Vanguard Managed Solutions

Vanguard Applications Ware

BSC 2780/3780-to-SNA/LU0 Conversion

Vanguard 6455 and 7300 Series

Notice

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Introduction

This manual describes the IBM Binary Synchronous Communication (BSC) Interactive 2780/3780-to-SNA/LU0 conversion feature for the Vanguard 6455 and 7300 Series platform.

BSC 2780 and 3780-to-SNA/LU0 Conversion

The BSC 2780 and 3780-to-SNA/LU0 conversion is designed specifically for use in Tandem and IBM S/390 networks utilized by large financial institutions. SNA/LU0 was not designed for (batch) file transfer. The networks used are typically referred to as processor networks. This software:

- Provides a streamlined host-site connection via a LAN interface
- Eliminates numerous leased lines at the host location
- Eliminates serial lines
- Improves LAN performance using Ethernet/Token Ring
- Improves performance (increased bandwidth)

ATM service providers can upgrade to a LAN based Ethernet or Token Ring.

Limitations

BSC 2780/3780-to-SNA LU0 conversion supports 256 devices on the Vanguard 6455 and 7300 Series platform.

TPAD Support

The BSC 2780 and 3780 TPAD software has been enhanced in Release 6.0 to support the BSC 2780-to-SNA LU0 Conversion software at the Host Site. Release 6.0 (or greater) of the BSC 2780 and 3780 TPAD software must be loaded into the remote Vanguard so that the BSC 2780-to-SNA LU0 Conversion software at the Host Site functions properly.

Note

The Vanguard 7300 Series does not support the TPAD software.

Automated Teller Machine (ATM)

The acronym (ATM) in this manual refers to Automatic Teller Machine.

Note

Do not confuse Automated Teller Machine with Asynchronous Transfer Mode, a cell-switching and multiplexing protocol.

Before Using This Manual

Before using this manual you should have experience using IBM or IBM-compatible equipment. You should be familiar with the IBM Binary Synchronous Communications (BSC) protocol.

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Related Vanguard Information

Refer to these related Vanguard Applications Ware documents for additional information:

- *Vanguard Basic Protocols Manual* (Part No. T0106)
  - Includes *Vanguard Configuration Basics Manual* (Part No. T0113)
- *Vanguard SNA Feature Protocols Manual* (Part No. T0101)
  - Includes *Vanguard IBM BSC 3270 Manual* (Part No. T0101-03)
  - Includes *Vanguard BSC 2780/3780 Manual* (Part No. T0101-02)
  - Includes *Vanguard SDLC Option Manual* (Part No. T0101-05)
  - Includes *Vanguard BSC 3270-to-SNA Conversion* (Part No. T0101-08)
- *Vanguard Alarms and Reports Manual* (Part No. T0005) for details on alarms and reports generated by this feature
- *Vanguard 7300 Series Installation Manual* (Part No. T0185)
- *Vanguard 6435/6455 Installation Manual* (Part No. T0166)

Related IBM Documentation

Before using the BSC 2780/3780-to-SNA/LU0 feature, you should be familiar with IBM networking technology.

Below is a list of IBM documentation for additional sources of information.

- *IBM Systems Network Architecture, Formats*
  (IBM Part No. GA27-3136-12)
- *IBM Structure Overview for BSC Line Controls*
  (IBM Part No. SC30-3113-0)
- *Data Connections Ltd., Documentation Set*
  (http://www.dataconnection.com)

ICE Application Support

ACI Worldwide Incorporated provides an application, Internet Communications for the Enterprise (ICE) that runs serial-based ATMs over an LLC2 (SNA) Ethernet connection. BSC 3270-to-SNA conversion enables the BSC ATMs to communicate with Tandem hosts over an Ethernet LAN Interface.

Features

Features

BSC 2780/3780-to-SNA/LU0 conversion supports:

- Data Connections Limited (DCL) protocol stack
  SNA Physical Unit (PU) TYPE 2
- LU0 Support
- Single LU mapping to a 3780 serial port
- Logical Units (LUs) per node
  - Vanguard 6455 -256 LUs
  - Vanguard 7300 Series - 256 LUs

Theory of Operation

Introduction

The theory of operation presented in the following subsection provides a basic description of how the BSC 2780/3780-to-SNA/LU0 conversion feature is implemented in Vanguard products.

System Network Architecture Overview

SNA

Systems Network Architecture (SNA) is an IBM-defined data communications architecture that is widely used in networks. SNA specifies how hardware and software entities are connected to each other, and how they communicate with each other. SNA supports both hierarchical (top-to-bottom) and peer-to-peer network topologies.

SNA contains seven different layers that specify the formats and protocols used for communication. These layers range from the highest application layer to the lowest physical layer:

- Transaction Services (applications such as data base access and document interchange)
- Presentation Services (network resource management, session presentation and application management)
- Data Flow Control (data flow synchronization and exchange)
- Transmission Control (data exchange pacing and encryption tasks)
- Path Control (data routing between source and destination and network data traffic control)
- Data Link Control (data transmission between adjacent nodes, using Channel Connect, SDLC, or Token Ring protocols)
- Physical Control (physical and electrical connections between adjacent nodes)

SNA has evolved into an Advanced Peer-to-Peer Networking (APPN) design, where multiple APPN nodes with attached peripheral nodes can interact with each other.

SNA Terminology

The key SNA terms are:

- End User
- Logical Unit (LU)
- Physical Unit (PU)
- System Service Control Point (SSCP)
- Primary Logical Unit (PLU)
- Secondary Logical Unit (SLU)
- Network Addressable Unit
- Session
- SNA Data Formats

Each of these terms is briefly described in the following subsections.

End User

End users typically interact with the SNA architecture through I/O devices such as printers and display stations. End users generally work with applications and application data and are the final source and destination of such data.

Logical Unit (LU)

SNA defines a set of LU (logical unit) types, ranging from 1 through 7. Each LU type has certain characteristics and features that are associated with the SNA stack. The common LU types are:

- LU4 = Printer
- LU7 = Display
- LU0 or LU2 = LU-to-LU communication

Logical Units are “ports” through which end users communicate with each other and the host computer. They are defined as network-addressable software units. Data packet structures are associated with the LU types that support the SNA communications protocols. The LU0 or LU2 type of logical unit supports the most advanced communications interface between two network nodes.

Physical Unit (PU)

SNA defines a set of (PU) physical unit types that characterize attributes and network functionality of devices. PUs in the SNA world are defined as the software controlling the physical devices. PUs have the following features:

- Are network-addressable nodes
- Control the physical interface
- Support and control the Link Level Protocols (such as SDLC or LLC2)
- Provide network access for end users

The primary PU types are:

- Host Node (PU Type 5)
- Communication Controller node or Front End Processor (FEP) node (PU Type 4)
- Cluster Controller node (PU Type 2)
- Advanced Cluster Controller node (PU Type 2.1)
- Terminal Node (PU Type 1)

System Service Control Point (SSCP)

The System Service Control Point (SSCP) is the central control point within an SNA network that manages and allocates the various network resources. The SSCP “domain” defines all the components (network addressable units) controlled by that SSCP. Each host system has one or more SSCPs, each with its own domain.

Local Service Control Points (LSCP) control the resources within the local node and can be within the domain of an SSCP.

Primary Logical Unit (PLU)

In SNA, the Logical Unit (LU) that sends the Bind to activate a session with its partner LU.

Secondary Logical Unit (SLU)

In SNA, the LU that contains the secondary half-session for a particular LU-to-LU session. An LU can contain secondary and primary half-sessions for different active LU-to-LU sessions.

Network Addressable Unit (NAU)

Network addressable Units (NAUs) are entities that are recognized and controlled by the network. These include:

- Logical Units (LUs)
- Physical Units (PUs)
- System Services Control Points (SSCPs)

Each NAU has a unique address and is the source or destination of data through the Path Control Network (defined as the bottom three of the seven SNA levels). The Path Control Network includes the Data Link Control and the physical layer.

Session

A session is the logical connection between two NAUs that uses specified SNA protocols and allocates the resources required. These resources include the network paths, buffers, and protocols required for the session. Common session types are LU-to-LU, SSCP-to-PU, and SSCP-to-LU.

SNA Data Formats

SNA has a number of different data formats which are used by the NAUs, Path Control layer, and Data Link Control layer to exchange information. These data formats consist of one or more headers, with accompanying messages. Each layer sets bits in specific headers.

IBM 2780/3780 Overview

IBM BSC 2780/3780

The BSC 2780/3780 provides the capability to transfer data between two devices via an X.25 or Frame Relay network. It is a peer-to-peer protocol. Vanguard products use a full-duplex, point-to-point circuit, as the physical transmission path. For more information reference the *BSC 2780/3780 Manual* (Part Number T101-02).

How the BSC 2780/3780-to-SNA/LU0 Conversion Works

Introduction

BSC 2780/3780-to-SNA/LU0 conversion is used in the financial, banking and network provider-environments where ATM's are networked into:

- Tandem K Series host computers
- Tandem S Series host computers
- Central-site IBM 3745 communications controllers
- Stratus Hosts
- IBM S/390 Servers

Defined

The BSC 2780/3780-to-SNA/LU0 conversion feature allows ATM service providers to upgrade their old serial lines to Ethernet or Token Ring.

BSC 2780/3780-to-SNA/LU0 is designed to provide a network connection between an SNA connection over an Ethernet LAN on a Tandem host to a remote 2780/3780 serial connection over a frame relay network. This feature conforms financial industry requirements for a processor network. The processor network provides linkage between ATM services provider hosts and databases and numerous individual Bank host computers and databases.

This network is necessary to allow verification of personal account balances for consumers using an ATM that is not affiliated with a single bank.

Purpose

The BSC 2780/3780-to-SNA/LU0 conversion is typically used on processor networks. Processor networks are used to link individual bank databases to the Automated Teller Machine (ATM) service providers (Tandem) host computers. The ATM network (shown in Figure 1-1) and the processor network are separate and unique. When a customer utilizes an ATM to withdraw money, the keyboard, display and physical money distribution in the ATM is controlled by the service providers host computer.

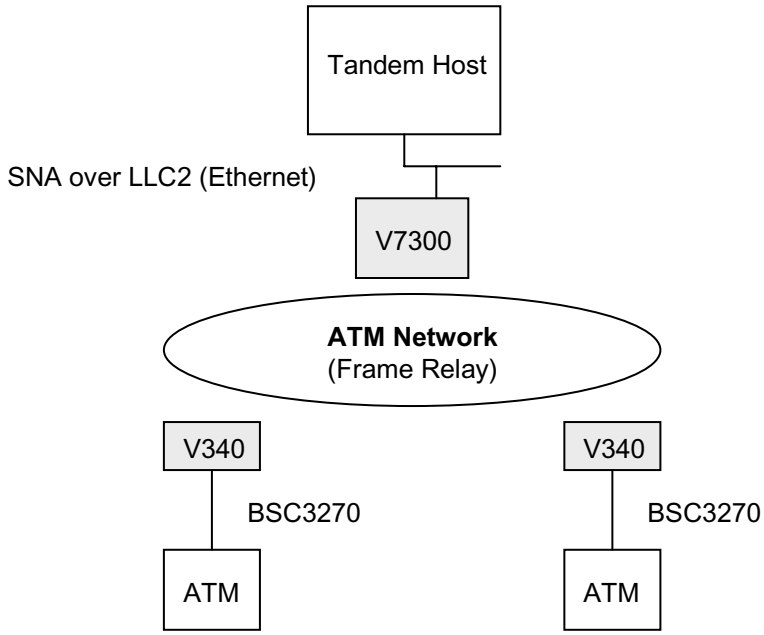


Figure 1-1. The ATM Network

Processor Network

The actual approval and amount of money withdrawn is controlled by the customer's individual bank. This approval process occurs over the processor network. See Figure 1-2.

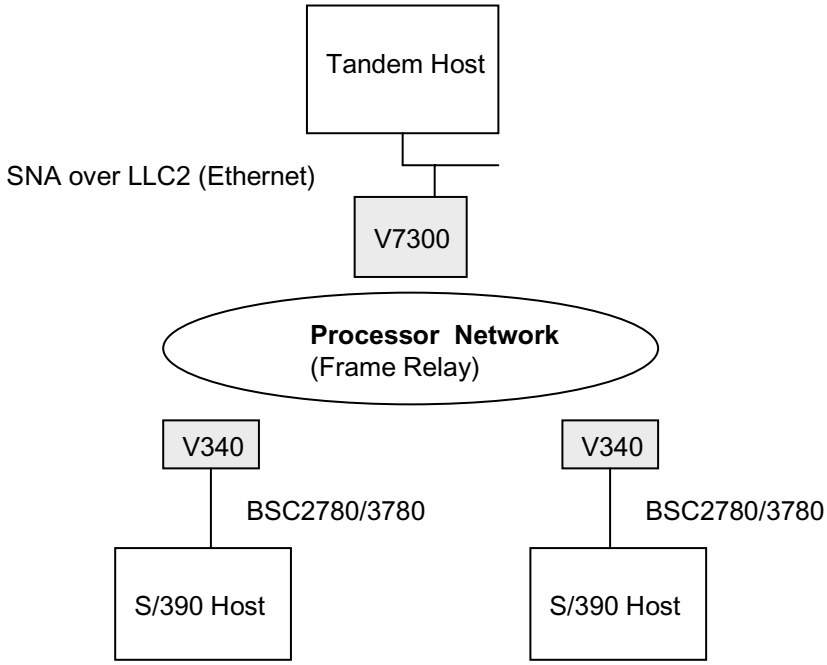


Figure 1-2. Processor Network

Interactive 2780/3780 BSC Protocol - IBM 3650 Emulation

Although most banks use IBM S/390 host computers for customer databases, and service providers typically use Tandem computers, they both communicate using an interactive version of 2780/3780 BSC protocol called IBM 3650 emulation. Most implementations of 2780/3780 protocol is for batch or file transfer applications. It was developed by IBM before SNA was introduced. 2780/3780 is a peer-to-peer file batch protocol that allows files to be sent to adjacent nodes in either direction.

When SNA was announced in 1978, 2780/3780 batch protocol was replaced with RJE (Remote Job Entry). RJE, or IBM 3777, uses SNA protocols to provide a communications path between adjacent Physical Units (PU's). RJE file transfer applications use Logical Unit (LU) Type 1 along with SNA Character Stream (SCS). Because SNA is an architecture describing all of the layers in the OSI model, SNA rules were strictly adhered to and are not covered here.

BSC 3270-to-SNA Conversion

The BSC 3270-to-SNA conversion allows banks and ATM network providers to retain BSC 3270-attached ATMs while providing a LAN attachment at the host.The BSC 3270-to-SNA converts the upper layers of SNA and the LLC2 data link control (layer two) protocol in the host Vanguard node to Display System Protocol (DSP) for transport within Frame Relay (Annex G) or X.25.

The BSC 2780/3780-to-SNA/LU0 conversion is similar to the BSC3270-to-SNA conversion feature used in ATM networks.

BSC 3270 and 2780/3780Features Working Together

The BSC 3270-to-SNA conversion feature allows serial attached ATM's using BSC3270 protocol to be connected in the data center over a LAN (Token Ring or Ethernet) connection using SNA protocols and LU mapping to ATM's. Each ATM in the network appears as a single LU in the Tandem host. The Tandem host supports SNA over a LAN connection by installing a third party SNA subsystem called ICE. The ICE subsystem is analogous to VTAM on an S/390 IBM platform. ICE was developed by a company called In-Session and is currently owned by ACI.

The BSC 2780/3780-to-SNA/LU0 feature provides the same capability to service provider customers in the processor network. A bank connection utilizes 2780 protocol at one end of the network and the Tandem host connection at the service provider side is SNA over LAN.

Together as shown in Figure 1-3 both of these features allow the ATM network and processor networks to terminate at the service provider host over a LAN connection.

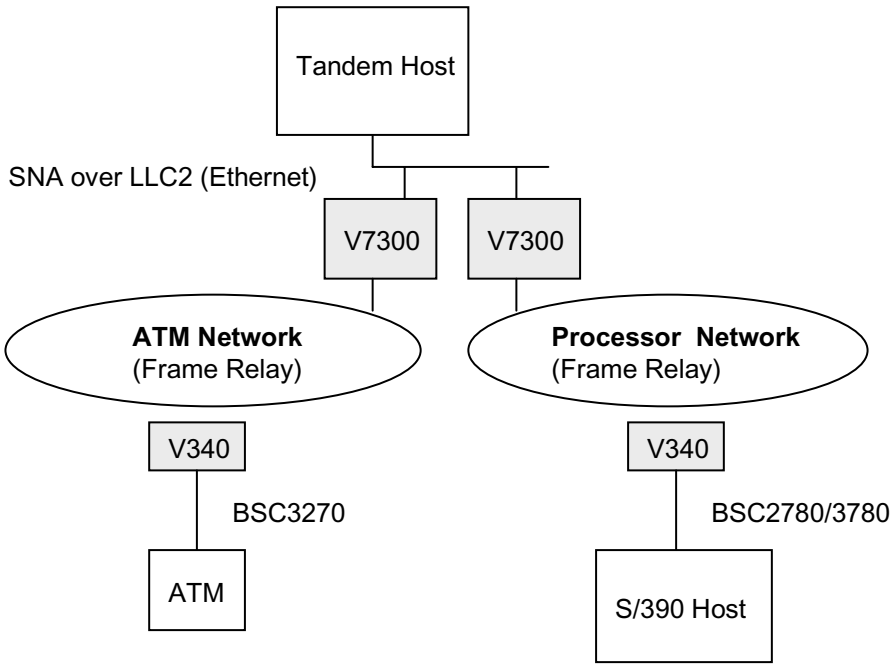


Figure 1-3. ATM Network and Processor Network

2780/3780 TPAD

The 2780/3780-to-SNA/LU0 conversion feature software can exist with the 2780/3780 TPAD software in a Vanguard node co-located with the 2780/3780 host. Similar to the BSC3270-to-SNA conversion software feature it is also possible to have the 2780/3780 conversion software reside on the SNA host side of the network.

The BSC 2780/3780 TPAD feature works in conjunction with the existing BSC 3270-to-SNA conversion feature.

Feature	*Central Site*
BSC 2780/3780-to-SNA/LU0	Maps SES protocol and data to an SNA logical unit.
BSC 3270-to-SNA	Uses DSP protocol to logical unit (LU) mapping.

Typical Implementation

The 2780/3780-to-SNA/LU0 conversion feature in most cases requires two geographically dispersed Vanguard platforms each with unique functionality.

1) The Vanguard node associated with the SNA host provides the high level of protocol conversion between SES encapsulated data to an SNA secondary logical unit (SLU) using LU type 0 SNA protocols.
The host Vanguard node also provides a socket connection to the SNA processor application (SNAP). SNAP provides the physical unit (PU) type 2.0 node necessary for communication with the host PU type 4 boundary and PU type 5 SNA access method components. In the case where the SNA conversion occurs in the host node, the SNAP function also supports a socket connection to the LLC2 component (SLAC) in the Vanguard.

2) The remote Vanguard node is the node supporting the serial (WAN) connection to an IBM or equivalent host that supports 2780/3780 protocol. Unlike typical applications where 2780 is used for file transfers consisting of multiple blocks of data, this feature is more interactive. Although interactive applications are specifically described in the BSC 2780/3780 documentation, it still applies to the protocol specification.

Implementation

The interactive implementation of 2780/3780-to-SNA/LU0 protocols varies from typical applications in two ways:

1) First, the 2780 protocol is always terminated in a single node. Only one host provides the 2780/3780 connection. The adjacent host is always SNA over a LAN connection using the LLC2 protocol.

2) Second, interactive 2780/3780 consists of block sizes less than 256 bytes and not more that 2 to 3 consecutive blocks before termination of the conversation.

Startup Sequence

The startup of the application always occurs at the SNA host. The host application enables the SNA access method (ICE) in the host Tandem to start an SNA session with the PU component in the Vanguard and a single Secondary Logical Unit (SLU). See Figure 1-4 below:

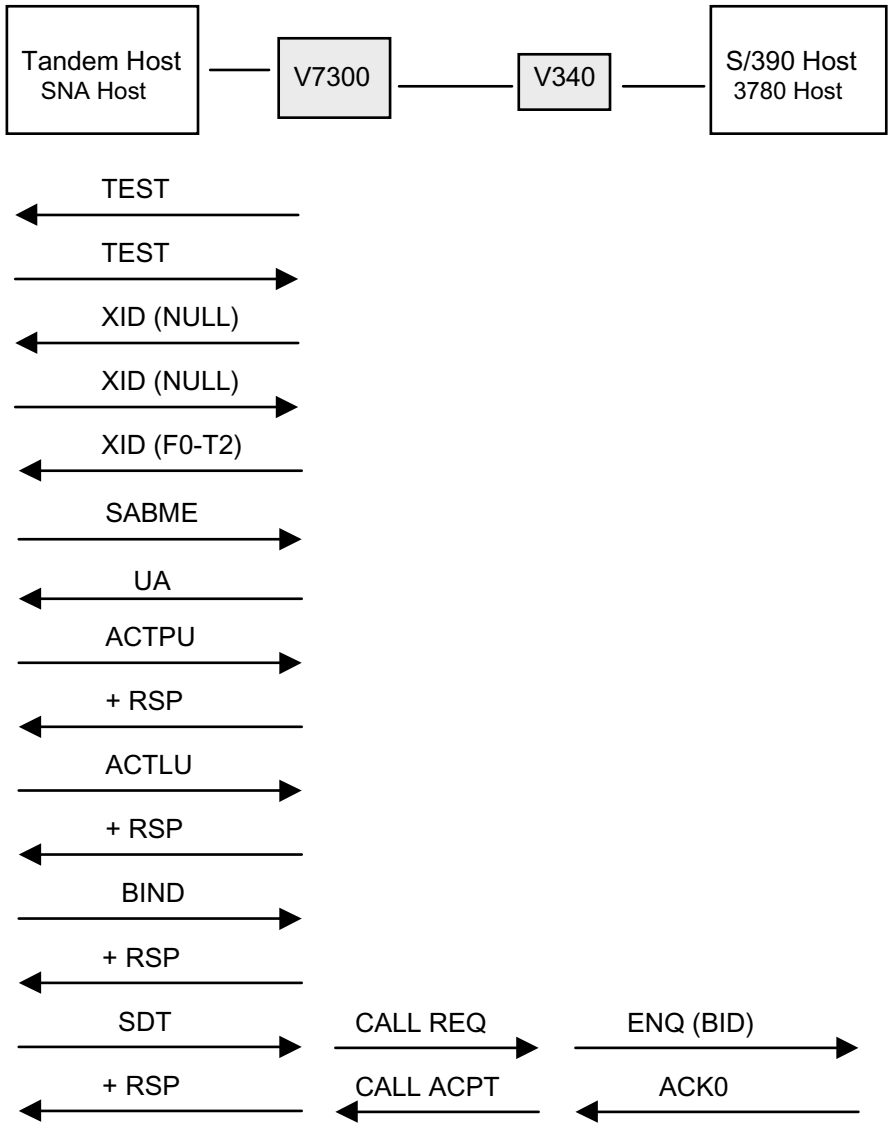


Figure 1-4. Start-up Sequence After SSCP Activation

The host Vanguard node then sends a call request to the adjacent Vanguard node supporting the 2780/3780 host connection.

Figure 1-4 also shows the startup sequence on the 2780/3780 side of the network. Prior to startup, the link between the Vanguard and the 2780/3780 host is in control mode. Unlike BSC3270, 2780/3780 is a peer to peer protocol. A connection can be requested from either side by sending a bid (ENQ) to an adjacent node. The connection is established when an ACK0 acknowledgment is received in response to the ENQ.

The application primary logical unit (PLU) to secondary logical unit (SLU) session is always active in the processor network with this feature. The LU to LU session can be terminated at any time if a failure to contact a 2780/3780 host occurs.

Bi-directional conversation occurs

Figure 1-5 is an example of interactive 2780/3780 data transfer sequence in a processor network between a service provider host and a bank host supporting 2780/3780. In this diagram, bi-directional conversation occurs between both the SNA and 2780/3780 hosts. Another point is that the 2780/3780 protocol is terminated at the Vanguard 340 in this case.

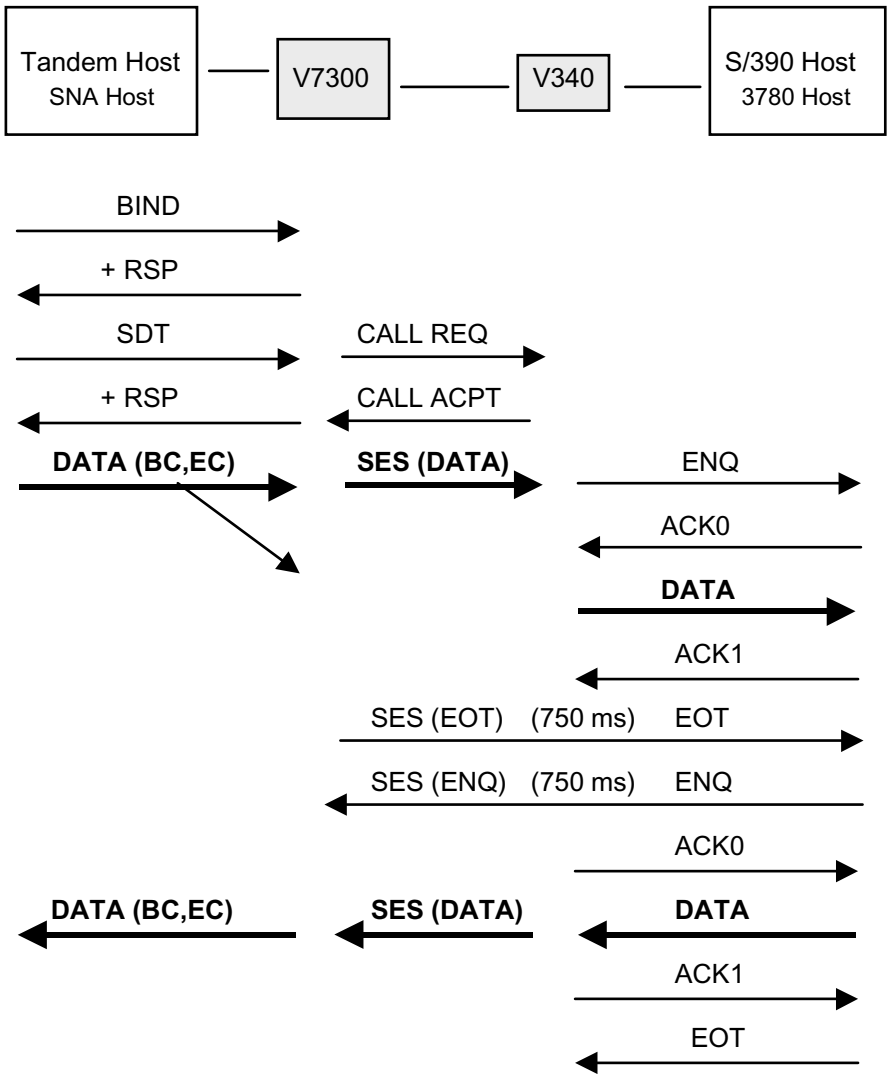


Figure 1-5. Interactive Data Transfer Sequence - Central Site

Start Up BID Failure

Contact failure with 2780/3780 results when the Tandem (SNA) host attempts to send an inquiry to an adjacent 2780/3780-connected bank host in a processor network. With the LU to LU session in place, the host sends an SNA data RU from the application to the SLU in the central site Vanguard.

Figure 1-6 shows the SVC between the Vanguard 7300 Series and the Vanguard 340 is up. The SVC was established at the initial start up sequence when the host application was activated, see Figure 1-4. Upon receipt of data at the Vanguard 340, the 2780/3780 TPAD software sends a bid or ENQ ('2D') to the adjacent host.

Note

If the host does not respond with an ACK0, NAK, or WACK with a three second timer, a retry is initiated at the TPAD. The TPAD must make no more than three attempts to establish a connection with the 2780/3780 host.

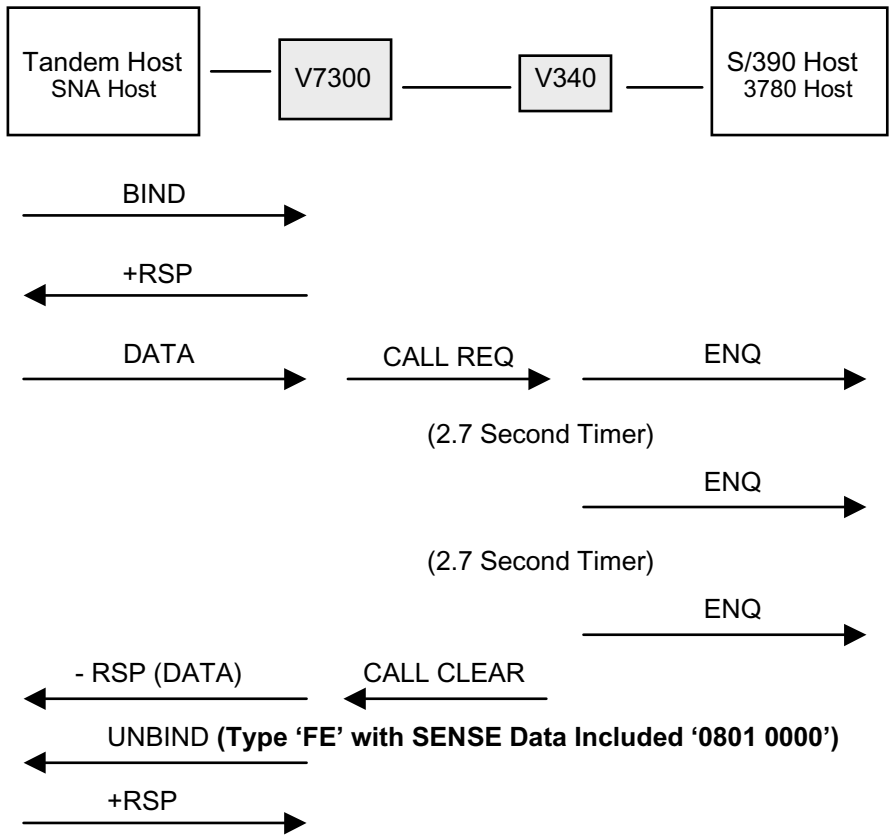


Figure 1-6. In Session/Start Up BID Failure and SNA Response

After three attempts, if no contact is made with the downstream host, the TPAD clears the SVC call back to the SNA SLU in the Vanguard 7300. The call clear results in the SNA processor sending an UNBIND request to the Tandem SNA host primary logical unit (PLU) in the application.

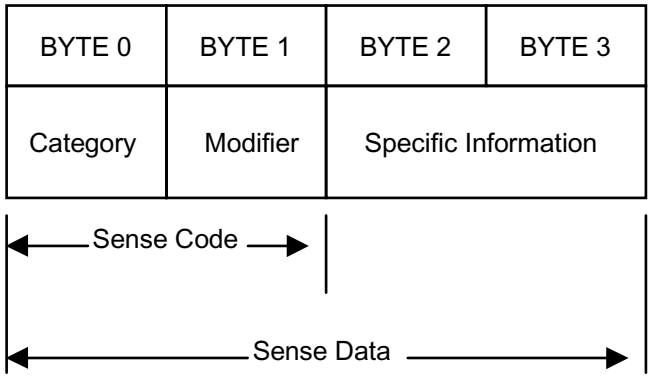
Accompanied with the UNBIND request is an appended SENSE code of '0801 0000'. This sense code defines the SLU in the Vanguard as "Resource Not Available". At this point the host responds with a +RSP to the UNBIND request and terminate the LU to LU session.

After a failure of the SLU, the host application attempts to reestablish the session by sending a BIND request to the V7300 SLU. The Vanguard 7300 immediately sends a CALL REQ to the 2780/3780 TPAD. The TPAD again attempts to contact the downstream 2780/3780 host by sending an ENQ, waiting three seconds for a response and retrying the 3-attempt count. At this point the TPAD sends a CALL CLEAR to the Vanguard 7300 again. This time SNAP sends a -RSP to the BIND request with a SENSE code of 0801 0000 and the origination address of the SLU.

Refer to the next section for more information on Sense Codes.

SNA Sense Codes

Sense data refers to four bytes of hex data sent between SNA Conversion and the SNA host. Variations of sense data can be used in problem determination and diagnosis. Sense data can be included in a negative response, an UNBIND request, or an LUSTAT request. See Figure 1-7 Sense Data Format.



Category Field

'00'	**User Sense Data**
'08'	Request Reject
'10'	Request Error
'20'	State Error
'40'	Request Header (RH) Usage Error
'80'	Path Error

Modifier Field

'XX'	Reserved

Specific Information Field

'YY, ZZ'	**2780/3780 Conditions**

Figure 1-7. Sense Data Format

In the case of BSC 2780/3780 or BSC 3270 to SNA Conversion, a unique set of sense codes is mapped to unusual conditions occurring with the networks or the remote devices. These unique Sense Codes are presented to the host as an inbound UNBIND command.

Note

Reference Appendix A of this manual for detailed Sense Code information.

Error Code and Alarms from Networks or Remote Devices

Reference Appendix A of this manual for detailed Error Code information from networks or remote devices through alarms or sense codes.

2780/3780 Transparency Support

Transparency Support

The 2780/3780 TPAD software supports Transparent Monitor mode. Transparency allows up to 256 different EBCDIC bit patterns to be sent between the 2780/3780 client host and the SNA secondary logical unit (SLU).

Transparent monitor mode is started when the 2780/3780 TPAD receives a valid block of data from the 2780/3780 host with the STX ('02') preceded by a DLE ('10'). Once in transparent monitor mode any data pattern can be transmitted with the exception of the following:

- A transparent SYNC sequence DLE ('10') SYN ('32')
- Transparent text terminating sequences:

```
DLE ('10') ETX ('03')
DLE ('10') ETB ('26')
DLE ('10') ENQ ('2D')
```

The 2780/3780 TPAD leave transparent monitor mode when a DLE ('10') SYN ('32') is NOT received in within a 3- second window or a DLE ('10') ETX ('03') is received.

All data blocks received from the 2780/3780 host in transparent mode is sent to the SNA host within the delimiter of STX and ETX. For this reason there is no difference in the way transparent and non-transparent data is handled by SNA in the SLU.

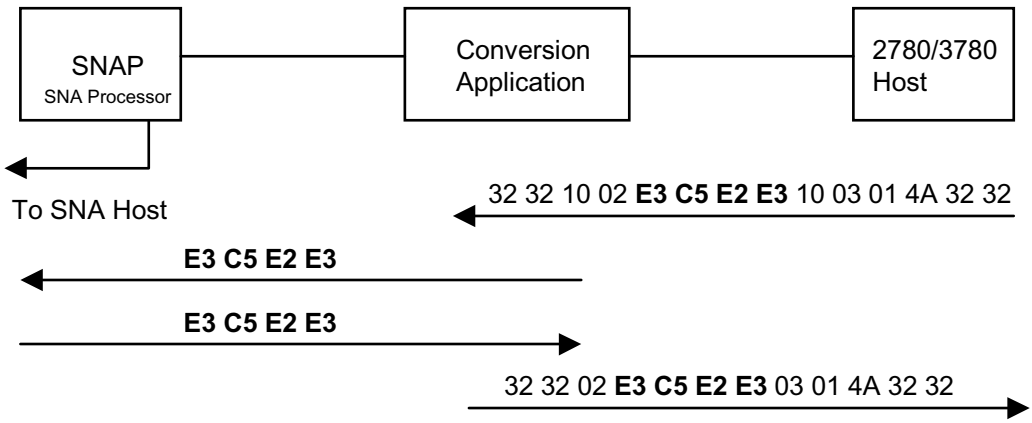


Figure 1-8. Vanguard Transparent Mode Data Support with SNA

If a 2780/3780 host is operating in transparent mode, inbound data is handled as described. Outbound data (from the SNA SLU to the 2780/3780 Terminal Control Unit (TCU)) is always sent as non-transparent data.

Burst Count Support

The 2780/3780 TPAD supports a burst counter which allows a predetermined number of blocks to be sent or received.

- **In transmit mode**, the 2780/3780 TPAD sends data blocks to the 2780 host until the configured burst counter is decremented to '0'. At this point the 2780/3780 TPAD sends EOT to the host allowing the 2780 host to send data.
- **In receive mode,** the 2780/3780 TPAD software counts data blocks received until the counter indicates the predetermined limit. At this point it sends RVI ('10 7C') in response to data blocks received after the burst counter reached it's limit.

The burst counter is associated with the 2780/3780 port configuration. The recommended transmit and receive burst count range is 1 to 20.

SNA Profile Support

SNA session (upper layer) protocols are determined when the LU to LU session is bound between the primary logical unit (PLU) and the secondary logical unit (SLU). Various combinations of SNA protocols can be selected depending on the application requirements using profiles.

Profiles are divided into two categories:

- Transmission Control (TS)
- Function Management (FM)

The TS and FM profiles are specified at the time of session activation via parameters in the following SSCP and LU activation commands:

ACTPU - Activate Physical Unit

ACTLU - Activate Logical Unit

BIND - Activate LU to LU session

Other commands such as ACTCDRM can also specify profiles but are not applicable to this feature. ACTCDRM is used to activate VTAM cross domain resources.

The 2780/3780-to-SNA/LU0 conversion feature is required to support the following Transmission Control (TS) and Functional Management (FM) profiles specified in bytes 2 and 3 of the BIND for the LU to LU session:

Transmission Control (TS) Profile 4

TS Profile 4:

- Primary to secondary and secondary to primary normal flows are paced (Pacing)
- Sequence numbering is supported whenever the SNA six byte transmission header (TH) supports a sequence number field. In the case of this application a FID 2 TH header is supported which contains a sequence number field.
- SDT, CLEAR, RQR and STSN are supported

Function Management (FM) Profile 4

FM Profile 4:

- Primary LU half session and secondary LU half sessions use immediate response mode.
- Primary LU half session and secondary LU half sessions support the following Data Flow Control (DFC) functions.
  - CANCEL
  - SIGNAL
  - LUSTAT
  - QEC
  - QC
  - RELQ
  - SHUTD
  - SHUTC
  - RSHUTD
  - CHASE
  - BID and RTR

Adding A New 2780/3780 Device

Boot Sequence

Add a new device to the SNA-to-BSC Conversion Device Table:

Step	Action	Result
1	Select **Configure** from the Control Terminal Port (CTP) Main menu.	The Configure Menu Displays.
2	Select **SNA Features Configure** from the Configure menu.	The **SNA Features Configure** menu displays, with a prompt for the selection.
3	Select the feature to configure: • APPN Node Table • SNA to BSC Conversion Device Table	At the prompt, select **SNA to BSC Conversion Device Table**.
4	Add the new device to the **SNA-to-BSC Conversion Table**.	Proceed to the **SNA Features Boot** Menu.
5	Select **Boot** from the Control Terminal Port (CTP) Main menu.	The **Boot** menu Displays.
6	Select **SNA Features Records Boot** from the Boot menu.	The **SNA Features Record Boot** menu displays, with a prompt for the selection.
7	Select the feature to boot: • SNA to BSC Conversion Device	Once you proceed to the **SNA Features Records Boot**, then to the **SNA-to-BSC Conversion Device Menu**, you would then boot the specific device you have added.
8	Proceed to the Boot Menu for the **LLC to SDLC Stations**.	Select the specific Station menu, Ethernet or Token Ring.
9	Select the Individual Station to be booted. **Note** Do not use the **All Stations Boot** selection.	Boot.

Device Enable and Disable 2780/3780

Follow These Steps...

Follow these steps to configure Device Enable or Disable:

Step	*Action*	*Result*
1	Select **Port/Station/Channel Control** from the Control Terminal Port (CTP) Main menu.	The **Port/Station/Channel Control** menu Displays.
2	Select **SNA Features Control** from the Port/Station/Channel Control menu.	The **SNA Features Control** menu displays, with a prompt to select the feature to configure.
3	Select the feature to configure: • SNA to BSC Device Enable • SNA to BSC Device Disable	Your choice is displayed.

Chapter 2
Configuration

Overview

Introduction

This chapter provides configuration examples and procedures for the Vanguard Interactive (BSC) 2780 and 3780-to-SNA/LU0 conversion feature.

Configuration Information and Example

Central Site Configuration Example - (HPAD)

The configuration example shows a diagram of a possible network application for the BSC 2780/3780-to-SNA/LU0 conversion. An SNA Tandem host is utilized in an Ethernet configuration. Figure 2-1 shows the HPAD placing a call.

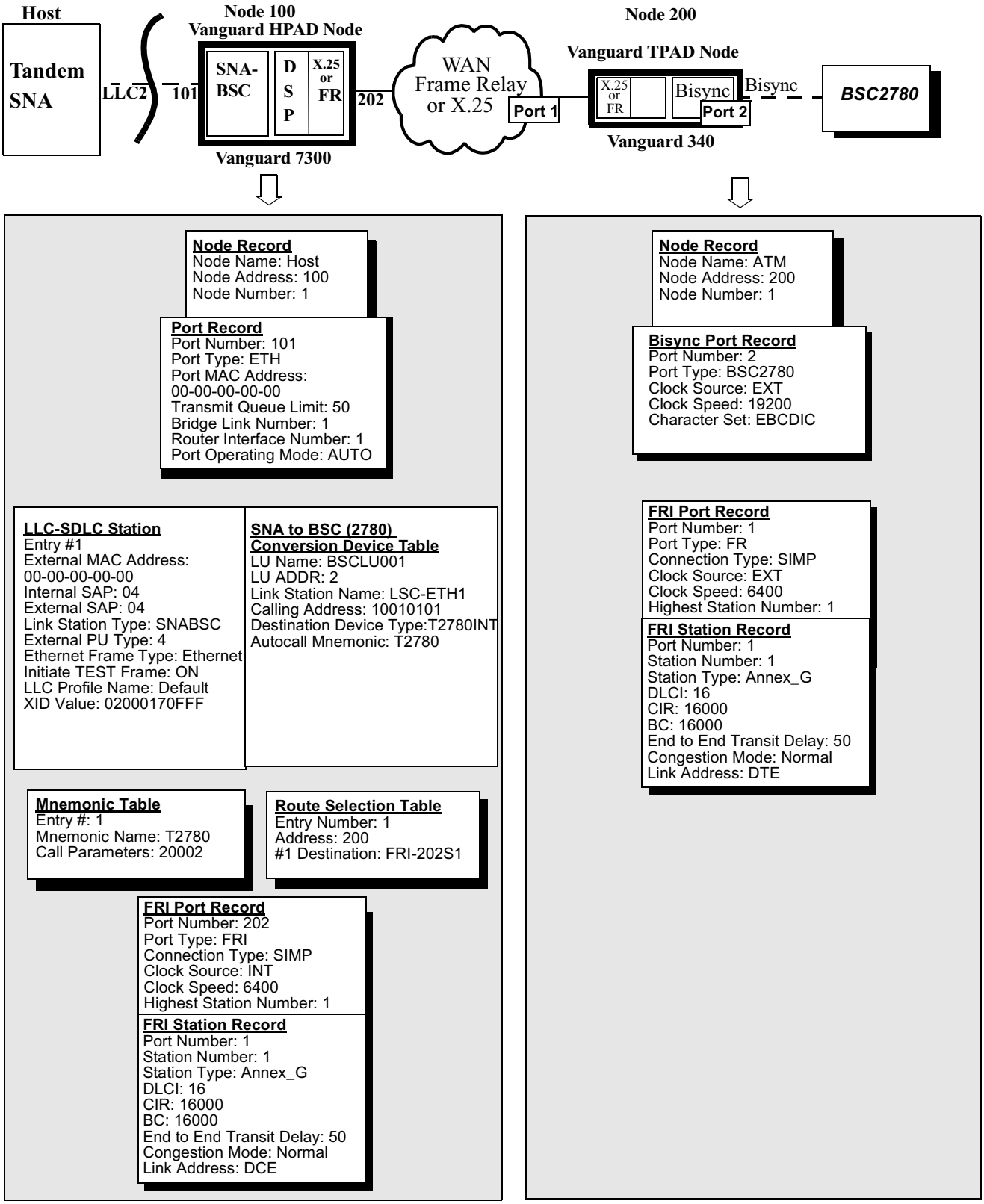


Figure 2-1. Example of HPAD Placing A Call

Before You Start

Online Help

Entering a **?** displays online Help for the current parameter option on the screen.

Ease of Configuration

With Ease of Configuration enabled, you only need to boot the port to make changes to the parameters marked with an asterisk.

Note

Ease of Configuration must be enabled on the Vanguard 6455 for the BSC 2780/3780-to-SNA/LU0 feature to operate.

For more information on Ease of Configuration, refer to the introductory portion of the *SNA Feature Protocols Manual,* (Part Number T0101).

Parameters with an asterisk (*)

Parameters identified by an asterisk require a node boot for changes to the parameter to take effect.

Vanguard 6455 Requirements for SNA/LU0

Vanguard 6455 Requirements

The guidelines below are required when using the BSC 2780/ 3780-to-SNA/LU0 feature:

- 32 Meg SIMM Memory Module
- Local Dynamic Port Creation Heap Size needs to be configured for Bisync and AS/400

Note

When setting the Local Dynamic Port Creation Heap Size, refer to the Ease of Configuration information located in the About The Vanguard Applications Ware SNA Feature Protocols Manual section of the *SNA Feature Protocols Binder* (Part Number T0101). A copy of your current configuration files should be saved before changing the Local Dynamic Port Create Heap Size.

Increase Parameters to Maximum Value

The following Node Record Parameters need to be increased in order to accommodate increasing the number of SNA 3780 remote ports to 256:

- Mnemonic Table Size
- Quantity of SES 3780 remote ports
- Maximum Simultaneous Calls

The Frame Relay Station or X.25 Port parameter; Number of Two Way Simultaneous Calls, needs to be increased in order to accommodate increasing the number of 3780 conversion stations to 256.

Configuring a Node

Introduction

To set up a Vanguard for BSC 2780/3780-to-SNA/LU0 operation, configure the following:

- Node Record
- Ethernet, Token Ring or Frame Relay Port Record
- Ethernet, Token Ring or Frame Relay Station Table
- LLC-SDLC Station Record
- SNA-to-BSC Conversion Device Table Records

Note

This assumes your Vanguard node is already configured for normal LAN/WAN operation. For details on configuring your node for LAN/WAN operation, refer to the *Vanguard Configuration Basics Manual*, (Part Number T0113).

Configuration

Follow the steps in the table below to configure the Node Record parameters:

Step	*Action*	*Result*
1	Select **Configure** from the CTP Main menu.	The Configure menu displays.
2	Select **Node** from the Configure menu.	The Node Record Configuration screen displays, showing the Node Name: parameter.
3	Enter the **Node Name:** parameter.	The parameters for the Node Record appear in sequence. **Note** An asterisk beside a parameter indicates that a Node Boot is needed for any changes to that parameter to take effect.

Configure Menu

Figure 2-2 is a sample Configure Menu for Central Site (HPAD):

```
Node:              Address:          Date:               Time:
Menu: Configure                                          Path: (Main.6)

  1. Node                             19. PPP Profiles
  2. Port                             20. ToW Table
  3. Configure Network Services       21. AT Dialer Profile
  4. Inbound Call Translation Table   22. SoTCP
  5. Outbound Call Translation Table  23. SNA Features Configure
  6. Calling Addr Translation Table   24. (reserved)
  7. CUD based Addr Translation Table 25. (reserved)
  8. SDLC Port Stations               26. (reserved)
  9. NUI/Password Table               27. (reserved)
  10. FRI Stations                    28. (reserved)
  11. Configure Bridge                29. (reserved)
  12. Configure LAN Connections       30. Configure SNMP
  13. Software Key Table
  14. Congifure Router
  15. LLC to SDLC Tables
  16. DORA Record
  17. TCP
  18. PPP Parameters

-Enter Selection:
```

Figure 2-2. Configure Menu Example

Configuring Port Records

Introduction

Port Records store the port configuration parameters, with each active port having a separate record. Active port number (location) and port type must be defined before you configure the remaining Port Record parameters.

Configuration

Follow these steps to configure the Port Records:

Step	*Action*	*Result*
1	Select **Configure** from the CTP Main menu.	The Configure menu displays.
2	Select **Port** from the Configure menu.	The Port Number parameter displays.
3	At the prompt, enter the number of the port you want to configure and press Return.	The parameters are successively displayed. **Note** When an asterisk appears beside a parameter in a record, a Node Boot is needed for any changes to that parameter to take effect.

Configuring the Ethernet Port Record

Ethernet Port Record Parameters

The Ethernet Port record contains these parameters:

Port Number

Range:	101 to 599, 2000 to 3999
Default:	101
Description:	Enter the number of the port to configure. This number is the Port Record reference number and represents both physical and virtual ports. Physical ports are located at the front and rear of the hardware chassis.

*Port Type

Range:	NULL, ETH
Default:	ETH
Description:	Specify the type of port you are configuring: • NULL - NULL port type • ETH - Ethernet port type **Note** A change to this parameter requires a node boot to take effect.

*Port MAC Address

Range:	00-00-00-00-00-00 to FE-FF-FF-FF-FF-FF
Default:	00-00-00-00-00-00
Description:	Specifies the MAC address of the LAN port. The entered value of 00-00-00-00-00-00 is replaced by the Burned in Address (BIA) if the LAN hardware is present. **Note** A change to this parameter requires a node boot to take effect.

Transmit Queue Limit

Range:	20 to 500
Default:	50
Description:	Specifies the maximum number of frames that can be queued on the LAN transmitter before any frames are dropped.

*Bridge Link Number

Range:	1 to 5
Default:	1
Description:	Specifies the bridge link number associated with the LAN port. The corresponding bridge link record must be configured under the bridge configuration menu.

*Router Interface Number

Range:	1 to 50
Default:	1
Description:	Specifies the router interface number associated with this LAN port.

Port Operating Mode

Range:	AUTO, 1000FD, 100FD, 100HD, 10FD, 10HD
Default:	AUTO
Description:	Specifies whether this LAN port runs in 1000Mbit Full-Duplex, 100Mbit Full-Duplex, 100Mbit Half-Duplex, 10Mbit Full-Duplex, 10Mbit Half-Duplex, or Auto-Negotiation mode. **Note** Vanguard 7300 Series - Release 6.4 and greater software supports 1000FD on ports 101 and 103 using the IBM750FX CPU card. ETH1 is port 101, ETH2 is port 103. Port 102 is the COM port.

Configuring Station Records

Introduction

Station records store the station configuration parameters, with each station assigned a separate record. The ports must be defined before you can configure the station record parameters.

Station records are configured through the various sets of LLC-to-SDLC Station Table parameters. The three types of station tables available are:

- LLC Profile Table
- Frame Relay Station Table
- Ethernet Station Table

Note

Token Ring is also available for the Vanguard 6455.

LLC-to-SDLC Table Menu

Figure 2-4 shows the LLC-to-SDLC Tables Menu:

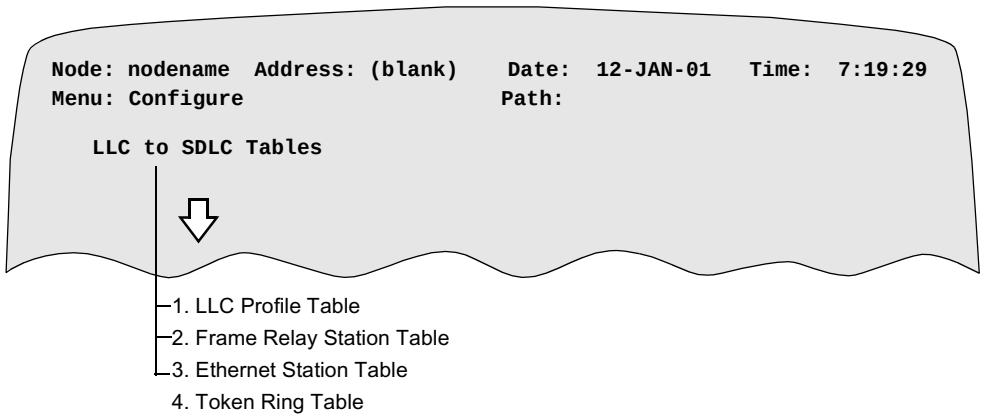


Figure 2-3. LLC to SDLC Tables Menu

Configuring the LLC-to-SDLC Tables

The LLC-to-SDLC Tables must be configured for each active station and conversion type. Follow these steps to access the tables:

Step	Action	Result
1	Select **Configure** from the CTP Main menu.	The **Configure** menu displays.
2	Select **LLC to SDLC Tables** from the Configure menu.	The **LLC to SDLC Tables** menu displays, with a prompt for the selection.
3	Select the station type to configure: • LLC Profile Table • Frame Relay Station Table • Ethernet Station Table • Token Ring Table	The corresponding Station Table Configuration displays, with the prompt for the entry number. **Note** The station type is listed only if the interface card is inserted and the port is configured.
4	Select the first entry number.	The prompt for the first station parameter displays. As you enter each parameter, the next parameter choice is displayed.

Ethernet Station Table Parameters

Parameter Numbers

The LLC-SDLC Conversion Ethernet Station Configuration contains these parameters:

Entry Number

Range:	1 to 1000
Default:	1
Description:	Entry number used to refer to this table record.

External MAC Address

Range:	00-00-00-00-00-00 to FF-FF-FF-FF-FF-FF (hexadecimal digits)
Default:	00-00-00-00-00-00
Description:	The MAC Address of the External LAN device associated with this station. For MAC Address Auto-Learn, enter 00-00-00-00-00-00. **Note** There are two forms commonly used for displaying the address: Canonical and non-Canonical.

*Internal MAC Address

Range:	00-00-00-00-00-00 to FF-FF-FF-FF-FF-FF (hexadecimal digits)
Default:	10-00-7C-54-29-77
Description:	The default internal MAC address is the MAC address of the LAN port. If this default internal MAC address is not to be used for this station, the configured Internal MAC address should be of the following form: nn:nn:nn:nn:ss:ss 1) nn:nn:nn:nn must be the same for all stations associated with this LAN port and not using the default MAC Address. nn:nn:nn:nn must also be unique to this node, and must not be zero's. 2) ss:ss must be different for each station associated with this LAN port and does not use the default MAC address, unless Service Access Point (SAP) multiplexing is being used to uniquely differentiate the stations. **Note** A change to this parameter requires a node boot to take effect.

Internal SAP

Range:	01-FE (hexadecimal digits)
Default:	04
Description:	The local Service Access Point (SAP) of this station. This should be 04, or a multiple of 04.

External SAP

Range:	01-FE (hexadecimal digits)
Default:	04
Description:	The Service Access Point (SAP) at the device associated with this station. This should be 04, or a multiple of 04.

*Link Station Type

Range:	SLAC, SNABSC
Default:	SLAC
Description:	• SLAC - LLC-SDLC Conversion (via QLLC) • SNABSC - SNA PU type 2.0 Link Station for support of SNA to Bisync Conversion **Note** You must perform a node boot for changes to take effect.

Ethernet Frame Type

Range:	802.3, Ethernet
Default:	802.3
Description:	This indicates whether 802.3 or Ethernet Version 2 frame format is to be transmitted onto the Ethernet for this station.

Initiate TEST Frame

Range:	OFF, ON
Default:	ON
Description:	Controls whether TEST poll frames are initiated locally during link setup. • OFF - The other side should initiate TEST frames • ON - This side generates TEST poll frames

LLC Profile Name

Range:	0 to 8 (alphanumeric characters)
Default:	DEFAULT
Description:	The name of the LLC-SDLC Conversion Profile Table entry that provides the LLC operating parameters for this station. To blank this field press the space bar.

XID Value

Range:	0 to 14 (hexadecimal digits)
Default:	(blank)
Description:	This is the identification sent by an HPAD station when External Physical Unit (PU) Type is set to 4, or by a TPAD station in the form of a QXID response when External PU Type is set to 2. To blank this field press the space bar.

LLC Options

Range:	NONE, NOCALLXID, 1490APPC, SAVELEARNED, BACKUP
Default:	NONE
Description:	Select LLC options on this stations follows: • NONE - No special LLC station option (recommended for Link Station Type = SNABSC). • NOCALLXID - an XID is not sent from this LLC station to the external PU upon the LLC Station call establishment. • 1490APPC - Enables the Frame Relay LLC station to send the APPC NLPID when configured as a Type 2.1 External PU Type. • SAVELEARNED - Save the learned External MAC Address into the CMEM record for this LAN-attached LLC Station. Only applies if the external MAC Address is set to 00-00-00-00-00-00. • BACKUP - Used for two identical stations on one LAN. This station becomes active when a call is placed to it. Must be used with the WAIT initiate test frame option. • Negotiate - Used to allow LLC Station role to be negotiated. **Note** Where applicable, the options can be combined. Example: NOCALLXID+SAVELEARNED.

Frame Relay Station Table Parameters

Parameters

The Frame Relay LLC-SDLC station records are used when attaching to a host or front-end processor (when Ethernet is not used). The LLC-SDLC Conversion Frame Relay Station table contains these following parameters:

Entry Number

Range:	1 to 1000
Default:	1
Description:	Entry number used to refer to this table record.

*Frame Relay Port Number

Range:	1 to 3699
Default:	201
Description:	The port number of the Frame Relay port that the LLC-SDLC Conversion station is connected to. **Note** You must perform a node boot for changes to this parameter to take effect.

*Frame Relay Station Number

Range:	1 to 254
Default:	1
Description:	The Frame Relay station number on the Frame Relay port to which this LLC-SDLC Conversion station is connected. To obtain the corresponding DLCI number, refer to the configuration for that Frame Relay Station. **Note** You must perform a node boot for changes to this parameter to take effect.

1490 Encapsulation

Range:	LLC, BAN
Default:	LLC
Description:	Frame Relay 1490 frame format used to encapsulate LLC frames sent and received by this station. • LLC - LLC Frame is encapsulated in 1490 with the NLPID for 802.2. • BAN - LLC Frame is encapsulated in 1490 with the BAN and BNI MACs, and the NLPID for 802.5.

Internal SAP

Range:	01-FE (hexadecimal digits)
Default:	04
Description:	The local Service Access Point (SAP) of this station. This should be 04, or a multiple of 04.

External SAP

Range:	01-FE (hexadecimal digits)
Default:	04
Description:	The Service Access Point (SAP) at the device associated with this station. This should be 04, or a multiple of 04.

*Link Station Type

Range:	SLAC, SNABSC
Default:	SLAC
Description:	• SLAC - LLC-SDLC Conversion (through QLLC) • SNABSC - SNA PU type 2.0 link station for support of SNA-to-Bisync Conversion. **Note** You must perform a node boot for changes to take effect

Initiate Test Frame

Range:	ON, OFF
Default:	ON
Description:	Controls whether TEST poll frames are initiated locally during link setup. • ON - This side generates TEST poll frames. • OFF - The other side should initiate TEST frames. This is the only mode supported for MAC Address Autolearn.

LLC Profile Table

Introduction

The LLC Profile Table is used to provide information about the stations attached to an SDLC Port.

LLC Profile Table

Figure 2-4 shows the LLC to SDLC Tables Menu and the LLC Profile Table selection.

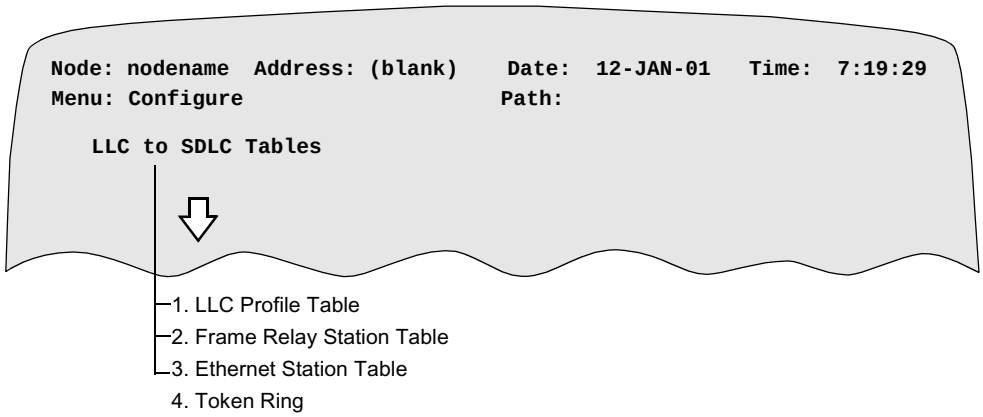


Figure 2-4. LLC Profile Table

Parameters

The LLC Profile Table configuration contains these parameters:

Entry Number

Range:	1 to 8
Default:	1
Description:	Entry number used to refer to this table record.

Profile Name

Range:	0 to 8 (alphanumeric characters)
Default:	DEFAULT
Description:	The name of this profile entry, referenced by LLC-SDLC conversion stations for their LLC operating parameters. To blank this field press the space bar.

T1 Reply Timer

Range:	1 to 25 seconds
Default:	3
Description:	This Ack Timer is used by a station to detect the remote station's failure to acknowledge an outstanding I-frame or supervisory frame with poll bit set to one.

T2 RX Ack Timer

Range:	1 to 255 tenths of seconds
Default:	3
Description:	The Receive Ack Timer is used by a station to determine how long it withholds acknowledgment of a frame(s) from the remote station that requires acknowledgment. This method reduces the number of acknowledgements generated by a link station. When this timer expires, the link station should immediately send an acknowledgment for all received frames not yet acknowledged. **Note** Time is in tenths of seconds.

T1 Inactivity Timer

Range:	2 to 255 seconds
Default:	30
Description:	The Idle Timer is used by a station to detect an inoperative condition of the logical link. This timer is started when the link becomes idle (no data to pass and no outstanding acknowledgments) and if the timer expires, the station sends a supervisory frame with the poll bit set to one.

N2 Retry Count

Range:	1 to 20
Default:	8
Description:	This count defines the number of times an I-frame or supervisory frame with poll bit set to one is transmitted, due to T1 acknowledgment time-out, before the logical link is declared down (inoperative).

N3 Ack Delay Count

Range:	1 to 15
Default:	3
Description:	The receive count is used in conjunction with T2 to reduce the number of acknowledgments a station generates. The receive count is used by a station to determine how many frames are received from the remote station while withholding acknowledgment of these frames. This method reduces the number of acknowledgements generated by a link station. When this count expires, the link station should immediately send an acknowledgment for all received frames not yet acknowledged.

TX Window Size

Range:	1 to 15
Default:	7
Description:	The transmit window size parameter defines the maximum number of I-frames a station can transmit without acknowledgment.

TA Startup Timer

Range:	1 to 255 seconds
Default:	10
Description:	The TA Startup Timer is used by a station as the retry timer when establishing a logical link.

SLAC Ring Number

Range:	0000-0FFF (hexadecimal digits)
Default:	0000
Description:	This is the hexadecimal ring number used by Frame Relay 1490 SLAC stations using 802.5 (BAN) encapsulation. If a value of 0 (zero, the default) is entered, this ring number is not inserted into the Route Indicator field.

SLAC Bridge ID

Range:	0 to 15
Default:	1
Description:	This is the bridge ID used by SLAC stations that use 802.5 encapsulation.

SNA Features Configure Tables

Follow These Steps...

Follow these steps to configure the SNA Features Table record:

Step	Action	Result
1	Select **Configure** from the Control Terminal Port (CTP) Main menu.	The Configure Menu Displays.
2	Select **SNA Features Configure** from the Configure menu.	The **SNA Features Configure** menu displays, with a prompt for the selection.
3	Select the feature to configure: • APPN Node Table • SNA to BSC Conversion Device Table	At the prompt, enter the number of the feature you are configuring.

SNA Features Configure Menu

Figure 2-5 shows the SNA Features Configure Menu.

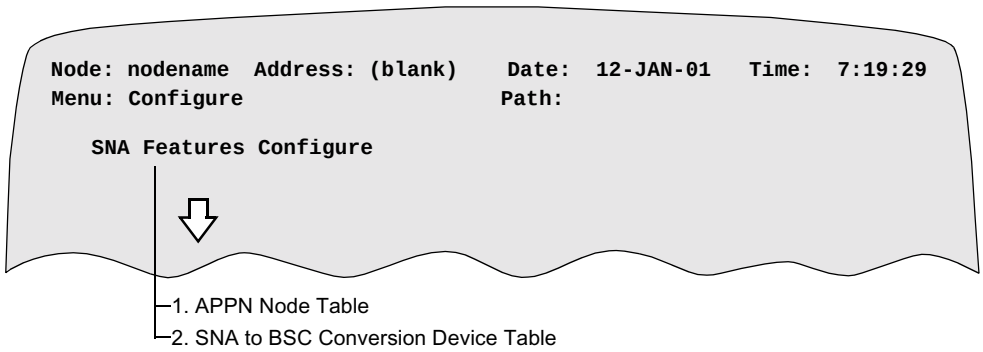


Figure 2-5. SNA Features Configure

Advanced Peer-to-Peer Networking (APPN) Node Table

Default Setting

For BSC 2780/3780-to-SNA/LU0 conversion use the default setting for the APPN Node Table parameter.

*APPN Node Table

Range:	0 to 8 (alphanumeric characters)
Default:	APPN
Description:	The Local Network Identifier associated with this Vanguard. **Note** The Adjacent AS/400 must have this Network Identifier defined in its Network Attributes or defined in its definition of the APPC and RWS Controller used to attach to this Vanguard. To blank this field press the space bar.

SNA to BSC Conversion Device Tables (2780)

Entry Number

Range:	1 to 256
Default:	1
Description:	Entry number used to refer to this table record. **Note** Maximum supported range for the Vanguard 6455 is 256. Maximum supported range for the Vanguard 7300 Series is 256.

LU Name

Range:	1 to 8 (alphanumeric characters)
Default:	(blank)
Description:	This is the name of the Logical Unit (LU). To blank this field press the space bar. **Note** You must perform a node boot for changes to this parameter to take effect.

LU ADDR

Range:	1 to 255
Default:	1
Description:	This is the Logical Unit (LU) identification number.

Link Station Name:

Range:	1 to 16 (alphanumeric characters)
Default:	LSC-ETH1
Description:	This is the name of the SDLC to LLC2 Station that the specific Logical Unit (LU) or the LU group is being defined for. To blank this field press the space bar.

Destination Device Type

Range:	TERM, ATM, T2780INT, TD2780INT
Default:	ATM
Description:	Range descriptions are: • TERM - Device is a 3270 Display • ATM - Device is an ATM • T2780INT - Device is a 2780 (Interactive)* • TD2780INT - Device is a 2780 (Interactive with 3270 display capability)*
*When using BSC 2780, T2780INT must be specified as the Destination Device Type. When T2780INT is configured, “Destination Control Unit Address” and “Destination Device Address” parameters are not displayed.	

Destination Control Unit Address

Range:	00-D9 (hexadecimal digits)
Default:	40
Description:	Specifies control unit address on remote PAD. Used with Connection Request Mode = 2 or 3. The address consists of two hexadecimal digits. Valid ranges depend on the device. Character Set as follows: • EBCDIC: 40, C1, C2, C3, C4, C5, C6, C7, C8, C9, 4A, 4B, 4C, 4D, 4E, 4F, 50, D1, D2, D3, D4, D5, D6, D7, D8, D9, 5A, 5B, 5C, 5D, 5E, 5F • ASCII: 20, 41, 42, 43, 44, 45, 46, 47, 48, 49, 5B, 2E, 3C, 28, 2B, 21, 26, 4A, 4B, 4C, 4D, 4E, 4F, 50, 51, 52, 5D, 24, 2A, 29, 3B, 5E
*When using BSC 2780, T2780INT must be specified as the Destination Device Type. When T2780INT is configured, “Destination Control Unit Address” and “Destination Device Address” parameters are not displayed.	

Destination Device Address

Range:	00-D9 (hexadecimal digits)
Default:	40
Description:	Specifies the device address on remote PAD. Used with Connection Request Mode = 2 or 3. This address consists of two hexadecimal digits. Valid ranges depend on the device. Character Set as follows: • EBCDIC: 40, C1, C2, C3, C4, C5, C6, C7, C8, C9, 4A, 4B, 4C, 4D, 4E, 4F, 50, D1, D2, D3, D4, D5, D6, D7, D8, D9, 5A, 5B, 5C, 5D, 5E, 5F • ASCII: 20, 41, 42, 43, 44, 45, 46, 47, 48, 49, 5B, 2E, 3C, 28, 2B, 21, 26, 4A, 4B, 4C, 4D, 4E, 4F, 50, 51, 52, 5D, 24, 2A, 29, 3B, 5E
*When using BSC 2780, T2780INT must be specified as the Destination Device Type. When T2780INT is configured, “Destination Control Unit Address” and “Destination Device Address” parameters are not displayed.	

Calling Address

Range:	0 to 15 (decimal digits)
Default:	(blank)
Description:	Calls placed from this node have this address in the X.25 calling address. For calls received by this node, this field is compared to the X.25 calling address and a match must be made in order for the call to accepted. To blank this field press the space bar.

Connect Timer

Range:	5 to 1000 seconds
Default:	200
Description	The Connect Timer specifies the maximum length of time in seconds to wait for the Terminal PAD (TPAD) to connect. This is the maximum amount of time the response to initial request from host would be delayed while attempting to connect to TPAD. **Note** If TPAD is the call originator, this value must be greater than Service Timer configured for the BSC 3270 port in TPAD.

Character Set

Range:	ASCII, EBCDIC
Default:	EBCDIC
Description:	Indicates whether Terminal/ATM devices on this port support an ASCII or EBCDIC character set.

Connection Request Mode

Range:	2 to 3
Default:	2
Description:	Specifies which Display System Protocol (DSP) Connection Request Mode (CRM) to use. There are two modes of connection as follows: • 2 - Specific class CRM-connects to a specific device as indicated in the destination control unit and device address. • 3 - Non-specific class CRM-connects to any device as indicated in the destination control unit address.

Autocall Mnemonic

Range:	0 to 8 (alphanumeric characters)
Default:	(blank)
Description:	This mnemonic references the remote X.25 address which is autocalled. If blank, then autocalling is disabled and the other end should initiate the call. To blank this field press the space bar.

SNA Options

Range:	NONE, UBNSHC, BINDCR, RENOTIFY, LUADBG, DSPDBG, SESDBG
Default:	NONE
Description:	• NONE - No User's SNA Option • UBNSHC - Send UNBIND to PLU after SHUTC • BINDCR - When configured, Call Request is always sent when Bind is received. • RENOTIFY -When configured, sends Notify down or up to initiate re-logon after a device disconnection or reconnection. • LUADBG - Print LUA Debug Information • DSPDBG - Print DSP Debug Information • SESDBG - Print SES Debug Information

SES Device Characteristics

Range:	NONE, XPAR
Default:	NONE
Description:	NONE - No option XPAR- Device supports transparency

Billing Records

Range:	OFF, ON
Default:	OFF
Description:	This controls whether billing (accounting) records are created for calls on this station. • OFF: No billing records are created • ON: Billing records are created

Chapter 3
Statistics

Introduction

This chapter describes how to generate SNA Feature Statistics.

Types of SNA Feature Statistics

You can generate these SNA Feature Statistics:

- SNABSC Device Summary
- SNABSC Device Summary for LLC Station
- Detailed SNABSC Device Statistics by:
  - LU Name
  - Entry Number
- Reset SNA-DSP/SES Device Statistics by:
  - LU Name
  - Entry Number

Generate and Reset Statistics

Follow these steps to generate and reset statistics:

Step	*Action*	*Result*
1	Select **Status/statistics** for the Control Terminal Port (CTP) Main Menu.	The menu for **Status/statistics** displays.
2	Select **SNA Feature Statistics** from the **Status/statistics** Menu	The **SNA Feature Statistics** menu displays.

SNA Features Statistics Menu

Figure 3-1 shows the SNA Feature Statistics Menu.

```
Node: nodename  Address: (blank)    Date:  12-JAN-01   Time:  7:19:29
Menu: SNA Feature Statistics       Path:

  1. SNABSC Device Summary
  2. SNABSC Device Summary for LLC Station
  3. Detailed SNABSC Device Statistics by LU Name
  4. Detailed SNABSC Device Statistics by Entry Number
  5. Reset SNA-DSP/SES Device Statistics by LU Name
  6. Reset SNA-DSP/SES Device Statistics by Entry Number
```

Figure 3-1. SNA Feature Statistics Menu

SNABSC Device Summay

Figure 3-2 shows selection number 1, the SNABSC Device Summary.

```
Node: Nodename  Address: 102                Date: 26-DEC-2002  Time: 13:23:50
SNABSC Device Summary Statistics                              Page:  1 of  8

                           PU   LU  Remote CU/   MNEMONIC SSCP APPL LULU
Ent# LU Name  Link Station  SESS ADR Type     DEV CALL ADR SESS CONN SESS SVC
==== ======== ============= ==== === ====== ===== ======== ==== ==== ==== ====
   1 MMCLU001 lsc-eth4      down   1 TERM   40/40 cntrl1   down DIS  down down
   2 MMCLU002 lsc-eth1      up     2 TERM   40/C1 cntrl2   up   up   down up
   3 MMCLU003 lsc-eth1      up     3 TERM   40/C2 cntrl2   up   up   up   up
   4 MMCLU004 lsc-eth1      up     4 TERM   40/C3 cntrl2   up   up   up   up
   5 MMCLU005 lsc-eth1      up     5 TERM   40/C4 cntrl2   up   up   down up
   6 MMCLU006 lsc-eth1      up     6 TERM   40/C5 cntrl2   down DIS  down down
   7 MMCLU011 lsc-eth2      up     1 ATM    40/40 atm1     up   up   up   up
   8 MMCLU012 lsc-eth2      up     2 ATM    40/40 atm2     up   up   up   up
   9 MMCLU013 lsc-eth2      up     3 ATM    40/40 atm3     up   up   up   up
  10 MMCLU014 lsc-eth2      up     4 ATM    40/40 atm4     up   up   down down
  11 MMCLU015 lsc-eth2      up     5 ATM    40/40 atm5     down DIS  down down
  12 MMCLU016 lsc-eth2      up     6 ATM    40/40 atm6     down DIS  down down
  13 MMCLU101 lsc-eth3      up     1 T2780  ----- t27801   up   up   up   up
  14 MMCLU102 lsc-eth3      up     1 T2780  ----- t27802   up   up   up   up
  15 MMCLU103 lsc-eth3      up     2 T2780  ----- t27803   up   up   down down
  16 MMCLU104 lsc-eth3      up     3 T2780  ----- t27804   down DIS  down down

 Press any key to continue ( ESC to exit ) ...
```

Figure 3-2. SNABSC Device Summary Statistics

Detailed SNA Device Statistics

Detailed Device Statistics can be viewed by:

- LU Name
- Entry Number

LU Name

Figure 3-3 shows the SNA Features Statistics Menu. To view the SNABSC Device Statistics by LU Name, enter selection number 3. You are prompted to type in the SNABSC LU Name.

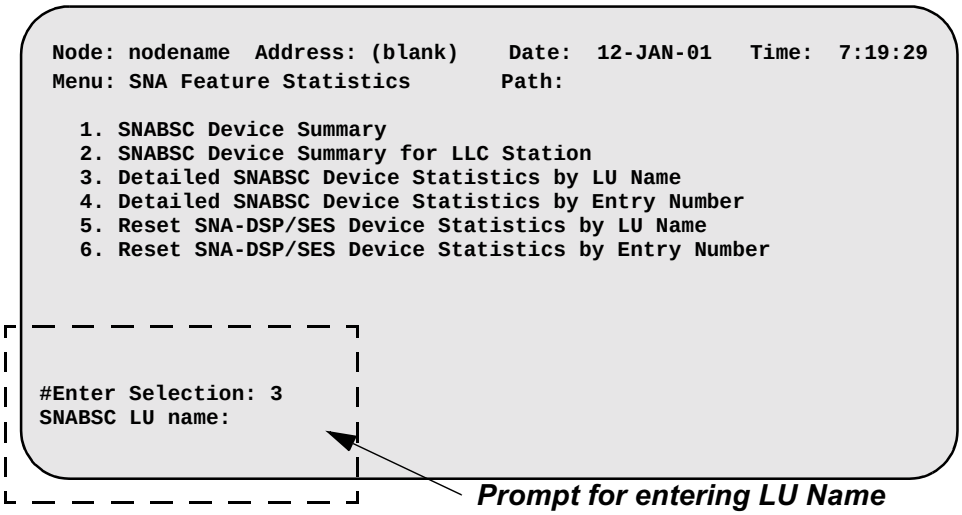


Figure 3-3. Detailed SNABSC Device Statistics by LU Name

Detailed SNABSC Device Statistics - Page 1

Figure 3-4 shows page 1 of the Detailed SNABSC Device Statistics. Enter selection number 4 to view the statistics by entry number. Two parallel sessions can run at the same time, as shown on this page.

```
 Node: Nodename  Address: 102                Date: 26-DEC-2002  Time: 16:20:40
Detailed SNABSC Device Statistics                            Page:  1 of  2

LU Name: MMCLU004              LU Address: 4
LinkStn: lsc-eth1              Device Entry is ENABLED

SSCP-PU Session State : Active   SSCP-LU Session State : Active
                                   LU-LU Session State   : Active

SSCP-LU Detailed Session Statistics:
 RU Summary:          Send   Receive  Data Summary: IN       OUT
            RU  Size: 0      0        Data Frames:  8        8
       Max  BTU Size: 1033   1033      FMD Frames:  8        8
 Current Window Size: 0      0         Data Bytes:  254      62
     Max Window Size: 0      0          FMD Bytes:  0        0

LU-LU Detailed Session Statistics:
 RU Summary:          Send   Receive  Data Summary: IN       OUT
            RU  Size: 1024   3840     Data Frames:  5        0
       Max  BTU Size: 1033   1033      FMD Frames:  5        0
 Current Window Size: 0      0         Data Bytes:  979      0
     Max Window Size: 0      0          FMD Bytes:  0        0

Press any key to continue ( ESC to exit ) ...
```

Figure 3-4. Page 1 of the Detailed SNABSC Device Statistics viewed by Entry Number

Detailed SNABSC Device Statistics - Page 2

Figure 3-5 shows Page 2 of the Detailed SNABSC Device Statistics viewed by entry number:

```
Node: Nodename  Address: 102                Date: 26-DEC-2002  Time: 16:22:25
Detailed SNABSC Device Statistics                              Page:  2 of  2

 LU Name: MMCLU004              LU Address: 4
 LinkStn: lsc-eth1              Device Entry is ENABLED

 Remote Device Type: TERM       Calling Address Configured: (None)
 Destination CU Addr/Dev Addr: C1 40

 LUA-SNABSC State: LU-LU Session         SNABSC-DSP State: Connected

 BIND Receive: 2        BIND Accept: 2        BIND Parameter Rej: 0
 FM Profile: 3   TS Profile: 3   LU Type: 2
 Outb FC: OFF  Inb FC: OFF     Last Outb LU-LU Seq # Rcv (Hex): 0001

 SNABSC-DSP Detailed Statistics:
                      IN     OUT                          IN       OUT
       Call Request: 0      7      Turbo Data Packets: 0        0
        Call Accept: 1      0            Data Packets: 2        4
        Call Reject: 6      0              Data Bytes: 35       1177
 Session Disconnect: 0      0         Terminal Status: 1        0
  Msg Seq# Resynced: 0      0           Cmd/Rsp Abort: 0        0
 Circuit Disconnect: 0      0       Cmd/Rsp Fwd Abort: 0        0
    Invite to Clear: 0      0      Unknown Disconnect: 0        0
Press any key to continue ( ESC to exit ) ...
```

Figure 3-5. Page 2 of the Detailed SNABSC Device Statistics

Note

When "SNABSC-DSP/SES State:" shows Connection Pending, or when attempting a connection, the detailed Call Summary shows a blank time stamp for that device.

```
Node: Node100   Address: 100                Date: 18-JUL-2002  Time: 15:07:34
 Detailed Call Summary                                          Page:  1 of  1

                                          Facilities
Calling Channel        Called Channel      R F N C       Connection Time
-------------------------------------------------------------------------------
FRI-204s3(16)          SDLC-202s1          0 0 0 0     18-JUL-2002 14:05:51
ATCIF-3                ControlPort         0 0 0 0     18-JUL-2002 14:55:05
SNABSC-NNLU0003        FRI-204s3(2)        0 0 0 0      0-   -   0  0:00:00
SNABSC-NNLU0002        FRI-204s3(3)        0 0 0 0      0-   -   0  0:00:00
SNABSC-NNLU001         FRI-204s3(4)        0 0 0 0      0-   -   0  0:00:00
SNABSC-NNLU0008        FRI-204s3(5)        0 0 0 0      0-   -   0  0:00:00
```

Figure 3-6. Blank Time Stamp

Reset SNABSC Device Statistics

You can reset the SNABSC Device statistics by:

- LU Name
- Entry Number

LU Name

Figure 3-7 shows the SNA Features Statistics Menu. If you would like to Reset SNABSC Device Statistics by LU Name, enter selection number 5. You are prompted to type in the SNABSC LU Name.

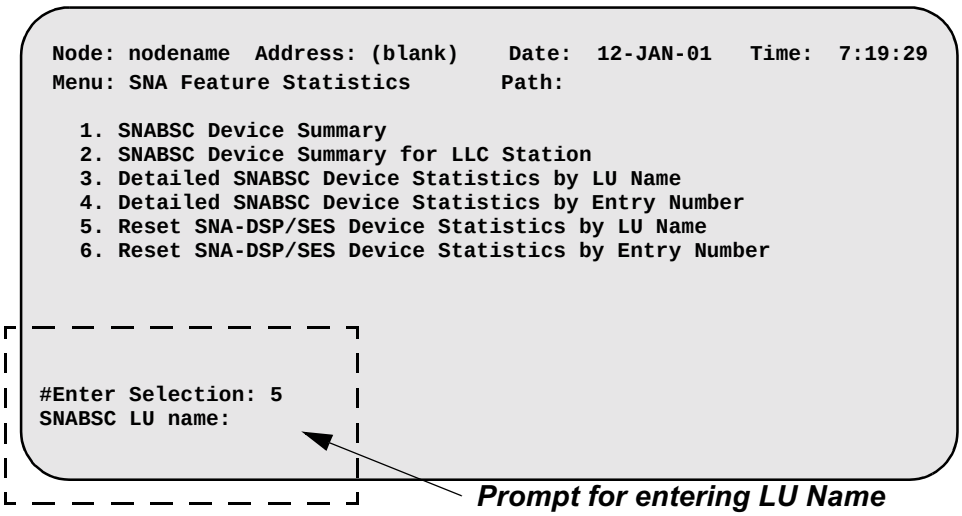


Figure 3-7. Reset SNABSC Device Statistics by LU Name

Reset SNA-DSP/ SES Device Statistics - Page 2

Figure 3-8 shows Page 2 of the Reset SNA-DSP/SES Device Statistics viewed by entry number. Under the DSP/SES Detailed Statistics on this page, all IN/OUT numbers under the Control Summary and Data Summary have been reset to zero.

```
   LU Name: MMCLU100      LU Address: 100     LU Type:   IBM-3278-2
   LinkStn:      lsc-eth1
Remote Device Type: T2780INT   Calling Address Configured: 102001100

LUA-SNABSC State: Inactive or Disabled         SNA-DSP/SES State: Disconnected

SNA-DSP/SES Detailed Statistics:

                        IN        OUT                          IN        OUT
   Call Request:        0         0         Turbo Data Packets:0           0
   Call Accept:         0         0         Data Packets:      0           0
   Call Reject:         0         0         Data Bytes:        0           0
   Session Disconnect:  0         0         Terminal Status:   0           0
   Msg Seg# Resynced:   0         0         Cmd/Rsp Abort:     0           0
   Circuit Disconnect:  0         0         Cmd/Rsp Fwd Abort: 0           0
   Invite to Clear:     0         0
   Unknown Disconnect:  0         0

LUA-SNABSC Detailed Statistics:                                  Reset to zero

BIND Receive: 0   BIND Accept: 0     BIND Parameter Rej: 0
   LUA-SNABSC Detailed Statistics:
   BIND Receive: 0    BIND Accept: 0    BIND Parameter Rej: 0
   Last Outbound LU-LU Sequence # Receive (Hex): 0000

 Press any key to continue ( ESC to exit ) ...
```

Figure 3-8. Page 2 of the Reset SNA-DSP/SES Device Statistics

Screen Terms

The screen terms are described in this table:

Term	*Description*
APPL Connected	Indicates the current status: • up: User Enabled connection • down: User Disabled connection
BIND Accept	Number of BINDs accepted
BIND Parameter Rej	Total number of BINDs rejected due to invalid parameters
BIND Receive	Total number of BINDs received from SNA Host
Call Request	Makes call connection
Call Accept	Accepts call
Call Reject	Rejects call
Circuit Disconnect	Logical Disconnect
Cmd/Rsp Abort	Abort command being received from or sent to SES
Cmd/Rsp Fwd Abort	Abort command being received from or sent to SES
Data Bytes	Total number of characters received from or sent to DSP
Invite to Clear	Request to clear
Link Station	Link Station type
Last Outbound LU-LU Sequence # Receive	Sequence number of the last RU received from the SNA Host
LU Address	This is the Logical Unit (LU) identification number
LU-LU Session	Indicates the current status: • up: Device is connected to the host application • down: Device is not connected to the host application
LU Model	Logical Unit Model number
LU Name	This is the name of the Logical Unit (LU)
Msg Seg# Resynced	Command to resync numbers
SSCP-LU Session	Indicates the current status: • up: Node is connected to the SSCP host • down: Node is not connected to the SSCP host
RU Summary	Request Unit Summary
RU	Request Unit
Session Disconnect	Disconnects from the network
Unknown Disconnect	Disconnects from the network

Appendix A
SNA Sense Codes

Overview

Introduction

This appendix provides descriptions for the SNA Sense Codes.

Error Codes from Networks and Remote Devices

Introduction

Error codes received by SNA/BSC Conversion from X.25 network or remote devices are displayed through alarms or sense codes sent to the SNA host in UNBIND command. There are four types of codes, three already implemented for X.25, and one from BSC3270-to-BSC2780 to SNABSC Conversion. Below are the codes (symbols):

- EE - Event Code (X.25)
- DD - Diagnostic Code (X.25)
- CC - Cause Code (X.25)
- SS - Specific Reason Code (BSC3270/BSC2780-to-SNABSC Conversion)

Alarms

The alarm displays the error code in the following format when there is disconnection from remote device:

Disconnection from DSP:

Nodename 27-JUN-2002 17:04 LU MMCLU002 DISC FROM DSP DEV (EE, DD, CC, SS)

Disconnection from SES:

Nodename 27-JUN-2002 17:04 LU MMCLU002 DISC FROM SES DEV (EE, DD, CC, SS)

Note

If SS's value is non-zero, then it has greater significance than DD and CC. Otherwise, DD and CC are the more significant code (even if either or both are 00).

SNA Sense Code in Inbound UNBIND

The following table describes SNA UNBIND command format with the sense code:

Code	*Description*
TH0 - TH5	Transmission Header
RH0 - RH2	Request/Response Header
RU0- x'32'	UNBIND Command
RU1- x'FD'	UNBIND Type ■ **Note** 'FD' is unique to Vanguard Managed Solutions. 'FD' is not documented in IBM's format manual.
RU2 - RU5	Sense Code

UNBIND Sense Code Format

The UNBIND can only be sent after a LU-LU session is established and where UNBIND (instead of LUSTAT, for example) is used to inform SNA Host of disconnection. Where UNBIND is not used, alarms (described above) must be used to determine the cause of disconnection or unsuccessful Call Request.

The sense code is formatted in inbound (to SNA Host) UNBIND command to indicate DSP or SES and any possible reason for disconnect from device.

Byte 0 (RU2)

- bits 0-3: always '0000'
- bits 4-7: always '1000'

Byte 1 (RU3)

- bits 0-3: always '1111'
- bits 0-1: '00' - from DSP
  '01' - from SES
- bits 2-3: '00' - Bytes 2-3 contain Specific Code
  '01' - Event is SASD*; byte 2 contains Diagnostic Code and byte 3 contains the Cause Code
  '10' - Event is SASCBB*; bytes 2 contains Diagnostic Code and bytes 3contains the Cause Code
  '11' - Event is SACD*; bytes 2 and bytes 3 are reserved

Bytes 2 - 3 (RU4 - RU5)

Specific Code or Diagnostic/Cause Code

Sense Code Summary

The following tables list the Sense Code Summary by DSP, SES and Event:

Code	*From*	*Event Description*
x'08F0 00SS'	DSP	SS = Specific Code
x'08F1 DDCC'	DSP	Event is SASD*; DD = Diagnostic Code; CC = Cause Code

Code	From	Event Description
x'08F2 DDCC'	DSP	Event is SASCBB*; DD = Diagnostic Code; CC = Cause Code
x'08F3 DDCC'	DSP	Event is SACD*
x'08F4 00SS'	SES	SS = Specific Code
x'08F5 DDCC	SES	Event is SASD*; DD = Diagnostic Code; CC= Cause Code
x'08F6 DDCC'	SES	Event is SASCBB*; DD = Diagnostic Code; CC = Cause Code

* Event Codes are described in the next section.

EE - Event Codes

Event Codes

The following table lists the Event Codes:

Code	*Description*
X'05' - SASD	Session Disconnect
X'06' - SASCBB	SASCBB- Session Reject
X'07' - SACD	Circuit Disconnect (DSP only)

Note

Details of Diagnostic, Cause, and Specific Reason code are described in this section.

DD - Diagnostic Code

Diagnostic Codes

The table below lists the Diagnostic Codes that are X.25 or network specific.

Code	*Description*
X'00'	Generic code; no additional information
X'01'	Invalid P(S)
X'02'	Invalid P(R)
X'10'	Generic code; packet type invalid
X'11'	Packet invalid in state R1
X'14'	Packet invalid in state P1
X'15'	Packet invalid in state P2
X'16'	Packet invalid in state P3
X'17'	Packet invalid in state P4
X'18'	Packet invalid in state P5
X'1B	Packet invalid in state D1
X'1D'	Packet invalid in state D3
X'20'	Generic code; packet not allowed
X'21'	Unidentifiable packet
X'22'	Call on logical one way channel
X'23'	Invalid packet on PVC
X'26'	Packet too short
X'27'	Packet too long
X'29'	Invalid bits in packet
X'2B'	Unauthorized interrupt conf
X'2C'	Unauthorized interrupt
X'30'	Generic code; timer expired
X'31'	Timer expired for incoming call
X'32'	Timer expired for clear
X'33'	Timer expired for reset
X'34'	Timer expired for restart
X'40'	Generic code; call set-up problem
X'41'	Facilities/region code not allowed
X'42'	Facilities/region parameter not allowed
X'43'	Bad called address
X'44'	Bad calling address
X'45'	Invalid facilities length

Code	Description
X'46'	Incoming call barred
X'47'	No logical channel available
X'48'	A call collision occurred
X'49'	Duplicate facility requested
X'4A'	Non-zero address length
X'4B'	Non-zero facility length
X'4C'	Facility not found when expected
X'51'	Improper cause code from DTE
X'53'	Inconsistent Q Bit setting
X'54'	NUI Problem (e.g. invalid NUI)
X'78'	Temporary routing problem

Network Specific

The table below lists the Diagnostic Codes that are network specific:

Code	Description
X'80'	Call limit reached on node that was not the destination
X'81'	Call limit reached on destination node
X'82'	No LCN's available on node that was not the call destination
X'83'	Call disconnected by the CTP
X'84'	Link failure in intermediate node
X'85'	Call passed through same node twice
X'86'	Call passed through too many nodes
X'9A'	(#) received a Restart at level 3
X'9C'	(#) Rx DISC at level 2.
X'9D'	(#) Rx DM at level 2.
X'9E'	(#) Rx SABM at level 2.
X'9F'	(#) Rx FRMR at level 2.
X'A0'	(#) Rx invalid N(r). Tx FRMR.
X'A1'	(#) Rx unsolicited F bit. Tx FRMR.
X'A2'	(#) Rx unknown command. Tx FRMR.
X'A3'	(#) Rx unknown response. Tx FRMR.
X'A4'	(#) Rx I field too long for L1. Tx FRMR.
X'A5'	(#) No response after N2 tries. Tx SABM.
X'AE'	(#) Rx frame of incorrect size. Tx FRMR.
X'AF'	(#) Address error, sent FRMR.

Code	Description
X'B0'	(#) Source port is in BusyOut state.
X'B1'	(#) Destination port is in BusyOut state.
X'B2'	(#) DCP reconnection attempt rejected. Do not retry
X'B3'	/* */
X'B4'	Cannot bring up a call when configuration is changing
X'B5'	NS Feature invalid configuration - during table boot.
X'B6'	(#) Call Request specified unacceptable resources
X'B8'	(#) NUI Database problem (busy, timeout, congestion)
X'B9'	Invalid Quality Of Service (QoS)
X'BA'	Clear Request from a Voice end-point
X'BB'	Call cleared by port configured for Redirection

CC - Cause Codes

Cause Codes

The table below lists the Cause Codes that are X.25 or network specific:

For Clear Indication

Code	*Description*
X'01'	Number busy
X'03'	Invalid facility request
X'05'	Network congestion
X'09'	Out of order
X'0B'	Access barred
X'0D'	Not obtainable
X'11'	Remote procedure error
X'13'	Local procedure error
X'15'	RPOA out of order
X'19'	Reverse charging acceptance not subscribed
X'21'	Incompatible destination
X'29'	Ship absent
X'3A'	(#) control port intervention

For Reset Indication

Code	*Description*
X'01'	Out of order (P)
X'03'	Remote procedure error
X'05'	Local procedure error
X'07'	Network congestion
X'09'	Remote DTE operational (P)
X'0F'	Network operational (P)
X'11'	Incompatible destination
X'1D'	Network out of order (P) / (P) -- may only be sent on PVCs

For Restart Indication

Code	Description
X'01'	Local procedure error
X'03'	Network congestion
X'07'	Network operational
X'7F'	Registration/cancellation confirmed

SS - Specific Code

DSP Specific Codes

The tables below show the SS - Specific Codes from DSP:

Device Status Error Received

Code	*Description*
x'01'	Received Device Status error

Poll Responses

Code	*Description*
x'10'	Invalid poll response
x'11'	Received ENQ in response to poll to term
x'12'	Received WACK to a poll

Timed Out or Disabled

Code	*Description*
x'20'	Timed out - no response from term to message
x'21'	Idle Device Timeout
x'22'	Device disabled
x'23'	Received RVI in response to Select
x'24'	Received EOT in response to text
x'25'	No response to Call Request
x'26'	No Call Request from TPAD

Receive Error

Code	*Description*
x'30'	Response error from term to message
x'31'	Receive error on first text from term
x'32'	Receive error on partial text from term
x'33'	Error on partial text from term
x'34'	Receive error on term response to message

Send Error

Code	Description
x'40'	Received NAK to message to term
x'41'	Received ENQ in response to message to term

Bad Acknowledgment

Code	Description
x'50'	Invalid ack0 from term to message
x'51'	Invalid ack1 from term to message
x'52'	Invalid response to message
x'53'	Invalid response to select

Disconnect Key Received

Code	Description
x'60'	Disconnect key in response to poll
x'61'	Disconnect key in response to select
x'62'	Disconnect key in response to message
x'63'	Disconnect key in response to ENQ

Disconnect from SNABSC

Code	Description
x'70'	Wrong SNA state
x'71'	Retry Call Request due to no packet
x'72'	Shutdown by Applications
x'73'	Cannot Call Request due to no socket connection

SES Specific Code

The tables below show the SS - Specific Codes from SES:

Timed Out - Waiting for ACK to Line Bid

Code	Description
x'01'	Timed out - no line bid ACK from local

Timed Out - Waiting for Something from Local

Code	*Description*
x'10'	Timed out - no partial text from local
x'11'	Timed out - no expected NAK from local due to bad BCC
x'12'	Timed out - no expected ACK from local
x'13'	Timed out - no expected ACK w/TID from local
x'14'	Timed out - no text from local
x'15'	Timed out - no ENQ (HID) from local
x'16'	Timed out - no response to Call Request
x'17'	Timed out - no Call Request from TPAD

Bad ACK0/ACK1 or NAK Sequence from Local

Code	*Description*
x'20'	Bad ACK0/ACK1 or NAK sequence from local

Unexpected EOT from Local

Code	*Description*
x'30'	Unexpected EOT from local
x'31'	Unexpected EOT from local
x'32'	Unexpected EOT received from local (EIA)
x'33'	Unexpected EOT from local

Received Error on Text from Local

Code	*Description*
x'40'	Received error on first text from local
x'41'	Received error on partial text from local

Disconnect from SNABSC

Code	*Description*
x'50'	Wrong SNA state
x'51'	Retry Call Request due to no packet
x'52'	Shutdown by Applications

Disconnect from SNABSC

Code	Description
x'53'	Cannot Call Request due to no socket connection

2780 PAD is Re-Initialized

Code	Description
x'60'	2780 PAD is re-initialized

Software Errors

Code	Description
x'C0'	Timed out - no expected NAK from local due to time out waiting for remote text
x'C1'	Unexpected DISC from remote (EIA)
x'C2'	Timed out - no text from remote
x'C3'	Timed out - no flow control clear from remote side
x'C4'	Timed out - no text ACK from remote
x'C5'	Excessive WACK ENQs from local; due to no text ACK from remote
x'C6'	Timed out - nothing from either direction
x'C7'	Received Session Bound from remote but local issued a disconnect request
x'C8'	Unexpected event waiting for ACK from remote
x'C9'	Timed out - no ACK (TID) from remote
x'CA'	Timed out - no ENQ (HID) from remote
x'CB'	Bad event - no ENQ (HID) from remote

Unknown Reason

Code	Description
x'FF'	Unknown reason

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