCE interface in packet mode operation relating to the exchange of data and signaling, where this information is contained in packets. See also frame level interface.

packet mode operation. (TC97) Synonym for packet switching.

packet mode terminal. (TC97) Data terminal equipment that can control, format, transmit, and receive packets.

packet sequencing. (TC97) A process of ensuring that packets are delivered to the receiving data terminal equipment (DTE) in the same sequence as they were transmitted by the sending DTE.

packet switched data transmission service. (CCITT/ITU) A user service involving the transmission and, if necessary, the assembly and disassembly of data in the form of packets.

packet switching. (TC97) The process of routing and transferring data by means of addressed packets so that a channel is occupied only during the transmission of a packet; upon completion of the transmission, the channel is made available for the transfer of other packets. Synonymous with packet mode operation. See also circuit switching.

PAD. Packet assembly/disassembly.

PCNE. Protocol Converter for Non-SNA Equipment.

permit. (CCITT/ITU) An authorization sent on a logical channel for the transmission of one or more data packets in the reverse direction.

physical circuit. (CCITT/ITU) A circuit created with hardware rather than by multiplexing. See also data circuit. Contrast with virtual circuit.

physical level. The mechanical, electrical, functional and procedural media used to activate, maintain and deactivate the physical link between the data terminal equipment (DTE) and the data circuit-terminating equipment (DCE). See also data link level, higher level, packet level.

port. An access point for data entry or exit.

Post Telephone and Telegraph Administration (PTT). A generic term for the government-operated common carriers in countries other than the USA and Canada. Examples of the PTT are the Post Office in the United Kingdom, the Bundespost in Germany, and the Nippon Telephone and Telegraph Public Corporation in Japan.

primary station. The data station that supports the primary control functions of the data link, generates commands for transmission, and interprets received responses. Specific responsibilities assigned to the primary include initialization of control signal interchange, organization of data flow, and actions regarding error control and error recovery functions at the data link level. Contrast with secondary station. See also combined station.

public data network (PDN). See public network.

public data transmission service. (CCITT/ITU) A data transmission service established and operated by an Administration and provided by means of a public data network.

> **Note:** Circuit switched, packet switched and leased circuit data transmission services are feasible.

public network. (CCITT/ITU) A network established and operated by an Administration for the specific purpose of providing data transmission services to the public. Circuit switched, packet switched, and leased-circuit services are feasible. Contrast with user-application network.

> **Note:** Administration refers to both an Administration and an RPOA.

Recognized Private Operating Agency (RPOA). Any individual, company, or corporation, other than a government department or service, that operates a telecommunication service and that is subject to the obligations undertaken in the Convention of the International Telecommunication Union and in the

Regulations; for example, a communication common carrier. Contrast with telecommunication Administration.

reset (of a virtual circuit). (CCITT/ITU) Reinitialization of flow control on a virtual circuit, which eliminates all data that may be in transit for the virtual circuit at the time of resetting.

reset collision. A condition that occurs when a data terminal equipment (DTE) and a data circuit-terminating equipment (DCE) simultaneously transmit a reset request packet and a reset indication packet over the same logical channel.

reset packet. (CCITT/ITU) A packet used for the resetting of a virtual circuit at the DTE/DCE interface.

response. In data communications, a reply represented in the control field of a response frame. It advises the primary/combined station with respect to the action taken by the secondary/combined station to one or more commands. See also command.

response frame. A frame transmitted by a secondary station or a frame transmitted by a combined station that contains the address of the transmitting combined station.

reverse charging acceptance. A facility that enables a data terminal equipment (DTE) to receive incoming packets that request reverse charging.

RNR packet. A packet used by a data terminal equipment (DTE) or by a data circuit-terminating equipment (DCE) to indicate a temporary inability to accept additional packets for a given virtual call or permanent virtual circuit.

RPOA. Recognized Private Operating Agency.

RR packet. A packet used by a data terminal equipment (DTE) or by a data circuit-terminating equipment (DCE) to indicate that it is ready to receive data packets within the window.

secondary station. A data station that executes data link control functions as instructed by the primary station. A secondary station interprets received commands and generates responses for transmission. Contrast with primary station. See also combined station.

sequence number. A numerical value assigned to each message exchanged between two nodes.

S format. Supervisory format.

S frame. Supervisory frame.

slip. (CCITT/ITU) The displacement of a sequence of digits from its allowed digit positions such that digits are either lost or gained. See also controlled slip.

supervisory (S) format. A format used to perform data link supervisory control functions such as acknowledge I frames, request retransmission of I frames, and request a temporary suspension of transmission of I frames. See also information format, unnumbered format.

supervisory (S) frame. A frame in supervisory format, used to transfer supervisory control functions. See also information frame, unnumbered frame.

switched connection. (1) (TC97) A mode of operating a data link in which a circuit or channel is established to switching facilities, as, for example, in a public switched network. (2) A connection that is established by dialing. (3) Contrast with nonswitched connection.

switched line. A telecommunication line in which the connection is established by dialing. Contrast with nonswitched line.

switched network. Any network in which connections are established by closing switches, for example, by dialing.

telecommunication administration. (CCITT/ITU) Any governmental department or service responsible for discharging the obligations undertaken in the Convention of the International Telecommunication Union and in the Regulations. Contrast with Recognized Private Operating Agency.

telecommunication line. (1) (TC97) The portion of a data circuit external to a data-circuit terminating equipment (DCE) that connects the DCE to a data switching exchange (DSE), that connects a DCE to one or more other DCEs, or that connects a DSE to another DSE. (2) Any physical medium, such as a wire or microwave beam, that is used to transmit data. (3) Synonymous with data transmission line, transmission line. (4) Contrast with data link.

> **Note:** A telecommunication line is the physical medium; for example, a telephone wire, a microwave beam. A data link includes the physical medium of transmission, the protocol, and associated devices and programs--it is both logical and physical.

time-out. (CCITT/ITU) A parameter related to an enforced event designed to occur at the conclusion of a predetermined elapsed time.

transmission line. Synonym for telecommunication line.

transparency. See transparent.

transparent. (1) In data transmission, pertaining to information that is not recognized by the receiving program or device as transmission control characters. (2) See code transparent, code transparent data transmission, inherent transparency.

transparent data. Data that is not recognized as containing transmission control characters.

transparent data transfer phase. (CCITT/ITU) The phase of a call during which any bit sequence can be transmitted in both directions between data terminal equipments (DTEs).

transparent information. Information that is not recognized as transmission control characters by a receiving program or device.

U format. Unnumbered format.

U frame. Unnumbered frame.

unbalanced data link. A data link between a primary station and one or more participating secondary stations. The primary station assumes responsibility for the organization of data flow and for data link level error recovery operations and transmits command frames to the secondary stations. The secondary stations transmit response frames. Contrast with balanced data link.

unnumbered (U) commands. Commands that do not contain sequence numbers in the control field.

unnumbered (U) format. A format used to provide additional data link control functions and unnumbered information transfer. See also information format, supervisory format.

unnumbered (U) frame. A frame in unnumbered format, used to transfer unnumbered control functions. See also information frame, supervisory frame.

unnumbered (U) responses. Responses that do not contain sequence numbers in the control field.

user-application network. (TC97) 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 class of service. (TC97) A category of data transmission provided in a network in which the data signaling address selection and call progress signals signalling rates and terminal operating mode are standardized.

virtual call. See virtual call facility.

virtual call facility. (CCITT/ITU) A user facility in which a call setup procedure and a call clearing procedure will determine a period of communication between two data terminal equipments (DTEs) in which user's data will be transferred in the network in the packet mode of operation. All the user's data is delivered from the network in the same order in which it is received by the network.

Notes:

1. This facility requires end-to-end transfer control of packets within the network.
2. Data may be delivered to the network before the call setup has been completed, but it is not delivered to the destination address if the call setup attempt is unsuccessful.
3. Multi-access DTEs may have several virtual calls in operation at the same time.

virtual circuit. (TC97) In packet switching, those facilities provided by a network that give the appearance to the user of an actual connection. See also data circuit. Contrast with physical circuit.

virtual link. (CCITT/ITU) A procedure that operates over physical transmission media to provide a reliable and secure communications medium for use by higher levels of procedure, but which is not associated with a particular physical circuit.

window. An ordered set of consecutive packet send sequence numbers of the data packets authorized to cross a DTE/DCE interface on a logical channel used for a virtual call or as a permanent virtual circuit.

window edge. The lowest sequence number in a window.

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