



Vanguard Applications Ware TCP-to-BSC Conversion (VBIP)

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Part No. T0290, Rev A

Publication Code: TK

First Printing: October 2008

Manual is current for Release 7.1 of Vanguard Applications Ware.

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Overview

Introduction

The purpose of this document is to describe the BSC3270 to TCP/IP conversion feature targeted for a remote 3400 model Vanguard router.

TCP to BSC Conversion

The BSC3270 to TCP/IP conversion feature provides an alternative means of termination into the (HP (Tandem) or IBM (mainframe) host using TCP/IP communications subsystem specifically for Automated Teller Machine (ATM) service providers and bank networks. This feature allows banks and ATM network providers to retain BSC3270 attached ATMs while providing LAN/WAN connection with the host. Figure 1-1 illustrates BSC3270 to TCP/IP conversion components within the Vanguard router.

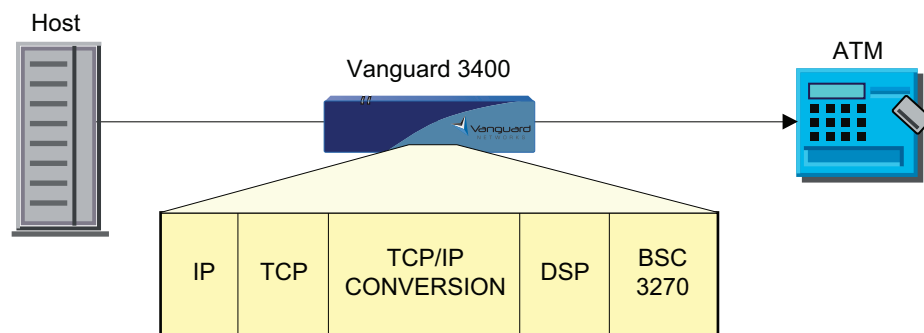


Figure 1-1. BSC3270 to TCP/IP Conversion

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 and IP routing.

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Related Vanguard Information

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

- Vanguard Basic Protocols Manual (Part No. T0113)
- Vanguard Router Basics Manual (Part No. T0100-01)
- Vanguard IP Routing Basics Manual (Part No. T0100-03)
- Vanguard IP and LAN Feature Protocols Manual (Part No. T0100-03)
- Vanguard Frame Relay Interface/Access Manual (Part No. T0106-02)
- Vanguard TCP/Telnet Basic Protocols Manual (Part No. T0106-07)
- Vanguard IBM BSC 3270 Manual (Part No. T0101-03)
- Vanguard SNMP/MIB Management Manual (Part No. T0106-04)
- Vanguard Alarms and Reports Manual (Part No. T0005) for details on alarms and reports generated by this feature
- Vanguard 3400 Series Installation Manual (Part No. T0288)
- Vanguard 6840 Installation Manual (Part No. T0287)

Related IBM Documentation

3174 Establishment ControllerGA23-0218

Features

BSC 3270-to-TCP conversion supports:

- Base24 or EPOC Host Applications
- TCP session to ATM mapping
- Server or Client role
- Up to 3 ATMs per node
- Cessation - prevents the Vanguard node from polling the ATM when the TCP session is down
- General or Specific polling
- Configurable Timers
- BSC3270 running version 5.3 or later Vanguard Application Ware

Cessation

Configuration for Cessation is CESS+CESS3. Vanguard node will not connect with and poll ATM device while the TCP session is down.

Theory of Operation

Introduction

The BSC3270 to TCP/IP conversion feature is designed to function in a remote Vanguard 3400 series router with sufficient memory and flash resources to support IP routing features, including BGP-4, QOS, Firewall, VPN, SSH Server, RADIUS Client, and SNMP for specific traps required for host status notification.

The theory of operation presented in the following subsection provides a basic description of how the BSC3270-to-TCP conversion feature is implemented in Vanguard products.

Among the financial industries host application programs supported are Base24 and EPOC, both of which run on an IBM or HP (Tandem) host platforms. The host application controls the ATM and all of its functions from displaying data, printing, and currency distribution.

Currently there is a significant number of ATM machines installed that use BSC3270 which requires a serial connection in the data center typically using an IBM-like Communications Controller or HP (Tandem) SWAN controller. Depending on the number of remote ATM machines this can result in hundreds of serial (leased) lines in the data center which for cost and maintenance reasons could be undesirable. The BSC3270 to TCP/IP conversion feature in the Vanguard router allows users to retain the remote BSC3270 ATM machines and connect them at the host using TCP/IP over a LAN interface, eliminating the need for serial line connections at the host.

Vanguard Networks was the first company to develop BSC3270 to SNA conversion allowing LAN connections at the host using IBM's SNA architecture. The new BSC3270 to TCP/IP feature 'VBIP' now adds host connectivity to include TCP/IP over a LAN/WAN connection.

How the BSC3270-to-TCP Conversion Works

Introduction

BSC3270-to-TCP 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

Purpose

The BSC3270-to-TCP conversion allows banks and ATM network providers to retain BSC3270 attached ATMs while providing a LAN/WAN connection with the host.

This feature will allow the attached BSC3270 ATM machine to appear as a TCP/IP device, complete with its unique IP device address and TCP port address, mutually exclusive to the inherent IP router capability, running in the same physical node.

Typical Application

Application #1 shown in Figure 1-2 below shows a typical application of BSC3270-to-TCP conversion. The network consists of these elements:

- Tandem Host
- Frame Relay WAN
- Vanguard 3410
- ATMs

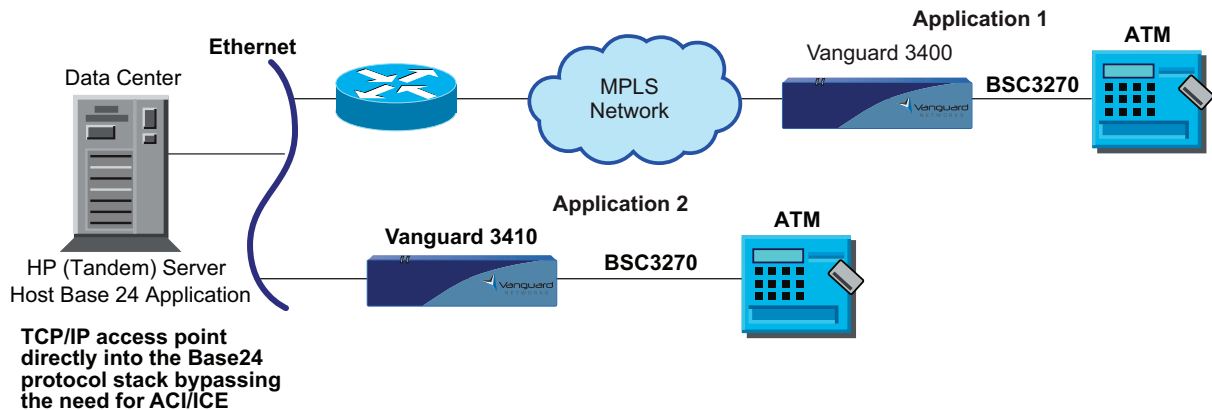


Figure 1-2. Typical BSC3270-to-TCP Application

Data Conversion

Figure 1-3 below shows the changes in the data formats as the packets pass through the network. Conversion is done in the Vanguard 3410.

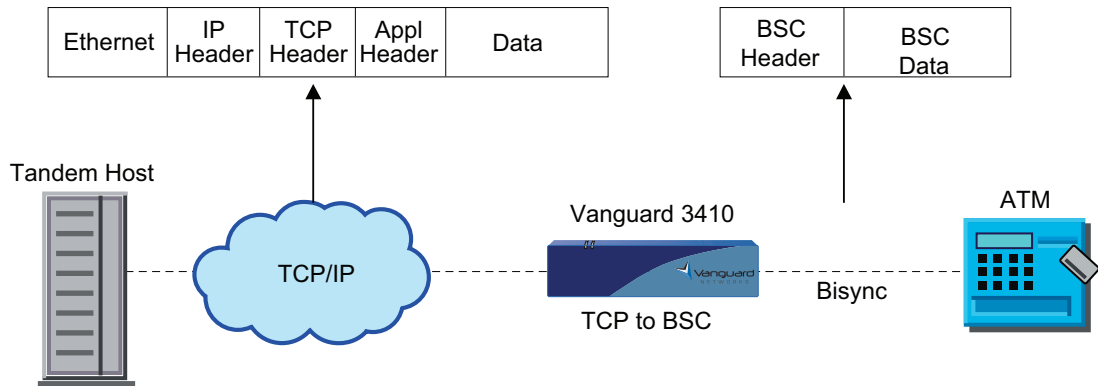


Figure 1-3. Data Conversion Diagram

Application Header Device Status

In the example shown Figure 1-4 in the frame contains source and destination MAC, IP and TCP port addresses.

The IP packet begins with inclusion of the VBIP header which in this case contains an "ATM Active" '00 80' status byte indicator. When status is sent to the host the Length field is '00' without any packet or application data. The Base24 application when configured to support VBIP requires at a minimum 'ATM Active' and 'ATM Inactive' status. In cases this may be the only status required by Base24.

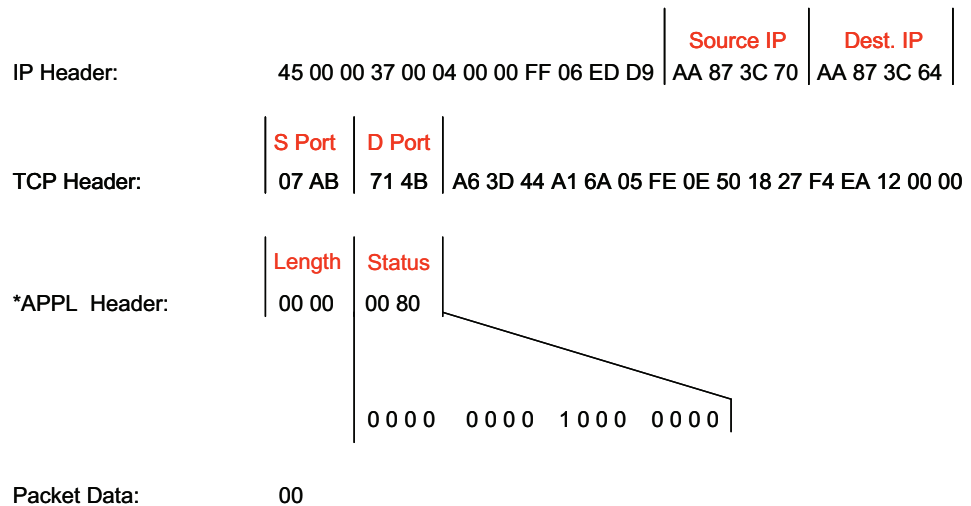


Figure 1-4. Application Header Status Diagram

ATM Active: Sent when the BSC3270 TPAD sends a specific poll to the ATM and received a valid (EOT) response. ATM Active status is also used as a 'wake up' to the Base24 application indicating the downstream ATM machine is ready for activation or download.

BSC 3270 Specific Poll

```
TX: 32 32 37 32 32 C1 C1 40 40 2D
TX: 32 32 37 32 32 C1 C1 40 40 2D
TX: 32 32 37 32 32 C1 C1 40 40 2D
TX: 32 32 37 32 32 C1 C1 40 40 2D
RC: 32 32 37 *
```

* Send 'ATM Active' status

Figure 1-5. BSC 3270 Specific Poll

ATM Inactive: This status is sent to the host at any time following a time out in BSC3270 TPAD. The 'ATM Inactive' status will be sent to the host from the VBIP when the downstream device fails to respond to a General or Specific poll. The time out is triggered when the BSC3270 TPAD tries counter reaches '0'.

Device Status

The Vanguard TCP/IP to BSC3270 conversion feature must include new functionality that will allow for exclusion and inclusion of a 4- byte application header used for (1) Presenting ATM terminal status to the host Base24 application program and (2) Calculating the byte count of the application data in the IP packet.

Applications Header

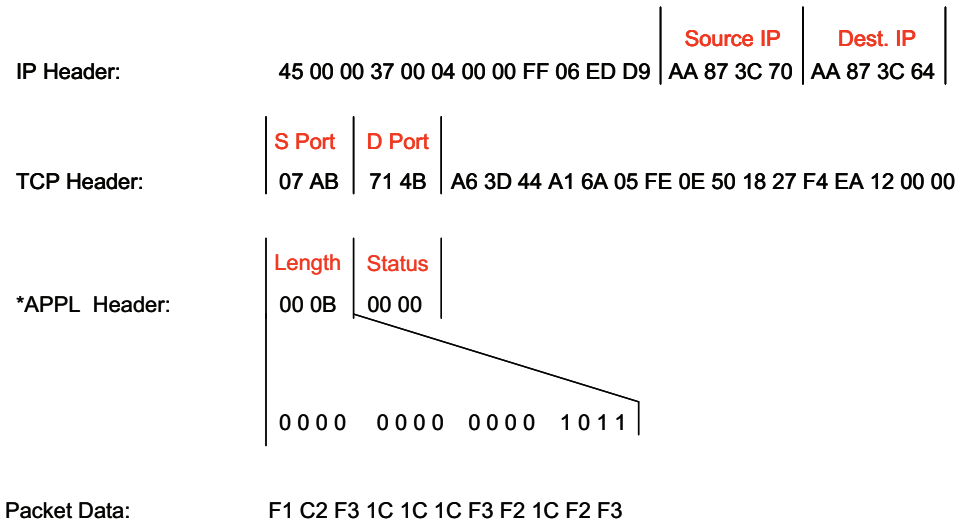
Byte 0 – 1	Length Field (Data between STX and ETX only)	
Byte 3 – 4	Status Field	
Hex	'80 00'	BSC Device OK
	'40 00'	BSC Operational Check
	'20 00'	BSC Data Check
	'10 00'	BSC Equipment Check
	'08 00'	BSC Intervention Required
	'04 00'	BSC Command Reject
	'02 00'	ATM Inactive
	'01 00'	BSC Msg. Received while Inactive/Dropped
	'00 80'	ATM Active
	'00 40'	BSC Device End
	'00 20'	BSC Unit Specify
	'00 10'	BSC Device Busy

Figure 1-6. Application Header Status Field

**Application Header
Packet Data Byte
Count**

In the example shown in Figure 1-7, the frame contains source and destination MAC, IP and TCP port addresses.

The IP packet begins with inclusion of the VBIP header which in this case contains a packet byte count of '00 0B' (11 bytes) with no status bits set in Bytes 2 and 3.



Note Application Header length field does not include the header itself, only the data between the BSC 'STX' and the 'ETX'.

Figure 1-7. Packet Data Byte Count

**EBCDIC to ASCII
Conversion**

Data sent from a BSC3270 ATM is EBCDIC encoded. The ACI Base24 application program will only support ASCII encoded application data from TCP/IP ATM's which the VBIP emulates. Therefore we must have a configurable option in the V3400 configuration menu for: (1) ASCII to EBCDIC conversion or (2) EBCDIC only. With a configurable option we can allow for this feature to be used with other host based application programs such as Advantage that may support EBCDIC data.

Start-up Sequence in Server Mode

Figure 1-8 shows an example of the start-up sequence of a typical BSC3270-to-TCP conversion. This start-up sequence establishes a TCP session between the Tandem host and the Vanguard 3400.

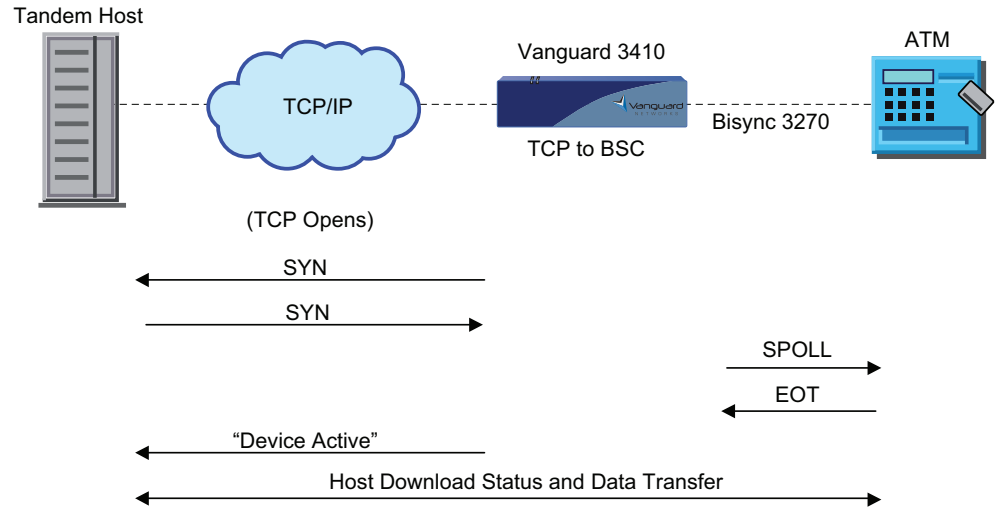


Figure 1-8. Typical BSC3270-to-TCP conversion Start-Up Sequence

Note

The BSC3270 node (the Vanguard 3400) must have the port configured with the Cessation option. Cessation prevents the Vanguard node from polling the ATM when the TCP session is down.

Fail/Recovery

Figure 1-9 shows an example of the BSC3270-to-TCP conversion Fail/Recovery:

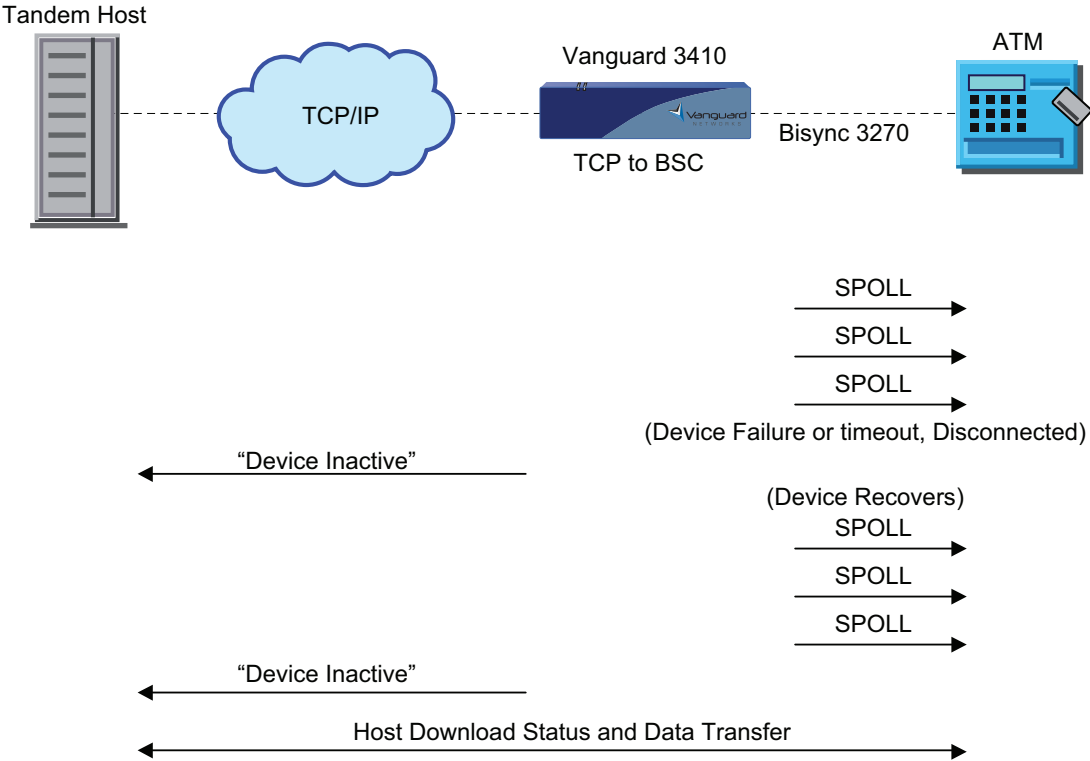


Figure 1-9. BSC3270-to-TCP conversion Fail/Recovery

Device Enable in Server Mode

Figure 1-10 shows an BSC3270-to-TCP Device Enable (ATM) example:

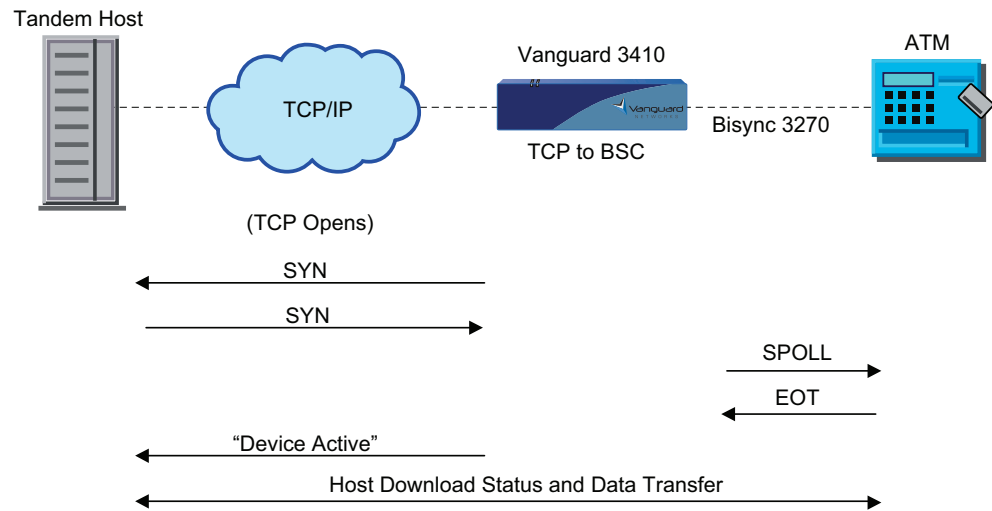


Figure 1-10. BSC3270-to-TCP Device Enable

Device Disable

Figure 1-11 shows an BSC3270-to-TCP Device Disable example.

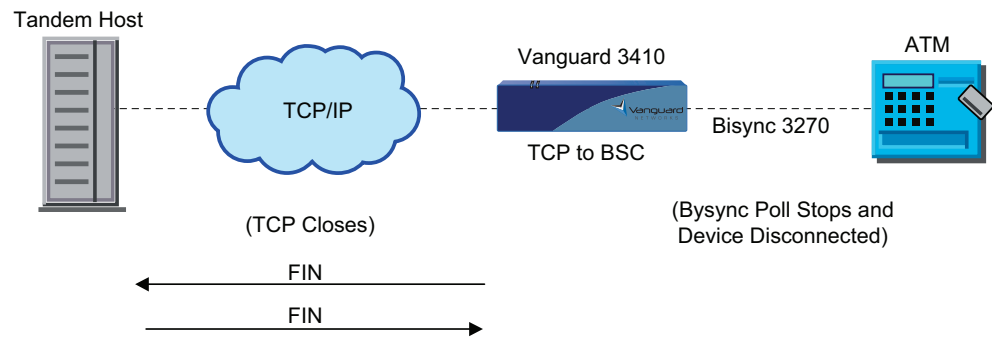


Figure 1-11. BSC3270-to-TCP Device Disable

Once disabled, the device unconditionally terminates the session. The system operator is responsible to ensure that an ATM customer is not in the middle of a bank transaction.

Note

The Cessation Option (CESS+CESS3) must be enabled so that the Vanguard 3400 does not send the poll to the ATM when the TCP session is down.

Device Boot

The device unconditionally terminates to a TCP session when booting. The system operator is responsible to ensure that an ATM customer is not in the middle of a bank transaction. Figure 1-12 shows a Device Boot example:

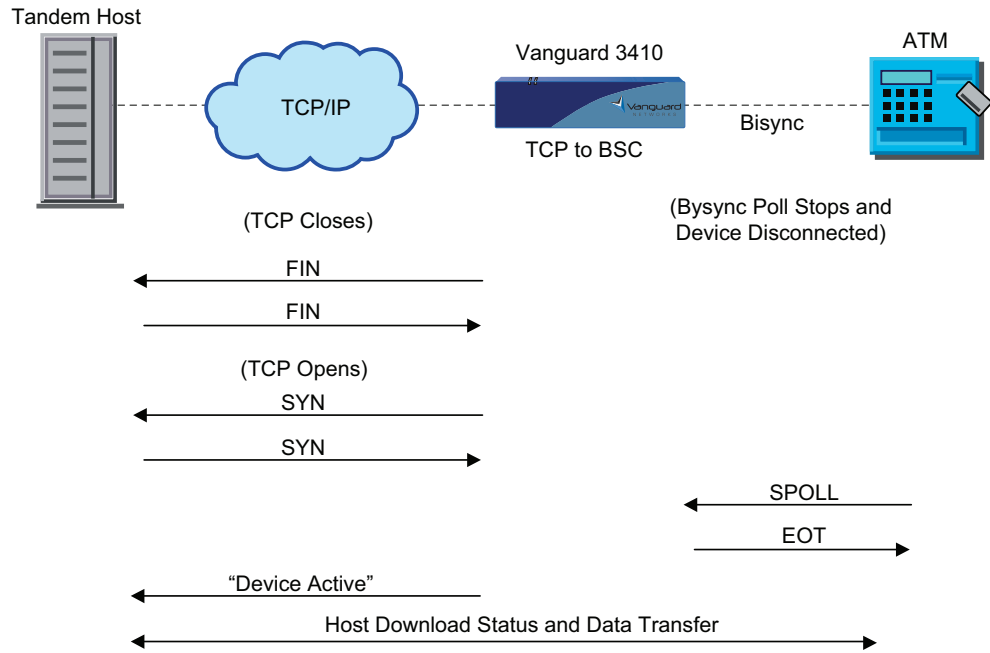


Figure 1-12. Device Boot Example

Note

The Cessation Option (CESS+CESS3) must be enabled so that the Vanguard 3400 does not send the poll to the ATM when the TCP session is down.

Overview

Introduction

This chapter provides configuration procedures and examples for BSC3270-to-TCP/IP operation.

Before You Start

Online Help

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

Parameters with an asterisk (*)

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

This chapter provides configuration examples and procedures for BSC 3270-to-TCP/IP conversion.

Configuration Information and Examples

Increase Parameters to Maximum Value for BSC-to-TCP

The guidelines below are required when using the BSC3270-to-TCP feature:

The following Node Record Parameters need to be set to accommodate the maximum number of BSC3270 to TCP sessions that can be configured:

- Mnemonic Table Size
- Quantity of DSP Devices
- Maximum Simultaneous Calls

Local Dynamic Port Creation Heap Size needs to be configured Bisync and AS/400.

■ Note

When setting the Local Dynamic Port Creation Heap Size, refer to the Ease of Configuration information located in the Ease of Configuration and Enable Ease of Configuration sections of the Vanguard Applications Ware Basic Protocols Manual - Part No. T0106 (Click Applications Ware Protocols Documentation -> Basic->About this Manual).

A copy of your current configuration files should be saved before changing the Local Dynamic Port Create Heap Size.

Configuration for BSC3270-to-TCP Operation

Introduction

To set up a Vanguard for BSC3270-to-TCP operation, configure the following:

- Node Record
- Ethernet Port Record
- Router (**see Note 1 below**)
- TCP (**see Note 2 below**)
- BSC3270 Port Record (**see Note 3 below**)
- BSC/DSP3270 Device Table (**see Note 3 below**)
- TCP-to-BSC Conversion Record Configure

■ Note 1

For details on configuring your node for LAN/WAN operation, refer to:

- Vanguard Configuration Basics Manual, (Part Number T0113)
- Vanguard Router Basics Manual (Part No. T0100-01)
- Vanguard IP Routing Basics Manual (Part No. T0100-03)

■ Note 2

For details on configuring your node for TCP operation, refer to:

- Vanguard TCP/Telnet Basic Protocols Manual (Part No. T0106-07)

■ Note 3

Only the parameters required for BSC3270-to-TCP operation are discussed in this manual. For details on configuring your node for BSC3270 operation, refer to:

- Vanguard IBM BSC 3270 Manual (Part No. T0101-03)

Configuring a Node

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.

Configuration Menu

Figure 2-1 below is a sample Configuration Menu:

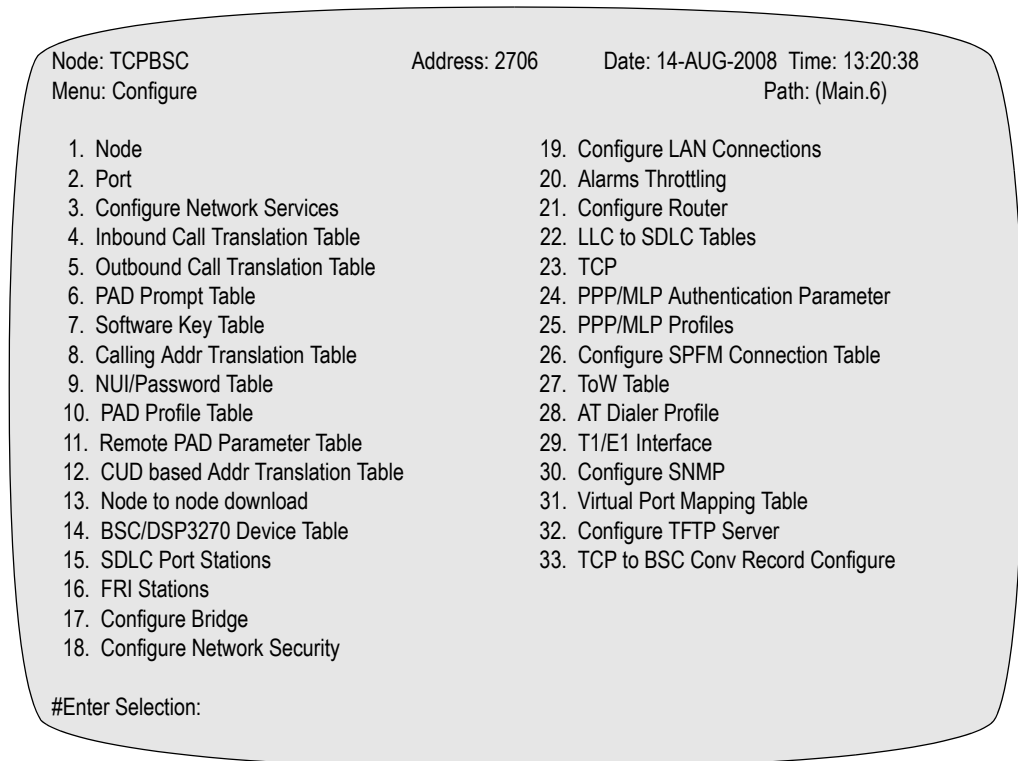


Figure 2-1. Sample Configuration Menu

Configuring Node Record

Introduction

The Node Record stores the node configuration parameters.

Configuration

Refer to Figure 2-2 and follow these steps to configure the Node Record:

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.

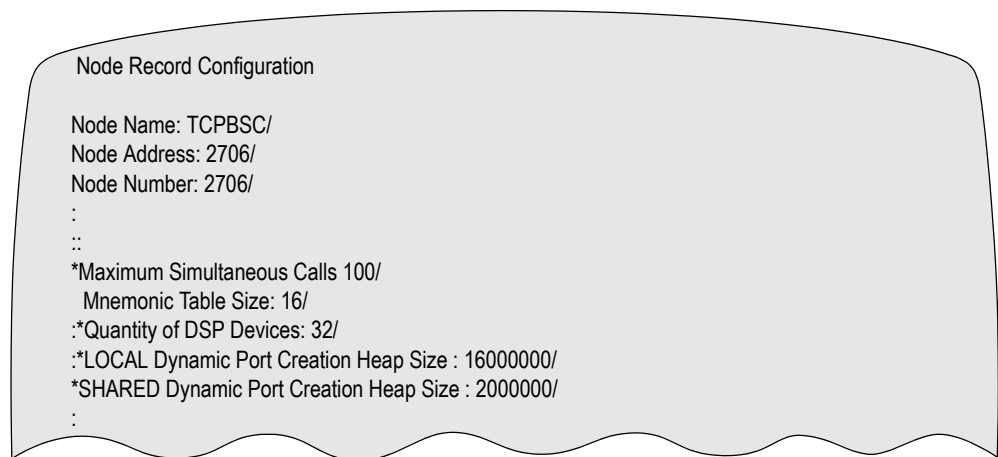


Figure 2-2. Node Record Configuration Menu

Maximum Simultaneous Calls

Range	0-2000
Default	100
Description	Limiting the number of calls allowed in the node will eliminate data loss in extreme traffic conditions. 0 - unlimited calls allowed
Boot Type	A change to this parameter requires a node boot to take effect.

Mnemonic Table Size

Range	1-2000
Default	16

Mnemonic Table Size *(continued)*

Description	Maximum permitted number of Mnemonic Table entries. The CMEM value of this parameter determines the maximum entry number for new CMEM table entries. It may be necessary to increase this size parameter value before adding new table entries.
Boot Type	A change to this parameter requires a node boot to take effect.

Quantity of DSP Devices

Range	1-1024
Default	32
Description	Maximum configured number of DSP type devices on this node. For example BSC3270, BSTD, IBM2260 all use DSP devices.
Boot Type	A change to this parameter requires a node boot to take effect.

LOCAL Dynamic Port Creation

Range	16384-16000000
Default	16000000
Description	Select size of the special local memory pool dedicated for dynamic port deletion and creation. Set size to 0 to disable the pool.
Boot Type	A change to this parameter requires a node boot to take effect.

SHARED Dynamic Port Creation

Range	16384-16000000
Default	2000000
Description	Select size of the special shared memory pool dedicated for dynamic port deletion and creation. This entry is ignored if the local memory pool size is zero.
Boot Type	A change to this parameter requires a node boot to take effect.

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	23 or 24
Default	23
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: <ul style="list-style-type: none"> • NULL - NULL port type • ETH - Ethernet port type
Boot Type	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.
Boot Type	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	1-50
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 TCP to BSC Tables

Configuration

Refer to Figure 2-3 and follow these steps to configure the TCP to BSC Features Table record:

Step	Action	Result
1	Select Configure from the CTP Main menu.	The Configure menu displays.
2	Select TCP to BSC Conv Record Configure from the Configure menu.	The Port Number parameter displays.
3	Select the feature to configure: 1 TCP to BSC Conversion Global Configure 2 TCP to BSC Conversion Records Configure	At the prompt, enter the number of the feature you are configuring.

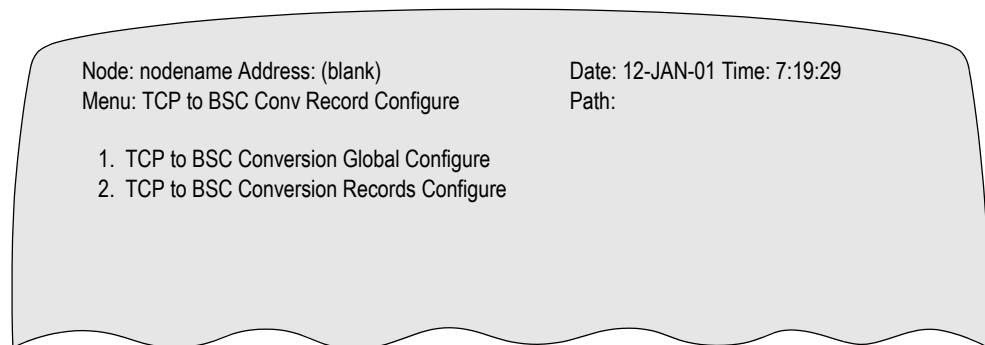


Figure 2-3. TCP to BSC Conversion Record Menu

Configuring TCP to BSC Conversion Record Menu

Figure below shows the **TCP to BSC Conversion Record Configure** Menu.

TCP to BSC Conversion Global Configuration:

The TCP to BSC Conversion Global record contains these parameters:

Default Setting

For BSC 3270-to-TCP conversion use the default setting for the **TCP to BSC Conversion Global Configuration**.

Maximum # of Devices

Range	1 to 3
Default	1

Maximum # of Devices *(continued)*

Description	Maximum number of ATMs to be configured. ■ Note This number must be at least the number of ATMs to be configured.
-------------	--

TCP Read and Write buffer size

Range	100-65000
Default	2048
Description	This parameter sets the size of read and write buffers posted to TCP by TCP BSC.

TCPBSC Window Size

Range	1-63
Default	15
Description	The window size that TCPBSC maintains with its peer.

TCP Maximum Segment Size

Range	1-2048
Default	536
Description	This parameter sets the maximum size of the segments sent out by TCP.

TCP Keep alive timer

Range	Enabled,Disabled
Default	Enabled
Description	Turn ON/OFF the TCP keep alive timer. If it is enabled, TCP sends keep alive packets every 1 minute.

Public Access TCP Port Number

Range	1-65535
Default	0
Description	This is the TCP port number that the TCPBSC Server will accept PUBLIC connections on.

**TCP to BSC
Conversion
Records
Configuration:**

The TCP to BSC Conversion record contains these parameters:

Entry Number

Range	1-3
Default	1
Description	Entry number used to reference this table record.

TCP Role

Range	CLIENT,SERVER
Default	CLIENT
Description	CLIENT - TCPBSC is client SERVER - TCPBSC is server

Destination IP Address

Range	A valid IP address in dotted notation
Default	0.0.0.0
Description	(Client only) Specifies the destination IP address used for session establishment.

Destination Port Number

Range	256-65535
Default	3000
Description	(Client only) Specifies the destination TCP port number used for session establishment.

Source Interface Number

Range	0-36
Default	0
Description	Specifies the Interface Number referring to the source IP Address. Interface 0 refers to Internal IP Address. In Server role, Interface 0 or a LAN interface is ignored, but a WAN interface may be specified only to allow the remote client to access this node.

Source Port Number

Range	256-65535
Default	3000
Description	(Server only) Specifies the source TCP port number used for session establishment.

BSC Device Type

Range	TERM,ATM
Default	ATM
Description	TERM - device is a 3270 display ATM - device is an ATM

Destination Control Unit Address

Range	00-D9 hexadecimal
Default	40
Description	<p>Specifies control unit address on remote PAD. Used with Connection Request Mode = 2 or 3. When placing the call from TCPBSC (HPAD), it must match BSC Control Unit Control Unit Address in BSC3270 device table parameter. When placing the call from BSC3270 (TPAD), it must match Destination Control Unit Address in BSC3270 device table parameter. The address consists of two hexadecimal digits. Valid ranges depend on device Character Set as follows:</p> <p>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</p> <p>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</p> <p>■Note For Connection Request Mode = 3, 0 can be specified as wild-card.</p>

Destination Device Address

Range	00-D9 hexadecimal
Default	40

Destination Device Address (continued)

Description	<p>Specifies device address on remote PAD. Used with Connection Request Mode = 2 or 3. When placing the call from TCPBSC (HPAD), it must match BSC Device Address in BSC3270 device table parameter. When placing the call from BSC3270 (TPAD), it must match Destination Device Address in BSC3270 device table parameter. This address consists of two hexadecimal digits. Valid ranges depend on 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</p>
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TCP Host Applications

Range	BASE24,EPOC
Default	BASE24
Description	Type of TCP Host applications supported for this session

3270 Command/WCC inserted in outbound Message

Range	0000-FFFF hexadecimal
Default	F1C2

3270 Command/WCC inserted in outbound Message

Description	<p>Use only for data containing no 3270 command and WCC on outbound LU type 0.</p> <p>Specifies the 3270 Write Command and the WCC to be inserted at beginning of each outbound RU.</p> <p>The 2 hexadecimal or ascii digits for the 3270 Command as follows:</p> <ul style="list-style-type: none"> 'F1' or '31' - Write 'F5' or '35' - Erase Write '6F' or '3F' - Erase All Unprotected <p>The 2 hexadecimal digits for the WCC as follows:</p> <ul style="list-style-type: none"> 'C2' - Restore input key operation 'C5' - Restore key operation and reset MDT bits in device buffer '0000' - nothing will be inserted in RU <p>Example:</p> <ul style="list-style-type: none"> 'F1C2' - Write on screen and restore input keys operation 'F5C5' - Erase and Write on screen, restore input keys operation, and reset MDT bits in device buffer.
-------------	--

Autocall Mnemonic

Range	0-8 alphanumeric characters, use the space character to blank field
Default	(blank)
Description	<p>This mnemonic references the remote X.25 address which will be auto-called.</p> <p>If blank, then autocalling is disabled, and the other end should initiate the call.</p>

EBCDIC/ASCII Translation

Range	Enabled,Disabled
Default	Enabled
Description	

TCPBSC Options

Range	NONE,NHOSTDA,TCPDBG,DSPDBG,TSTAUTOLOG
Default	NONE

TCPBSC Options (continued)

Description	NONE - no user's TCPBSC option NHOSTDA - Host will not send 'device active' status TCPDBG - print TCP debug information DSPDBG - print DSP debug information TSTAUTOLOG - VanguardNW reserved setting for test only.
-------------	--

Connect Timer

Range	5-1000
Default	10
Description	The Connect Timer specifies the maximum length of time in seconds to wait for device to connect. This is the maximum amount of time the response to initial request from host would be delayed while attempting to connect to device.

Initial TCP Retry Timer

Range	5-1000
Default	20
Description	The TCP Retry Timer I specifies the length of time in seconds to wait before first retry to connect TCP.

Subsequent TCP Retry Timer

Range	5-1000
Default	10
Description	The TCP Retry Timer II specifies the length of time in seconds to wait before each subsequent retry to connect TCP.

Host Active bit Time

Range	5-1000
Default	10
Description	Used immediately after TCP is connected and NHOSTDA option is not specified. The Host Active Bit Timer specifies the length of time in seconds to wait for 'device active' bit from the host. If it times out, TCPBSC will then place the call with the BSC device, send 'device active' bit to the host and start Host Data Timer to wait for data from the host. A zero value will cause TCPBSC to permanently wait for the 'device active' bit.

Host First Data Timer

Range	5-1000
Default	120
Description	Used immediately after placing a call with the BSC device. The Host Data Timer specifies the length of time in seconds to wait for first data block from the host. If it times out, TCPBSC disconnect from the BSC device and start Host Data Retry Timer.

Host Data Retry Timer

Range	5-1000
Default	10
Description	Used immediately after clearing the call with the BSC device during attempt to receive data from the host. The Host Data Retry Timer specifies the length of time in seconds to wait before retrying. When it times out, TCPBSC will then place the call with the BSC device, send 'device active' bit to the host and start Host Data Retry Timer.

Calling Address

Range	0-15 BCD digits, use the space character to blank field
Default	(blank)
Description	Calls placed from this node will 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 be accepted.

DSP Device Characteristics

Range	NONE, XPAR, COLOR, PRINa
Default	NONE
Description	NONE - no option XPAR - device supports transparency COLOR - device supports color PRINa - printer is attached to a terminal device Any combination of above specified by summin (eg. COLOR+PRINa).

Configuring BSC3270

BSC3270 Port Configuration

To configure the BSC3270 Port CESS+CESS3 must be selected. Figure 2-4 below shows the parameters in the Configuration record.

Configure->Port->Port Options: CESS+CESS3

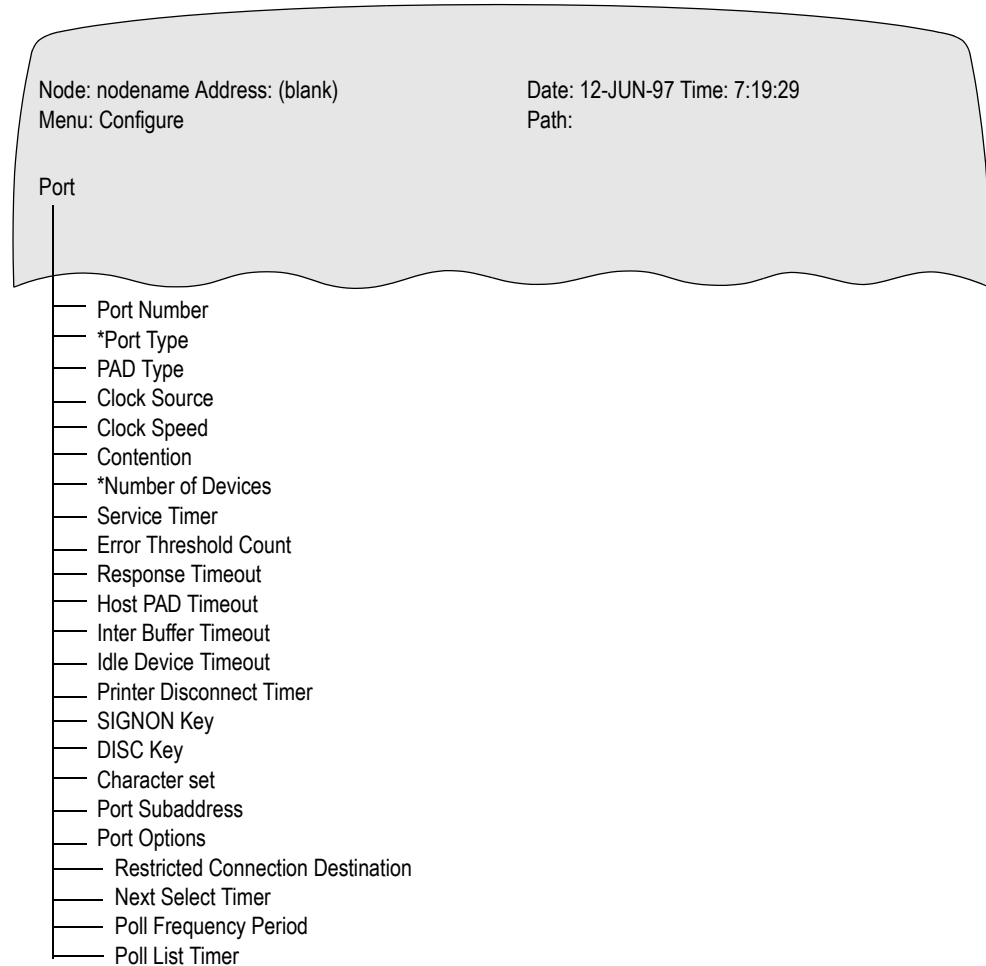


Figure 2-4. CESS+CESS3 Port Menu

**Port Options
Parameter**

Select the option CESS+CESS3 from the Port Options parameter.

Port Options

Range	NONE, CESS, SINGLE, EPAD, CESS2, CESS3
Default	None
Description	<p>Specifies the port type you are configuring:</p> <ul style="list-style-type: none"> • NONE: No option is specified. • CESS: This option turns the polling cessation ON. • In the HPAD, a G-POLL is not responded to if none of the terminals configured on that controller are in a connected state (that is, no SVC in place) and there are no printers configured on that controller. An S-POLL or SELECT or a data message to a terminal is not responded to if that device is not in a connected state. <p>In the TPAD, devices that are configured for AUTO+ORG are not polled until the connection (SVC) to the remote HPAD is established.</p> <ul style="list-style-type: none"> • CESS2: On the HPAD, a GPOLL (General Poll) response is not generated if all devices configured on a controller are in a disconnected state (that is, no SVC in place) and it does not receive a Device End status message. A SPOLL (specific poll), select or a data message response is not generated if the device is in a disconnected state and it does not receive a Device End status message. (Remote Device or TPAD must send a Device End status message.) • CESS3: On the TPAD, when the call request is received, a SPOLL is sent to the device. If an EOT is received from the device, the call accept is sent to the HPAD immediately. Otherwise, if the device does not respond with an EOT, a call reject is sent to the HPAD. CESS3 must be configured in conjunction with CESS, for use with HPAD SNABSC Conversion, and the call must originate from the HPAD. • SINGLE: The HPAD transmits only one complete message (single or multiple block message) when responding to a SPOLL or GPOLL. This option only applies to HPAD ports. • EPAD: This option pertains to the ASCII character set only. The message terminating EPAD character is hex 7F and FF when this option is enabled, otherwise hex FF is used. Any combination of the above can be specified by summing. For example, CESS+SINGLE.

BSC/DSP3270 Configuration

Figure 2-5 below is a sample Configure Menu. SPEOT must be selected in the Device Control parameter.

Configure->BSC/DSP3270 Device Table->Device Control: SPEOT

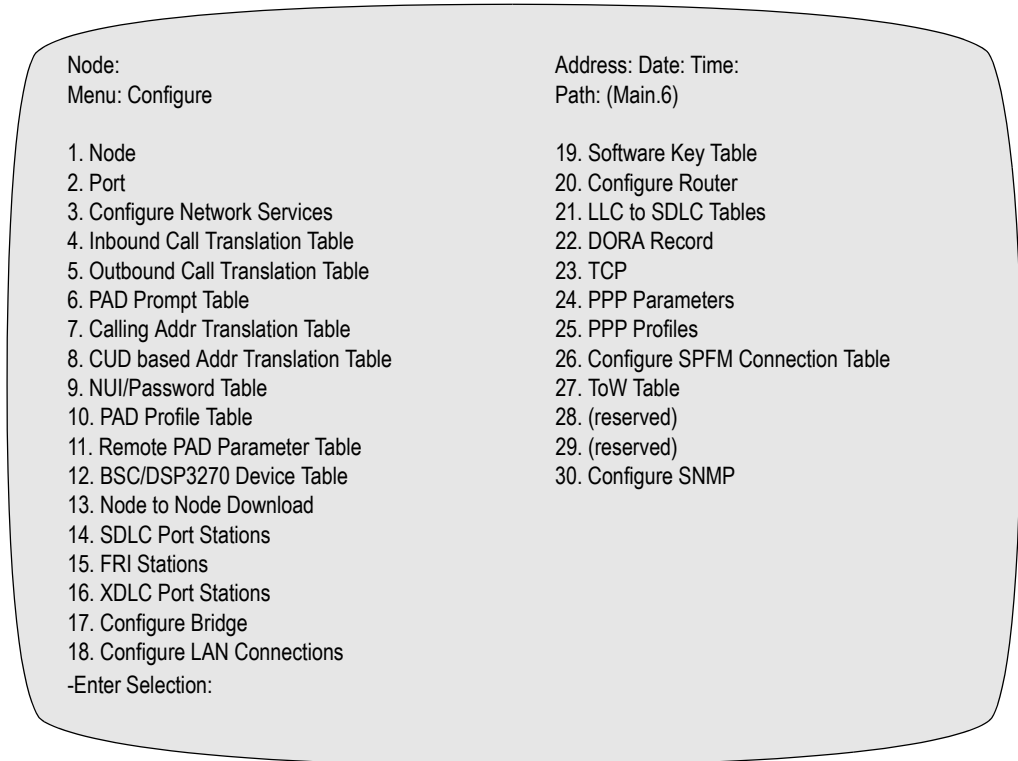


Figure 2-5. Sample Configuration Menu

Device Option Parameter

Select SPEOT from the Device Option parameter in the BSC/DSP3270 Device Table.

Device Control

Range	NONE, GPOLL, PSPOLL, SPOLL, MSPOLL, NSERV, NSTAT, RVI, SPEOT, SPEND, NCMD
Default	None

Device Control (continued)

Description	<p>Specifies device control:</p> <ul style="list-style-type: none"> • NONE: No device control parameter set. • GPOLL: Device is only polled by General Polls (TPAD only). • PSPOLL: Periodic specific polling of a device (TPAD only). • SPOLL: Forced specific polling of a device (TPAD only). • MSPOLL: Forced specific polling of a device, except when the controller is down (TPAD only). • NSERV: No service messages are sent to the device (TPAD only). • NSTAT: Disables the generation of dummy DEVICE END status messages. • RVI: Forces TPAD to send RVI as an ACK for terminal text/ status messages terminated with ETB or ETX (TPAD only). • SPEOT: SEL-ACK-TEXT-EOT-POLL-EOT or SEL-RVI-POLL- • EOT message exchanges between the TPAD and the controller disconnects the device's session to prevent a lockup condition due to a faulty controller (TPAD only). • SPEND: SPOLL is sent to every Service Timer Interval when the TPAD is flow controlled, that is, TPAD received WACK. • NCMD: Prevents the HPAD from checking for ESC and CMD codes in messages from the host. Consequently, the LCM flag is never sent in DSP messages to the TPAD. Printer devices are not supported. <p>■Note Any combination of the above may be specified by summing, for example, GPOLL+SPOLL. GPOLL overrides SPOLL if both are selected; this situation is not recommended. Devices under a COMMON CU ADDRESS must have identical Polling methods.</p> <p>For example, if CU40 has 4 devices, all devices must be GPOLL, SPOLL, or neither</p>
-------------	---

Configuration Examples

Application #1

Figure 2-6 and Figure 2-7 show how Node100 and Node 200 are configured to connect Base24 Host Server with BSC ATM Client in WAN environment. Note that TCP-to-BSC Conversion is in Node200 where Router and TCP-to-BSC Conversion Record are configured to use Internal Address as the source IP address through Source Interface Number 0 (internal IP address).

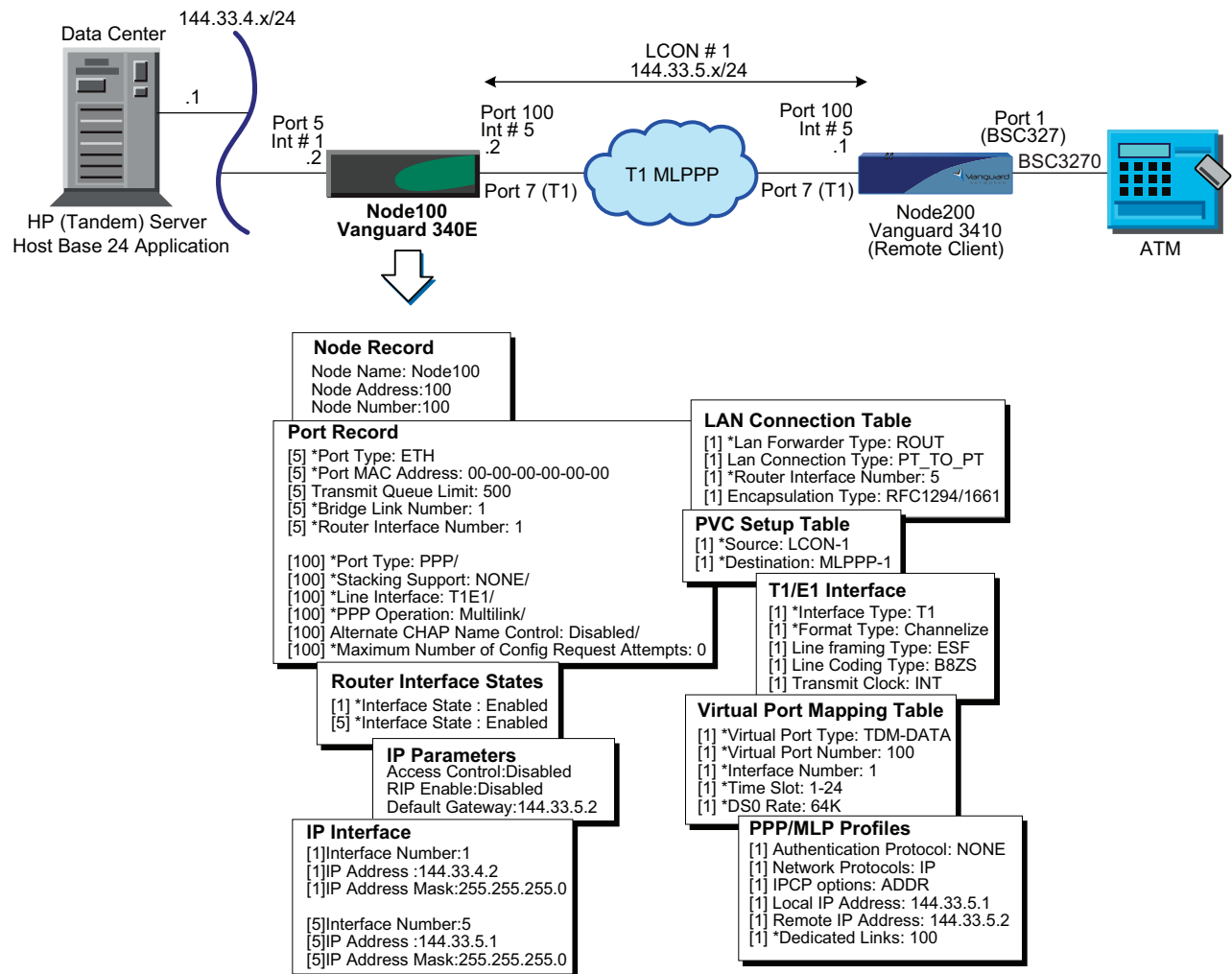
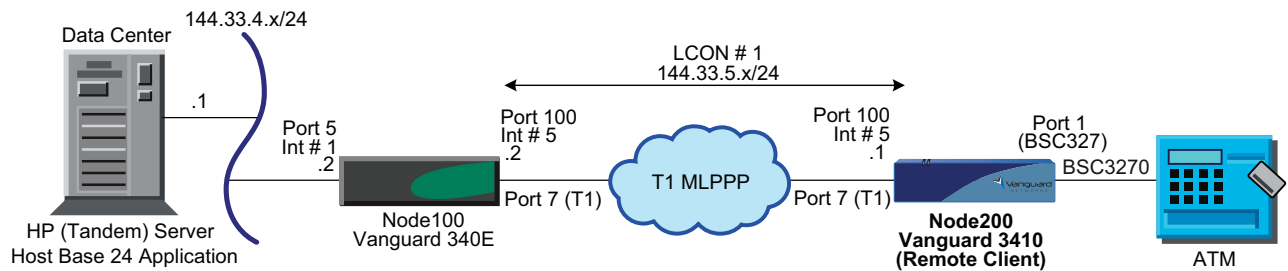


Figure 2-6. Example of Base24 Remote Client Application 1



Node Record
Node Name: Node200
Node Address:200
Node Number:200

BSC/DSP3270 Device
[1]BSC Control Unit Address:C1
[1]BSC Device Address:40
[1]DSP Device Type:TERM
[1]DSP Control:NONE
[1]Device Control:SPOLL
[1]Device Option:NONE
[1]DSP Device Characteristics:XPAR
[1]DSP Device Format Size:480
[1]DSP Character Set Capability:NONE
[1]DSP Application Identifier:0
[1]Connection Request Mode:2
[1]Destination Control Unit Address:C1
[1]Destination Device Address:40

Mnemonic Table
[1]Mnemonic Name:tcpbsc01
[1]Call Parameters:20001

LAN Connection Table
[1] *Lan Forwarder Type: ROUT
[1] Lan Connection Type: PT_TO_P
[1] *Router Interface Number: 5
[1] Encapsulation Type: RFC1294/16

PVC Setup Table
[1] *Source: LCON-1
[1] *Destination: MLPPP-1

T1/E1 Interface
[1] *Interface Type: T1
[1] *Format Type: Channelize
[1] Line framing Type: ESF
[1] Line Coding Type: B8ZS
[1] Transmit Clock: REC

Virtual Port Mapping Table
[1] *Virtual Port Type: TDM-DATA
[1] *Virtual Port Number: 100
[1] *Interface Number: 1
[1] *Time Slot: 1-24
[1] *DS0 Rate: 64K

PPP/MLP Profiles
[1] Authentication Protocol: NONE
[1] Network Protocols: IP
[1] IPCP options: ADDR
[1] Local IP Address: 0.0.0.0
[1] Remote IP Address: 0.0.0.0
[1] *Dedicated Links: 100

Port Record
[1]Port Type: BSC3270
[1]Interface Type:V.24
[1]V.24 Interface Option:RI
[1]PAD Type:TPAD
[1]Clock Source:INT
[1]Clock Speed:9600
[1]Contention:FDX
[1]Connection type:SIMP
[1]*Number of Devices:1
[1]Port Options:CESS3

[100] *Port Type: PPP/
[100] *Stacking Support: NONE/
[100] *Line Interface: T1E1/
[100] *PPP Operation: Multilink/
[100] Alternate CHAP Name Control: Disabled/
[100] *Maximum Number of Config Request Attempts: 0

TCP to BSC Conversion Global Configure
Maximum # of Devices: 1/
TCP Read and Write buffer size: 2048/
TCPBSC Window Size: 15/
TCP Maximum Segment Size: 536/
TCP Keep alive timer: Enabled/
Public Access TCP Port Number: 0/

TCP to BSC Conversion Record
[1]TCP Role:CLIENT
[1]Destination IP Address:144.33.4.1
[1]Destination Port Number:1024
[1]Source Interface Number:0*
[1]BSC Device Type:ATM
[1]Destination Control Unit [1]Address:C1
[1]Destination Device Address:40
[1]3270 Command/WCC inserted in outbound Message:0000

[1]Autocall Mnemonic:tcpbsc01
[1]EBCDIC/ASCII Translation:Enabled
[1]Host Applications :BASE24
[1]TCPBSC Options:NONE

Router Interface States
[5] *Interface State : Enabled
[6] *Interface State : Enabled

IP Parameters
Internal IP Address:144.33.4.2
Internal Net Mask:255.255.255.0
Access Control:Disabled
RIP Enable:Disabled
Default Gateway:144.33.5.1

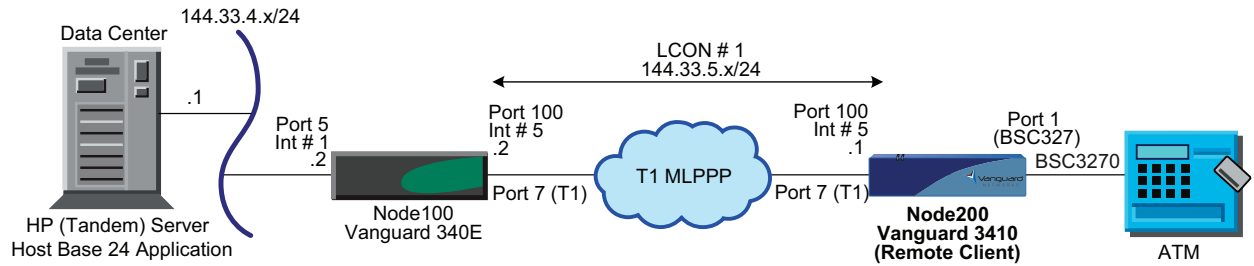
IP Interface
[5]Interface Number:5
[5]IP Address :144.33.5.2
[5]IP Address Mask:255.255.255.0

*NOTE: Use Internal IP Address as a source IP address

Figure 2-7. Example of Base24 Remote Client Application 2

Application #2

Figure 2-8 shows Router and TCP-to-BSC Conversion Record in Node 200 configured to use Source Interface Number 6 as the source IP address.



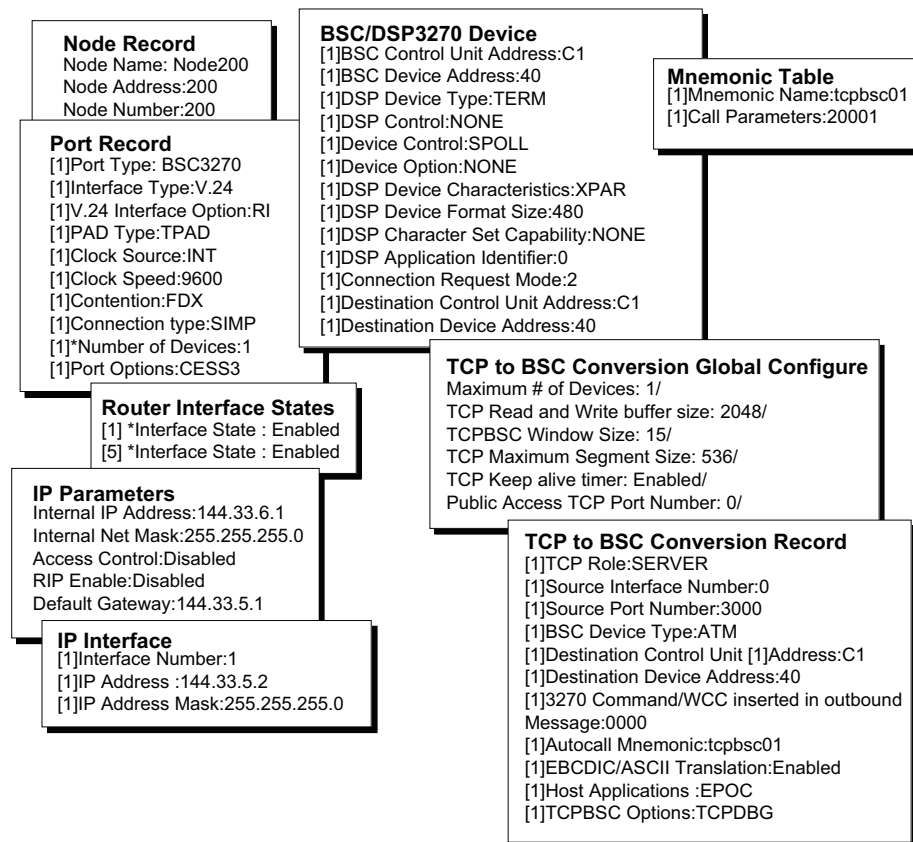
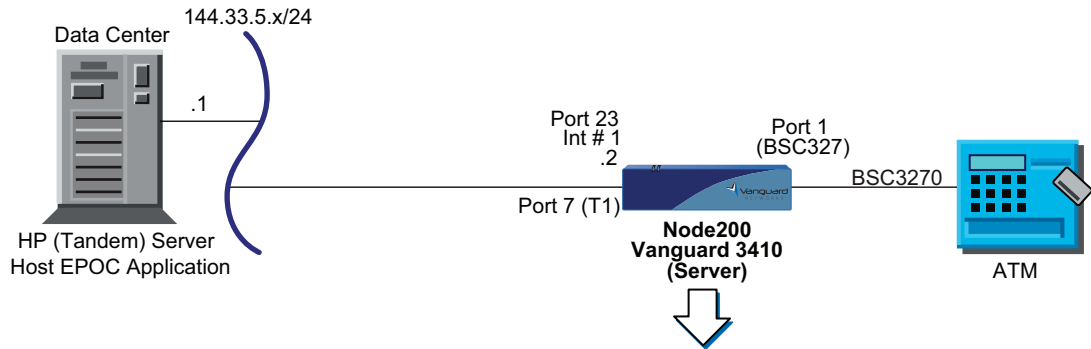
Node Record Node Name: Node200 Node Address:200 Node Number:200	BSC/DSP3270 Device [1]BSC Control Unit Address:C1 [1]BSC Device Address:40 [1]DSP Device Type:TERM [1]DSP Control:NONE [1]Device Control:SPOLL [1]Device Option:NONE [1]DSP Device Characteristics:XPAR [1]DSP Device Format Size:480 [1]DSP Character Set Capability:NONE [1]DSP Application Identifier:0 [1]Connection Request Mode:2 [1]Destination Control Unit Address:C1 [1]Destination Device Address:40	Mnemonic Table [1]Mnemonic Name:tcpbsc01 [1]Call Parameters:20001
Port Record [1]Port Type: BSC3270 [1]Interface Type:V.24 [1]V.24 Interface Option:RI [1]PAD Type:TPAD [1]Clock Source:INT [1]Clock Speed:9600 [1]Contention:FDX [1]Connection type:SIMP [1]*Number of Devices:1 [1]Port Options:CESS3 [100] *Port Type: PPP/ [100] *Stacking Support: NONE/ [100] *Line Interface: T1E1/ [100] *PPP Operation: Multilink/ [100] Alternate CHAP Name Control: Disabled/ [100] *Maximum Number of Config Request Attempts: 0	TCP to BSC Conversion Global Configure Maximum # of Devices: 1/ TCP Read and Write buffer size: 2048/ TCPBSC Window Size: 15/ TCP Maximum Segment Size: 536/ TCP Keep alive timer: Enabled/ Public Access TCP Port Number: 0/	LAN Connection Table [1] *Lan Forwarder Type: ROUT [1] Lan Connection Type: PT_TO_P [1] *Router Interface Number: 5 [1] Encapsulation Type: RFC1294/16
Router Interface States [5] *Interface State : Enabled [6] *Interface State : Enabled	TCP to BSC Conversion Record [1]TCP Role:CLIENT [1]Destination IP Address:144.33.4.1 [1]Destination Port Number:1024 [1]Source Interface Number:6 [1]BSC Device Type:ATM [1]Destination Control Unit Address:C1 [1]Destination Device Address:40 [1]3270 Command/WCC inserted in outbound Message:0000 [1]Autocall Mnemonic:tcpbsc01 [1]EBCDIC/ASCII Translation:Enabled [1]Host Applications :BASE24 [1]TCPBSC Options:NONE	PVC Setup Table [1] *Source: LCON-1 [1] *Destination: MLPPP-1
IP Parameters Access Control:Disabled RIP Enable:Disabled Default Gateway:144.33.5.1 IP Interface [5]Interface Number:5 [5]IP Address :144.33.5.2 [5]IP Address Mask:255.255.255.0 [6]Interface Number:6 [6]IP Address :144.33.4.2 [6]IP Address Mask:255.255.255.0	T1/E1 Interface [1] *Interface Type: T1 [1] *Format Type: Channelize [1] Line framing Type: ESF [1] Line Coding Type: B8ZS [1] Transmit Clock: REC	Virtual Port Mapping Table [1] *Virtual Port Type: TDM-DATA [1] *Virtual Port Number: 100 [1] *Interface Number: 1 [1] *Time Slot: 1-24 [1] *DSO Rate: 64K
		PPP/MLP Profiles [1] Authentication Protocol: NONE [1] Network Protocols: IP [1] IPCP options: ADDR [1] Local IP Address: 0.0.0.0 [1] Remote IP Address: 0.0.0.0 [1] *Dedicated Links: 100

*NOTE: Use Interface#6's IP Address as a source IP address.

Figure 2-8. Example of Base24 Remote Client Router and TCP-to-BSC Conversion Record

Application #3

Figure 2-8 shows TCP to BSC Conversion Record in Node 200 configured as a Server to EPOC Host Applications in LAN environment. Router and TCP-to-BSC Conversion Record are configured to use Internal Address as the source IP address through Source Interface Number 0.

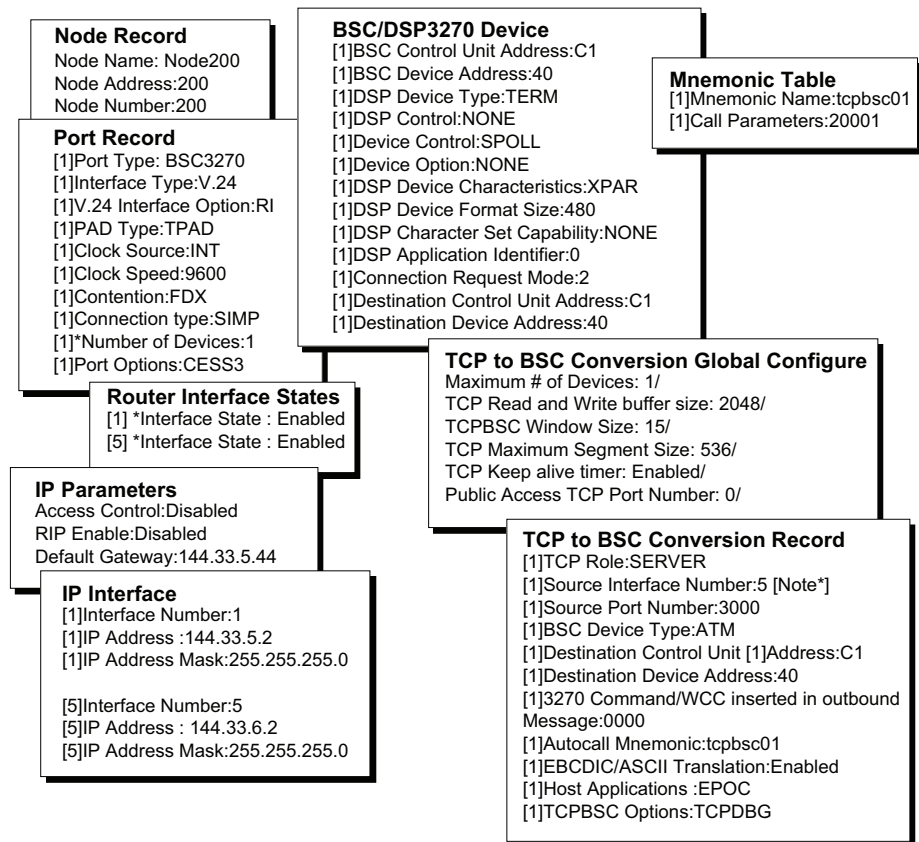
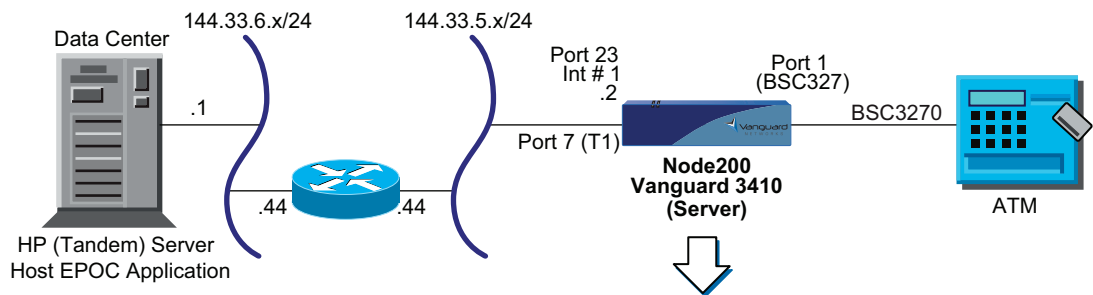


[Note*: Use Internal IP Address as IP Address as a source IP address.]

Figure 2-9. Example of TCP to BSC Conversion Record in Node 200 configured as a Server to EPOC Host Applications in LAN environment

Application #4

Figure 2-9 show TCP to BSC Conversion Record in Node 200 configured as a Server to EPOC Host Applications in LAN environment using Interface #6 as the source IP address through Source Interface Number.



[Note*: Use Interface#5's IP Address as IP Address as a source IP address.]

Figure 2-10. Example of TCP to BSC Conversion Record in Node 200 configured as a Server to EPOC Host Applications in LAN environment Using Interface #6

Introduction

This chapter describes how to generate TCP to BSC Statistics.

Types of TCP to BSC Statistics

You can generate these TCP to BSC Statistics:

- TCPBSC Device Summary
- Detailed TCPBSC Device Statistics by Entry Number
- Reset TCPBSC Detailed Statistics by 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 TCP to BSC Statistics from the Status/statistics Menu	The TCP to BSC Statistics menu displays.

TCP to BSC Statistics Menu

Figure 4 below shows the TCP to BSC Statistics Menu.

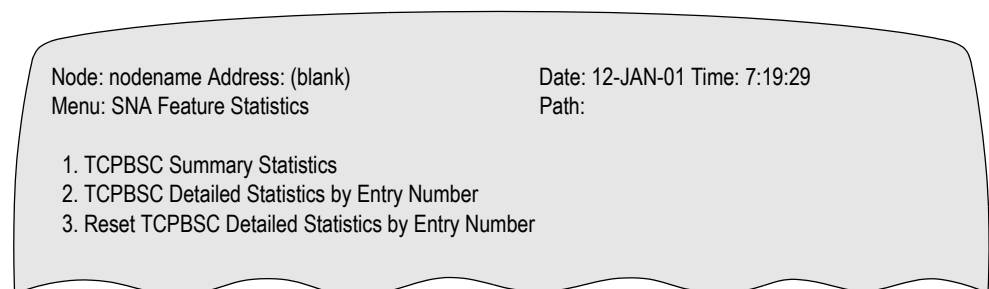


Figure 4. TCP to BSC Statistics Menu

TCPBSC Summary Statistics

Figure 5 below shows selection number 1, the TCP to BSC Summary Statistics.

IFN Ent#	Remote Role	CU/ Host	MNEMONIC Source IP	Destination IP	: Port	#	Type	DEV	CALL ADR	TCP	SVC
=====											
1	SRVR	BASE24	0.0.0.0	0.0.0.0	0	6	ATM	C1/40	tcpbsc0	DIS	down
2	CLNT	BASE24	144.33.8.2	144.33.4.1	1025	8	ATM	C1/40	tcpbsc02	up	up
					2000						

Figure 5. TCP to BSC Summary Statistics

TCP to BSC Detailed Statistics

Figure 6 shows the Detailed TCPBSC Statistics viewed by entry number:

Note

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

After TCP session comes up, “TCP Status:” may display one of the following:

wfda – waiting for “device active” status from the host

wffb – waiting for first data block from the host

wtrd – waiting to resend “device active” status to the host

Node: TCPBSC Address: 2706		Date: 13-AUG-2008 Time: 14:47:43	
Detailed TCPBSC Statistics		CLIENT/BASE24 Page: 2 of 2	
Entry # 2	TCP Status: up	SVC Status: up	
TCPBSC-TCP State: HDR RD		TCPBSC-DSP State: Connected	
Dest IP Addr: 144.33.4.1		Dest Port Num: 2000	
Source IP Addr: 144.33.8.2		Source Port Num: 1025 Source Inf Num: 8	
Remote Type: ATM		CU/DEV: C1/40	
Auto Mnemonic: tcpbsc02		Calling Address Configured: (None)	
Outb FC: ON Inb FC: OFF		Last Outb TCP Seq # Rcv (Hex): 5AF645C7	
Disconnect or Call Req Fail Reason/Sense Code: -----			
	IN	OUT	
DSP Call Request:	0	2	TCP Data Pkts: 268307 134143
DSP Call Accept:	2	0	TCP Data Bytes: 69357613 68008992
DSP Call Reject:	0	0	DSP Turb Data Pkts: 268280 0
DSP Session Disc:	1	0	DSP Data Pkts: 402420 268306
DSP Seq# Resyn'd:	0	0	DSP Data Bytes: 69350380 69625407
DSP Circuit Disc:	0	0	DSP Terminal Stat: 2 0
DSP Invite to Clr:	0	0	DSP Cmd/Rsp Abt: 0 0
DSP Unknown Disc:	0	0	DSP Cmd/Rsp Fwd Abt: 0 0
Max outb blk size from TCP – 512		Max inb blk size from DSP - 512	
Press any key to continue (ESC to exit) ...			

Figure 6. Detailed TCPBSC Statistics

**Reset TCPBSC
Detailed Statistics**

Figure 7 shows Reset TCPBSC Detailed Statistics viewed by entry number. In the Detailed Statistics on this page, all IN/OUT numbers have been reset to zero.

Node: TCPBSC Address: 2706 Date: 13-AUG-2008 Time: 14:47:43
 Detailed TCPBSC Statistics CLIENT/BASE24 Page: 2 of 2

Entry # 2 TCP Status: up SVC Status: up
 TCPBSC-TCP State: HDR RD TCPBSC-DSP State: Connected

Dest IP Addr: 144.33.4.1 Dest Port Num: 2000
 Source IP Addr: 144.33.8.2 Source Port Num: 1025 Source Inf Num: 8
 Remote Type: ATM CU/DEV: C1/40

Auto Mnemonic: tcpbsc02 Calling Address Configured: (None)
 Outb FC: ON Inb FC: OFF Last Outb TCP Seq # Rcv (Hex): 5AF645C7
 Disconnect or Call Req Fail Reason/Sense Code: -----

	IN	OUT		IN	OUT
DSP Call Request:	0	0	TCP Data Pkts:	268307	0
DSP Call Accept:	0	0	TCP Data Bytes:	69357613	0
DSP Call Reject:	0	0	DSP Turb Data Pkts:	268280	0
DSP Session Disc:	0	0	DSP Data Pkts:	402420	0
DSP Seq# Resyn'd:	0	0	DSP Data Bytes:	69350380	0
DSP Circuit Disc:	0	0	DSP Terminal Stat:	2	0
DSP Invite to Clr:	0	0	DSP Cmd/Rsp Abt:	0	0
DSP Unknown Disc:	0	0	DSP Cmd/Rsp Fwd Abt:	0	0
Max outb blk size from TCP - 512			Max inb blk size from DSP - 512		

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

Figure 7. Reset TCPBSC Detailed Statistics

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 TCPBSC Conversion from remote devices are displayed through alarms or sense codes in TCPBSC Detailed Statistics. There are four types of codes. 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 the BSC device:

Nodename 27-JUN-2002 17:04 LU MMCLU002 DISC FROM DSP 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).

Specific Reason Code in TCPBSC Detailed Statistics

The specific reason code is formatted to indicate any possible reason for disconnect from BSC device.

Byte 0

- bits 0-3: always '0000'

- bits 4-7: always '1000'

Byte 1

- bits 0-3: always '1111'

- bits 0-1: '00' - from DSP

'01' - future use

- bits 2-3: '00' - Bytes 2-3 contain Specific Code

'01' - Event is SASD*; byte 2 contains DSP Diagnostic Code and byte 3 contains the Cause Code

'10' - Event is SASCB*; bytes 2 contains Diagnostic Code and bytes 3 contains the Cause Code

'11' - Event is SACD*; bytes 2 and bytes 3 are reserved

Bytes 2 - 3

Specific Code or Diagnostic/Cause Code

Specific Reason Code Summary

The following tables list the Specific Reason Code received by BSC Device:

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 3 contains 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

Error Codes from Networks and Remote Devices

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' - SASCB	SASCB- 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.

Error Codes from Networks and Remote Devices

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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