Vanguard Managed Solutions

Vanguard Applications Ware
SNA Feature Protocols

BSC 3270

Notice

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Overview

Introduction

This document describes the IBM Bisynchronous Communication (BSC) 3270 option for the 6500*PLUS* and Vanguard nodes.

The BSC 3270 feature multiple remote BSC devices to connect to multiple hosts. This connection provides the interface to the host Front End Processor (FEP) and can be accomplished using either native BSC or X.25 to a FEP supporting BSC 3270. Support is provided for up to 32 devices per port and up to 256 devices per node. Configuration flexibility is provided with the ability to support Host PAD (HPAD) or Terminal PAD (TPAD) functionality on different nodes or on different ports on the same node.

Before Using This Manual

Before using this manual you should have experience using IBM or IBM-compatible equipment and should be familiar with Display System Protocol (DSP) and the IBM Binary Synchronous Communication (BSC) protocol.

In This Manual

About IBM BSC 3270

Introduction

The IBM BSC 3270 option is used to connect remote BSC devices to a host site over an X.25 network.

The option provides these capabilities:

- Access for Binary Synchronous Communication (BSC) devices to a BSC host
- Addition of multi-host capabilities to a BSC network
- Replacement of DSP for X.25/DSP applications
- Local BSC polling for reducing overhead network delay
- Printer sharing
- Multiple sessions
- ASCII/EBCDIC support
- Two-way autocalling

General Characteristics

The following summarizes the BSC interface line support:

- Compatibility with IBM BSC 3270 protocol
- Support for IBM BSC cluster controllers (3174, 3274, or 3276)
- Host BSC line support (single-line interface)
- Point-to-point and multipoint
- FDX/HDX support for EIA control of half-duplex modems
- Internal/external clocks
- Compatibility with IBM DSP protocol

Message Size Limitation

An error may occur when 3270 BSC handles large message sizes. If a host sends a message that is larger then the 254 characters allowed in a block, when transmitted on the TPAD end, the first block ends with the End of Text Block (ETB). Once there is an acknowledgment received for the first block, the TPAD sends a End of Transmission (EOT) before sending the second block, which ends the message, and has the BSC controller write to the device. This causes an error in some applications as it is expecting the whole message in multiple blocks before the EOT.

IBM BSC 3270 Related Documentation

For additional information concerning BSC 3270 supported messages and responses, refer to this document:

IBM 3270 Information Display System Component Description,
Publication Number GA 27-2749-7

BSC 3270 Option CSKs

Introduction

To use some of the features available with BSC 3270, you may need to enter a CSK (Customer Software Key), from the Control Terminal Port (CTP).

Entering a CSK

Complete this procedure to enter a CSK and refer to the following table for the appropriate CSK number.

Step	Action
1	Select Configure from the Main menu.
2	Select Software Key Table from the Configure menu.
3	Select a new entry at the Entry prompt.
4	At the Key Value prompt, enter the 20 character code, followed by a semi-colon (;) to save the CSK.

BSC 3270 CSK Numbers

This table contains a list of all BSC 3270 option CSKs:

Function	CSK	Added Functionality
Slow Poll CSK	49VF5V96CVCCMZQ6TAM	BSC 3270 TPAD sends the Poll to the device service timer when the SVC is not established. This is effective only when the CESS port option is configured.
BSC-IBM 2260 Conversion	7KLBPLEW7RFNQEWFBTBE	Enables an IBM 2260-to-BSC 3270 protocol conversion feature.
BSC 3270 Sync Fill Suppression	UAGV8U78E6LT35YWTL36	Suppress the SYNC filling between the buffers in a multi buffer packet on any BSC 3270 port.
BSC 3270 S/W EIA Strap for CTS	3VSW44B6FZR6TZNLGVMX	Forces the CTS HIGH on all BSC 3270 ports. CTS goes HIGH when the port is booted or enabled.
Support EPAD (FFh) in Normal Text Messages	LBF9D92CCHDACR8XRZ5D	Effects all CTP messages. The COP driver supports the EPAD (FFh) in normal text message. **Note** This CSK is for all ports using COP drivers.

Examining the CSK

Once you have entered the CSK, examine the port to verify the CSK value.

Step	Action
1	Select Examine from the Main menu.
2	Select Software Key Table from the Examine menu.
3	At the Entry prompt, type in the entry number used above in Step 3, “Entering a CSK.” The CSK appears.
4	Compare the displayed CSK against the above list, to verify that you have entered it correctly.

BSC 3270 Operation

Introduction

The BSC 3270 option lets you connect multiple remote BSC devices to multiple hosts. This connection provides the interface to the host Front End Processor (FEP) and can be accomplished using either native BSC or X.25 to an FEP supporting IBM BSC 3270. Support is provided for up to 32 devices per port and up to 256 devices per Vanguard node.

The number of Cluster Control Units (CCUs) depends on the number of devices configured per cluster controller. Speeds for BSC lines from 1.2 kbps to 19.2 kbps are supported. Host PAD (HPAD) or Terminal PAD (TPAD) functionality can be supported on different nodes or on different ports on the same node, providing configuration flexibility.

X.25 Connection

Vanguard devices use a full-duplex, point-to-point circuit as a physical transmission path to the Public Data Network (PDN), or to other equipment that adheres to the X.25 procedures defined by the 1980 and 1984 versions of the CCITT X.25 Specification.

Because most X.25 network equipment have a DCE appearance, the node is normally set to exhibit an X.25 DTE logical appearance on the X.25 trunk. When interconnecting the node to some types of network equipment, you may have to set up the node to operate as an X.25 DCE. In addition to the DTE or DCE logical appearance setting, the node allows you to tune the trunk parameters (frame window, packet window, and so on) to match the characteristics of the X.25 network.

Packet Description

Data transmitted over the X.25 trunk is in packet form. The node does not change or rearrange data received from a device. Rather, it assembles received characters into packets and disassembles received packets into characters.

Networks normally support packets containing a maximum of 128 bytes of user data as a standard default packet size. However, some networks handle a larger default packet size. For example, the normal arrangement for the Canadian DATAPAC network is 256–byte packets. The node can support 128–, 256–, 512–, and 1024–byte packets for incoming and outgoing packets. Facilities are available to allow negotiation for packet sizes different from the default size.

The number of characters in a packet can vary up to the maximum packet size, depending on the amount of data sent to the node by the device. For BSC connections, the node forwards a data block to the network using one or more packets. That is, upon receipt of a complete BSC data block, the node forwards as many packets as needed to accommodate the complete BSC data block. If the data block size exceeds the packet size, the M-bit is set to indicate a continuation of the data block.

Synchronous Device Support

The primary application of the IBM BSC 3270 option in the Vanguard Applications Ware SNA License is to support BSC-mode 327x cluster controllers over an X.25 network. Mainframe sites that support BSC 3270 protocol for remote devices may have varying configurations of hardware and applications software, yet the DSP 3270 support requirements remain constant, with only minor exceptions.

You can configure the node to support a variety of applications, subject to these maximums:

- 256 devices per node
- 32 devices per HPAD or TPAD line
- Up to a maximum of 32 devices for each controller

You may need a CCU to support BSC communications. The Partitioned Emulation Program (PEP) and Emulation Program (EP) IBM software products provide the CCU with BSC support.

An advantage of CCUs with EP or PEP installed is that the two or more configuration changes (such as line type or line speed) may be programmed instead of hardwired. This allows the network programmer to make configuration changes.

Note

EP is only used with Basic Telecommunications Access Method (BTAM) and non-Advanced Communications Function (ACF) Telecommunications Access Method (TCAM). PEP can be used with ACF/Virtual Telecommunications Access Method (VTAM) and ACF/TCAM.

EP and PEP support both synchronous and asynchronous protocols. The BSC PAD is only used with the 3270 BSC Protocol. The Asynchronous PAD provides asynchronous device support for IBM mainframes with IBM Network Terminal Option (NTO) software.

Basic Telecommunications Access Method

Basic Telecommunications Access Method (BTAM) supports synchronous and asynchronous protocols. Your mainframe's application programs must conform to IBM 3270 BSC protocol details. For example, the applications must be familiar with polling and error recovery.

The major limitation of BTAM is that each EIA-232-C link can access only one BTAM application at a time.

In addition. BTAM does not provide or cause any error recovery when a BSC controller sends an Intervention Required (IR) status for a device that has malfunctioned or been disconnected. When the terminal is repaired or reconnected and the remote cluster controller clears the IR status with a Device End (DE), the device is host-application dependent. These events may occur:

- You may receive a sign-on screen (that is, the host application detected the disconnection and logged off the prior user).
- You may return to the activity (or screen) from which the prior user was disconnected (for example, the host application did not perform any function when the prior user was disconnected).

Telecommunications Access Method

One characteristic that distinguishes Telecommunications Access Method (TCAM) from other access methods is the way TCAM uses the BSC Reverse Interrupt (RVI) to control input from the cluster controllers. The IBM BSC 3270 port fully supports the TCAM characteristic.

Several other characteristics distinguish TCAM from BTAM:

- TCAM is responsible for polling and managing the network, and insulating the application programs from directly supporting the device-dependent functions.
- When applications transmit data through TCAM, the data is queued onto disk. TCAM processes the queued requests sequentially and delivers the data to the application or device.
- TCAM provides line sharing between applications. Users on a communications line may access a set of application programs on a single host.

Virtual Telecommunications Access Method

Virtual Telecommunications Access Method (VTAM) provides support for BSC applications. VTAM/Network Control Program (NCP) supports the SNA/SDLC network. PEP has to be installed in the FEP to support the BSC interface requirement.

These features are required for BSC support:

- VTAM provides line sharing between applications and is subject to PEP limitations.
- NCP is responsible for polling and network control. NCP allows the mainframe to perform application-related processing.

Remote equipment can access the mainframes through an IBM FEP with EIA-232-D (V.24), V.35, X.21, and RS-530 connections. When you add Vanguard products to a BSC network, the remote equipment benefits from X.25 connections.

Hardware Flow Control

To handle hardware flow control with character-oriented protocols on an EIA232 port, the port must have an external clocking source to control data transmission flow. BSC 3270 does not have the hardware flow control auto-enable feature that is required by character-oriented protocols.

Configurations Supported

Introduction

Figure 1 shows the configuration supported. Both combinations of DSP and BSC are supported by Vanguard devices as follows:

- BSC out of the FEP into an HPAD connected through the network to a TPAD running BSC to a controller.
- DSP out of the FEP connected through the network to a TPAD that runs BSC to a cluster controller.

Network Configuration

Figure 1 shows a typical BSC 3270 network:

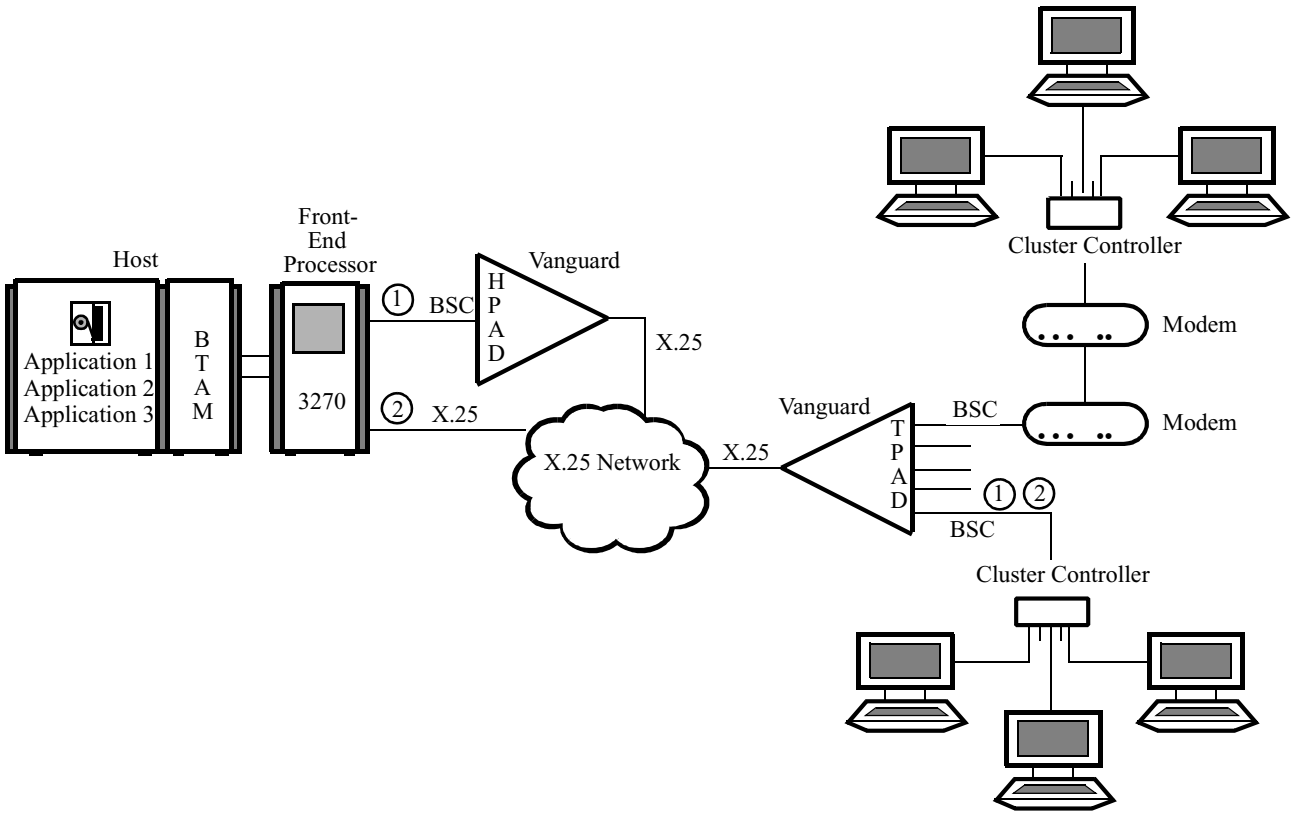


Figure 1. Network Using BSC 3270 Communication

Copying Configurations

When configuring large number of BSC 3270 devices with similar parameters, you can configure the first device and copy the configuration to subsequent devices in the network. However, you must first configure desired number of BSC 3270 devices in the Port Record.

After copying the configuration, you can change only the parameters that are different for each device. Since multiple devices can not have the same address, only one parameter *must* be changed. See “BSC Device Address” on page 46.

BSC Line Operation

Introduction

The transport of BSC 3270 data between nodes is done using the industry standard DSP protocol over X.25 links. DSP implementation is fully documented by several carriers, including Telenet, Tymnet, and Datapac. Other proprietary implementations are incompatible with all but the supplying vendor's X.25 equipment.

FEPs provide the BSC lines for connecting remote cluster controllers. The FEP provides network control for all remote lines connected to the FEP. In addition, the NCP supervises other programs residing in the FEP, such as those providing DSP. When configuring a new line for remote equipment support, you must ensure that BSC 3270 device table entries are defined with information relevant to the line, such as line speed and type, number of controllers and destinations, and their addresses.

The implementation of the BSC 3270 protocol conforms to standard line operation sequences defined by IBM's BSC 3270 protocol.

When connecting a node to a host line, the configuration of the node should match the SYSGEN provided by the host site. SYSGEN is short for generation of the table that includes the definitions of line and device characteristics. In general, you may not be required to modify an existing SYSGEN.

Example of Poll Response

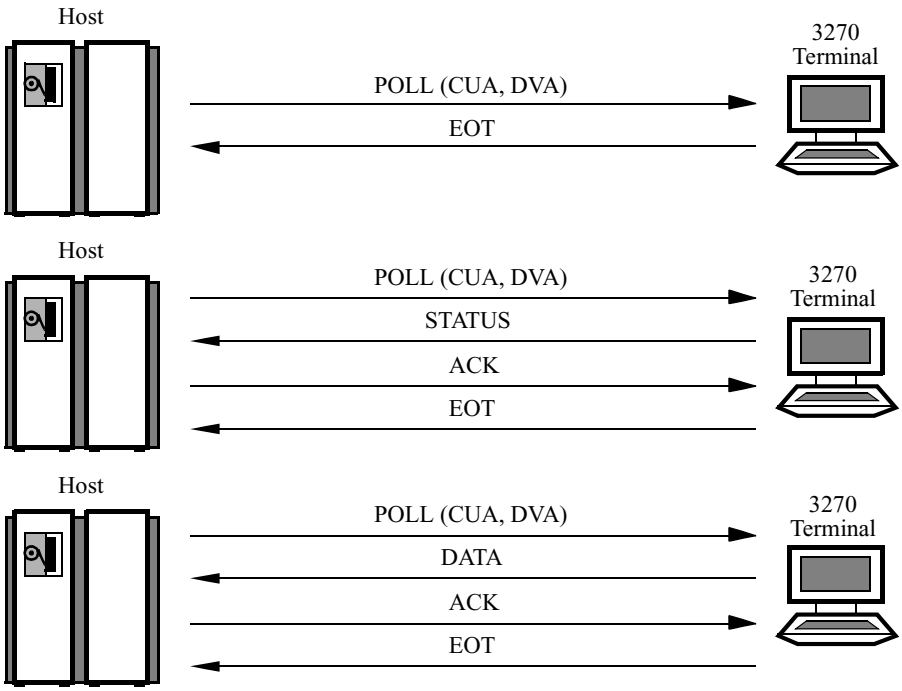
This table explains the messages that a terminal may respond with when polled. Figure 2 illustrates these messages.

Message	*Description*
EOT (End of Transmission)	This terminal response indicates that it has no information to send.
STATUS	This terminal response indicates that a two-byte status information message is being sent.
DATA	This terminal response indicates that it is sending a single- or multi-block message.

Each block of this message ends in ETB, while the final block ends in ETX. Each block is acknowledged by the host. When the terminal has no more information to send, it sends EOT.

Note

For additional information on BSC 3270 supported messages and responses. refer to the *IBM 3270 Information Display System Component Description,* Publication Number GA 27-2749-7.

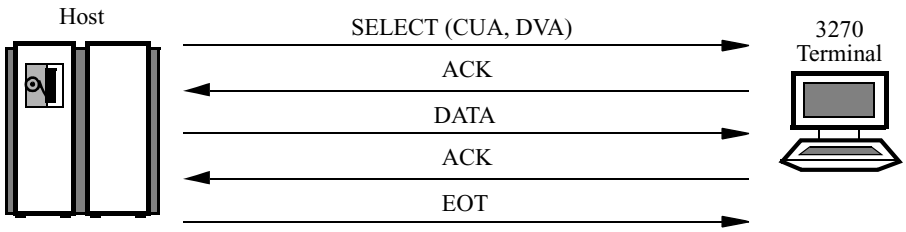


Note: CUA=Control Unit Address
DVA=Device Line Address

Figure 2. BSC Line Operation – Response to a Poll

Example of Host Selection

Figure 3 shows a host with data to send to a terminal. The host selects the terminal and then sends the command data to the terminal. Each transmission is acknowledged by the terminal, and the host signals the end of the sequence by transmitting an EOT.



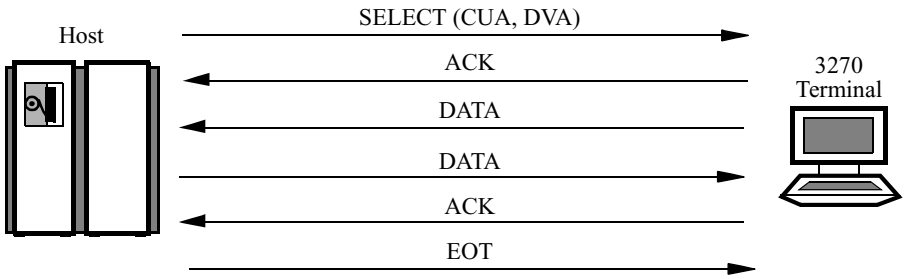
Note: CUA=Control Unit Address
DVA=Device Line Address

Figure 3. BSC Line Operation - Selection by a Host

Example of Limited Conversational Mode

In one mode of exchange, called Limited Conversational Mode (LCM), the host sends a command to a terminal that causes the terminal to respond with data. The host in this case sends a block of data representing a read command.

Figure 4 shows the sequence of exchange. The terminal implicitly acknowledges the host data (the read command) by sending its own data block and from that point on, the acknowledgments come from the host. LCM is supported with the READ and READ MODIFY commands.



Note: CUA=Control Unit Address
DVA=Device Line Address

Figure 4. Limited Conversational Mode

DSP Link Operation

Introduction

Both point-to-point and multipoint lines are supported, allowing up to 32 cluster controllers to be configured on one HPAD or TPAD line.

Either the Host or Terminal PAD can be configured to initiate the call. Each session established between a device in the TPAD and a device in the HPAD requires a separate virtual circuit. The configuration of devices and controllers in the TPAD and HPAD is independent and does not have to be in a one-to-one relationship.

During normal operation, all commands from the host and responses from the terminals are passed transparently through the node. The node is only responsible for maintaining the normal BSC polling sequences to the cluster controller(s) and normal BSC responses to the host(s).

Point-to-Point Example

Figure 5 shows point-to-point operation. Multiple cluster controllers spread out geographically can be connected to a host on a single line interface.

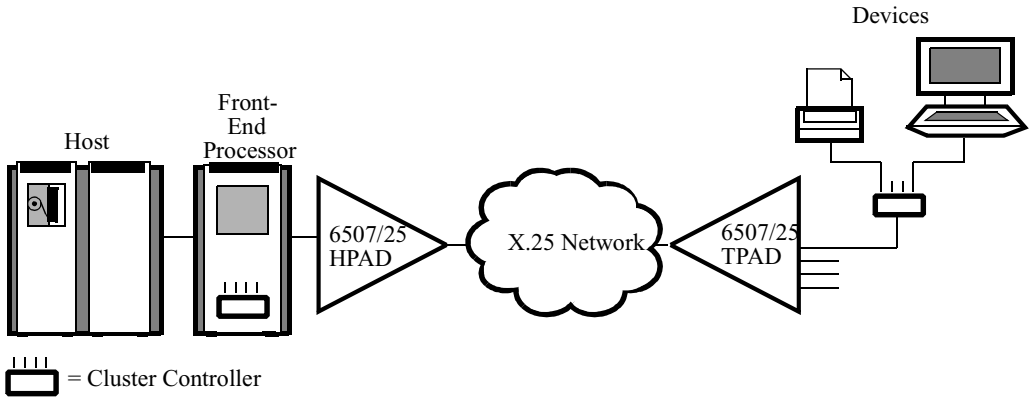


Figure 5. Point-to-Point Operation

Multipoint Examples

Figure 6 shows multipoint operation.

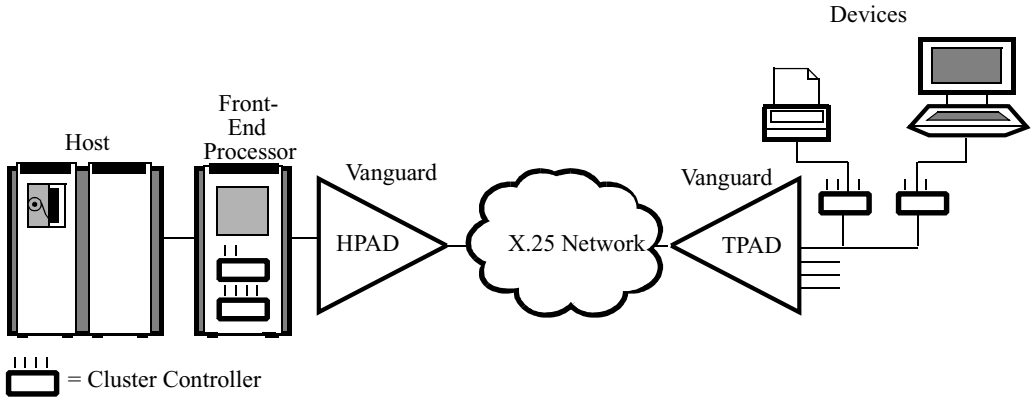


Figure 6. Multipoint Operation With One Host

Figure 7 shows an application with multiple hosts. Multiple cluster controllers spread out geographically can be connected to a host on a single line interface.

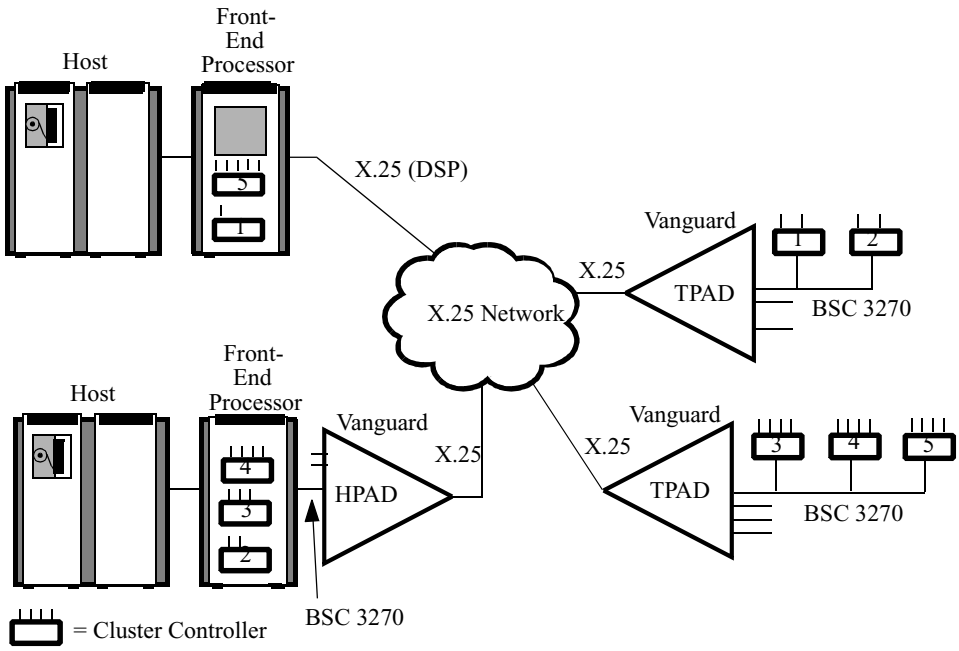


Figure 7. Multipoint Operation With Multiple Hosts

Call Establishment

Introduction

This section explains the requirements for establishing a call connection between a host and a terminal using a Switched Virtual Circuit (SVC).

Requirements for Incoming Calls

There are two requirements that must be met for a device the HPAD or TPAD to accept incoming calls.

- When the device is configured to receive the call, the call is accepted only if the HPAD has been polled by the host and the TPAD has received a response from that device to a poll.
- The DSP protocol Connection Request Mode (CRM) in the call packet must match the value configured in the destination device record.

For call connections to an FEP running DSP, the CRM parameters in the call sent by the TPAD must match the device parameters in the FEP configuration for the X.25 line. When a device on the HPAD connects, the HPAD responds to the next general poll for that device controller with a device end status. When a device on the HPAD disconnects, the HPAD responds to the next general poll for that device controller with a device intervention required status.

Network or TPAD Clears Call

A call clear may be received from the network at any time. When a call clear is received, the HPAD informs the host by responding to the next poll with an intervention required status for the device. When a terminal operator on a TPAD uses the call clear command (by using the user-configured function key) at his terminal, the TPAD sends an Invitation To Clear message to the HPAD which in turn issues the X.25 call clear.

HPAD Clears Call

A call may be cleared automatically by the HPAD if the HPAD does not receive a poll from the host within a timeout period.

Two-Way Auto Calling

The two-way auto calling feature means that the call connection can be established from either the DSP (host) or TPAD (terminal) side. The host is a part of your network, and the TPAD port is on a 6500*PLUS* or Vanguard node. The TPAD can be connected to only one device.

Connection Establishment

After a node boot, power recycle, port boot, or call clear (where call clear is not initiated by TPAD), the TPAD is idle. The TPAD starts polling after the host establishes the first X.25 connection. You must configure the Controller and Device addresses of the attached host device on the Vanguard at the TPAD side so that the addresses can be matched and the port identified.

The TPAD responds to the call packet with call accept and the **Circuit Enabled DSP** message, and starts the Idle Timer on call establishment. The Idle Timer is restarted every time data is transferred between host and TPAD. The link is disconnected by the TPAD when the Idle Timer expires, and the TPAD continues to poll the device.

Reestablishment of the connection can be initiated by host or TPAD.

The host starts a timer after the call is cleared by the TPAD. The host makes a call to the TPAD when this timer expires, and the TPAD responds with call accept and the **Circuit Enabled DSP** message. The host restarts the same timer on call failure and retries on timer expiration.

Device Polling

The TPAD continues to poll the device even after it brings down the X.25 call on Idle Timer timeout. While polling, if the TPAD has data to forward, the TPAD makes a call request. The HOST responds with call accept and the **Circuit Enabled DSP** message. If a call attempt fails, it is retried every “Autocall Timeout” for “Maximum Number of Autocall Attempts”. The range for “Autocall Timeout” is 5 to 255 seconds and the range for “Maximum Number of Autocall Attempts” is 0 to 255 (0 means unlimited attempts). When the call retry limit is reached, retry is discontinued and the polling of the device stops. A call request from the host and acceptance by the TPAD restarts polling of the device.

Polling the ATM Device

The TPAD does not poll the device after node boot, power cycle, TPAD port boot, or on receiving a call clear. It waits for the host to establish the connection. The call establishment starts the polling, and polling continues even after the TPAD disconnects the call on Idle Timer timeout.

The TPAD stops polling when the “Maximum Number of Autocall Attempts” is reached, or when the host sends the **Circuit Disconnect DSP** message, or on restart (node boot, power recycle, or port boot).

BSC 3270 Node Record

What You See in This Record

The Node Record contains parameters that define the BSC 3270 characteristics for the node. It includes many key values, including node name, address, alarm thresholds, and timers.

Figure 8 shows the parameters in the BSC 3270 Node Record.

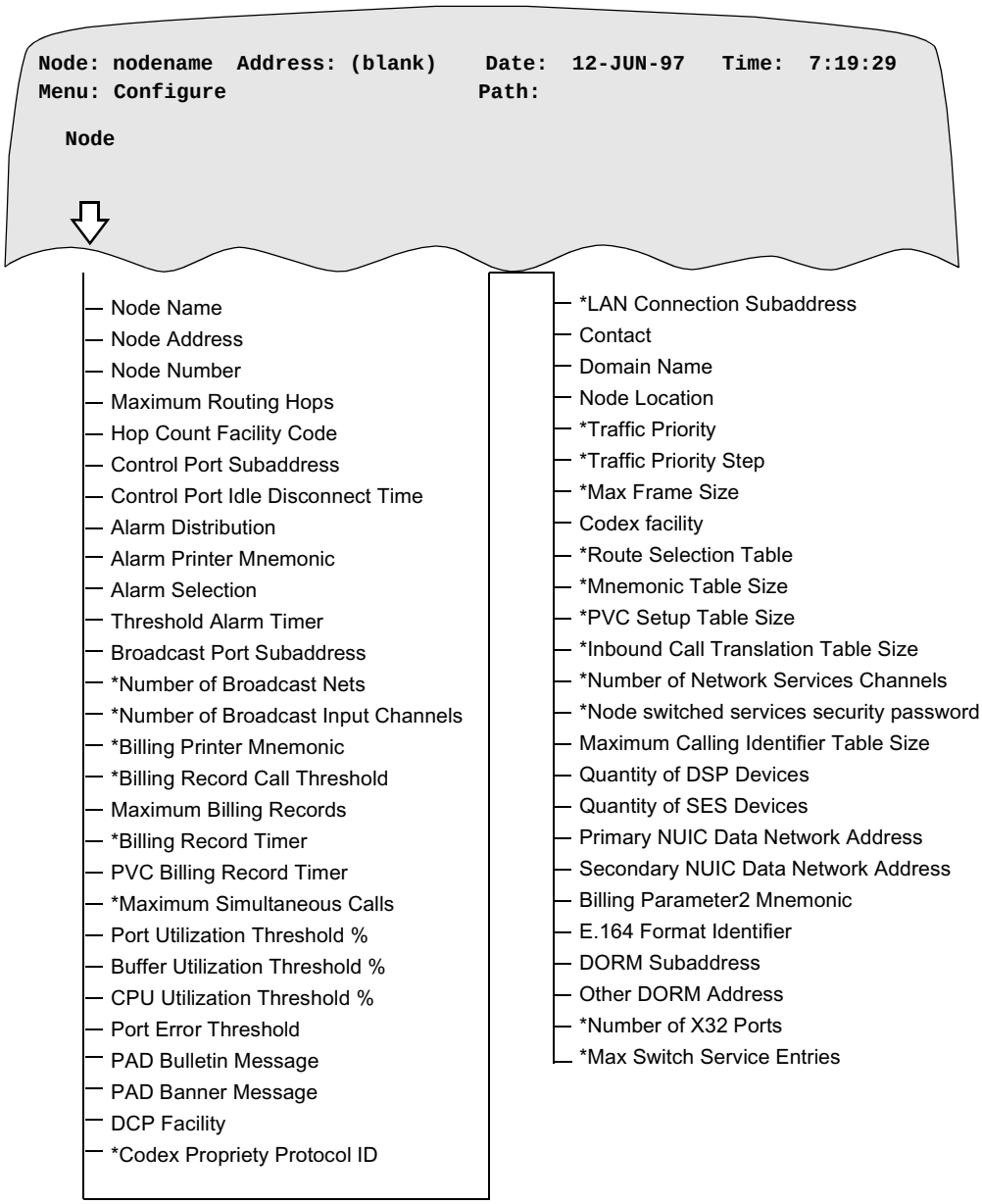


Figure 8. BSC 3270 Node Record Parameters

Configuring the Node Record

Before You Begin

Before you can configure parameters, you must log on to the local node's Control Terminal Port.

Steps to Configure the Node Record

Follow these steps to access the Node Record:

Step	*Action*	*Result*
1	From the CTP Main menu, select **Configure**.	The Configure menu appears.
2	Select **Node** from the Configure menu.	The first parameter appears: Node Name, as shown in Figure 8.
3	Enter parameter values, and press **;** when you finish.	This saves your changes to the Node record.
4	Press **<ESC>**.	The Configure menu appears.

Implementing Changes to Record Parameters

Follow these steps to implement changes to a record after entering parameter values:

Step	*Action*
1	Select **Boot** from the CTP Main menu.
2	Select **Table and Node Record** from the Boot menu.
3	Select **<y>** when the **Boot Configuration Table and Node Record Proceed <y/n>** prompt appears.
4	Press **Esc** to return to the CTP Main menu.

Node Record Parameters

Introduction

This section describes the Node Record parameters. Any parameter preceded by an asterisk (*) requires a Node Boot to implement changes.

Note

If you have enabled Ease of Configuration, you need to boot only the port to make changes to the parameters marked with an asterisk. For more information, refer to the Ease of Configuration section in the introductory portion of the binder (*SNA Feature Protocols Manual,* Part Number T0101).

Parameters

These are the Node Record parameters:

Node Name

Range:	0 to 8 alphanumeric characters
Default:	Nodename
Description:	Specifies the node name inserted into all alarms generated by the node to identify which node generated the alarm when it was sent to a remote destination.

Node Address

Range:	0 to 13 decimal digits
Default:	Blank
Description:	Specifies the main part of the network address for calls destined within the node. Individual subaddresses specify the exact destination. **Note** Use the space bar to blank this field.

Node Number

Range:	0 to 65535
Default:	0
Description:	Specifies the number that uniquely identifies this node for network routing. Every node in the network should have a unique number.

Maximum Routing Hops

Range:	2 to 15
Default:	15
Description:	Specifies the maximum number of inter-node links through which a call can pass before reaching its destination.

Hop Count Facility Code

Range:	200 to 254
Default:	200
Description:	Specifies the facility used in call packets on X.25 links with the inter-node link option for network routing. This should be the same in all nodes on the network and should only be changed if it interferes with another private network facility.

Control Port Subaddress

Range:	0 to 3 decimal digits
Default:	98
Description:	Specifies the control port in this node to which calls with a network address composed of the node address and this subaddress are routed.

Control Port Idle Disconnect Time (minutes)

Range:	1 to 255
Default:	10
Description:	Specifies the amount of idle time that can pass before the connection is terminated.

Alarm Distribution

Range:	NONE, CTP, PRIN
Default:	CTP
Description:	Specifies distribution of alarms: • NONE: No alarm is sent. • CTP: Sends alarms to the CTP. • PRIN: Sends alarms to Printer Distribution. **Note** Any combination of these options can be summed, for example, CTP+PRIN.

Alarm Printer Mnemonic

Range:	0 to 8 alphanumeric characters
Default:	blank
Description:	Used to call and send alarms, if Alarm Distribution specifies PRIN. This location is usually a printer used to print network alarms.

Alarm Selection

Range:	NONE, HIGH, MED, CONN, LOW, CODE
Default:	HIGH
Description:	Selects the type of alarm reporting used by the node. • NONE: No alarms are reported. • HIGH: High severity alarms reported. • MED: Medium severity alarms reported. • LOW: Low severity alarms reported. • CONN: Connection alarms reported. • CODE: Alarms from Codex 6000 communication processors reported. **Note** Any combination of these options can be summed, for example, HIGH+CONN.

Threshold Alarm Timer (minutes)

Range:	15 to 255
Default:	15
Description:	Specifies the time (in minutes) to wait before generating the same alarm twice.

Broadcast Port Subaddress

Range:	0 to 3 BCD digits
Default:	95
Description:	Specifies routing to the broadcast port in this node of calls with a network address composed of the node address and this subaddress. No routing table entries are needed.

*Number of Broadcast Nets

Range:	0 to 100
Default:	0
Description:	Specifies the supported number of broadcast nets. A value of 0 disables broadcast functions.

*Number of Broadcast Input Channels

Range:	0 to 10
Default:	1
Description:	Specifies the number of simultaneous call connections permitted to a broadcast port at any one time.

*Billing Printer Mnemonic

Range:	0 to 8 alphanumeric characters
Default:	Blank
Description:	Specifies the printer mnemonic called when printing billing records.

*Billing Record Call Threshold

Range:	1 to 99
Default:	10
Description:	When the number of billing records queued equals this threshold value, a call is placed to the logging device to dump the billing records.

Maximum Billing Records

Range:	0 to 512
Default:	100
Description:	Specifies the maximum number of billing records that can be stored before printing. All records created after this maximum value is reached are lost.

*Billing Record Timer (minutes)

Range:	0 to 65535
Default:	0
Description:	Specifies the period of time (in minutes) that billing records are stored before being printed.

PVC Billing Record Timer (minutes)

Range:	0 to 65535
Default:	0
Description:	Specifies the interval during which billing records are gathered and printed for all PVCs in the node that have Billing enabled.

*Maximum Simultaneous Calls

Range:	1 to 2000
Default:	100
Description:	Limits the number of calls allowed in the node to prevent data loss during heavy traffic conditions.

Port Utilization Threshold (%)

Range:	10 to 99
Default:	75
Description:	Generates a medium severity alarm if the number of data characters per second divided by the port capacity exceeds this percentage.

Buffer Utilization Threshold (%)

Range:	10 to 99
Default:	75
Description:	Generates a medium severity alarm if the number of data buffers in use exceeds the total available.

CPU Utilization Threshold (%)

Range:	10 to 99
Default:	75
Description:	Generates a medium severity alarm if the CPU usage for processing communications exceeds this percentage.

Port Error Threshold

Range:	1 to 255
Default:	10
Description:	Generates a medium severity alarm if the number of CRC errors on links, or parity errors on ASYNC ports exceeds this number.

PAD Bulletin Message

Range:	0 to 255 alphanumeric characters
Default:	Blank
Description:	Specifies the message sent by PAD ports to terminals when they enter the command mode.

PAD Banner Message

Range:	0 to 63 alphanumeric characters
Default:	“M” J VANGUARD (node %N) port %P(%C)”M”J
Description:	PAD ports send this message to terminals when they enter the command mode.

DCP Facility

Range:	201 to 254
Default:	201
Description:	Defines the facility used to carry DCP information at call setup and reconnection time (in Call Request and Call Accept packets) through a 6500 network.

*Codex Propriety Protocol ID

Range:	192 to 255
Default:	192
Description:	This value is put in the first byte of the Protocol Identifier field of the CUD in Call Request packets for protocols that have not been assigned a standardized value by CCITT.

*LAN Connection Subaddress

Range:	0 to 3 decimal digits
Default:	94
Description:	Specifies routing to a LAN Connection in this node for calls with a network address composed of the node address and this subaddress.

Contact

Range:	0 to 255 alphanumeric characters
Default:	Blank
Description:	Identifies the contact person for this managed node.

Domain Name

Range:	0 to 255 alphanumeric characters
Default:	Blank
Description:	Identifies the administratively assigned name for this managed node.

Node Location

Range:	0 to 255 alphanumeric characters
Default:	Blank
Description:	Identifies the physical location of this node.

*Traffic Priority

Range:	LOW, MED, HIGH, EXP
Default:	MED
Description:	Specifies the default traffic priority used on the node.

*Traffic Priority Step

Range:	1 to 65000
Default:	8
Description:	Specifies the number of packets to be transmitted for each lower priority packet transmitted.

*Max Frame Size

Range:	1620, 2200, 4096, 4590
Default:	2200
Description:	Specifies the largest permissible datalink level frame received on any LAN/WAN link on the node, excluding trailers. An extra 70 bytes is added to this frame for header manipulations. **Note** *Do not change this value without first consulting Vanguard Managed Solutions.*

Codex Facility

Range:	202 to 254
Default:	202
Description:	Represents the facility used in call packets on 6500 links for facilities between 4.xx nodes. Configure this parameter value should be the same on all network nodes. **Note** Change this parameter only if it interferes with another private network facility.

*Route Selection Table

Range:	1 to 1024
Default:	16
Description:	Specifies the maximum number of Route Selection Table entries. The CMEM value for this parameter determines the maximum entry number for new CMEM table entries. It may be necessary to increase the size of this parameter value before adding new table entries.

*Mnemonic Table Size

Range: Range - 7300:	1 to 2000 Vanguard 7300 Series maximum Mnemonic Table Size has been increased from 2,000 to 8,000 with release 6.0.P02B and greater.
Default:	16
Description:	Specifies the 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.

*PVC Setup Table Size

Range:	1 to 1024
Default:	16
Description:	Maximum permitted number of PVC Setup 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.

*Inbound Call Translation Table Size

Range:	1 to 1000
Default:	64
Description:	Specifies the maximum number of Inbound Translation Table entries. The CMEM value for this parameter determines the maximum number of new CMEM table entries. It may be necessary to increase the value of this parameter before adding new table entries.

*Number of Network Services Channels

Range:	1024 to 10,000 (0-10000 for Vanguard 300)
Default:	1024 (256 for Vanguard 300)
Description:	Specifies the number of Network Services Channels available.

Node Switched Services Security Password

Range:	0 to 9 alphanumeric characters; Use the space character to blank the field.
Default:	(blank)
Description:	Used by Switched Services security for verification when determining if a call is activated.

Maximum Calling Identifier Table Size

Range:	1 to 512
Default:	255
Description:	Specifies the maximum number of entries in the Calling Party ID Table Record (located under the Configure Network Services Record described in the *Bandwidth Management* manual, Part No. T0108). **Note** Boot the node to implement changes to this parameter.

*Quantity of DSP Devices

Range:	1 to 1024
Default:	65xx: 256 Vanguard 100: 16 Vanguard 200: 256 Vanguard 300: 32
Description:	Specifies the maximum configured number of SES-type devices on this node. Set this value close to the actual number of devices configured in the node, since each device allocated consumes a data buffer whether or not the node has an associated device.

*Quantity of SES Devices

Range:	1 to 1024
Default:	65xx: 256 Vanguard 100: 4 Vanguard 200: 256 Vanguard 300: 16
Description:	Specifies the maximum configured number of SES-type devices on this node. Set this value close to the actual number of devices configured in the node, since each device allocated consumes a data buffer whether or not the node has an associated device. **Note** This parameter only applies to BSC 2780.

Primary NUIC Data Network Address

Range:	0 to 15 decimal digits
Default:	Blank
Description:	Specifies the Data Network Address of the primary NUIC. All NUIC requests are first submitted to the primary NUIC.

Secondary NUIC Data Network Address

Range:	0 to 15 decimal digits
Default:	Blank
Description:	Specifies the Data Network Address of the secondary NUIC. All NUIC requests are submitted to the secondary NUIC in case the primary is not reachable.

Billing Parameter2 Mnemonic

Range:	0 to 8 alphanumeric
Default:	Blank
Description:	Specifies the mnemonic that the node uses to send billing records to this alternate destination.

E.164 format identifier

Range:	0 to 5 decimal digits
Default:	09
Description:	Addresses beginning with these digits are identified as E.164- format addresses.

DORM Subaddress

Range:	0 to 3 decimal digits
Default:	91
Description:	Specifies routing to a DORM in this node for calls with a network address composed of the node address and this subaddress.

Other DORM Address

Range:	0 to 15 decimal digits
Default:	Blank
Description:	Specifies the DNA of the other DORM in this network. **Note** If there is only one DORM, you need not configure this parameter.

*Number of X32 Ports

Range:	1 to 1024
Default:	50
Description:	Specifies the total number of X.32 dial-out ports in this network.

*Max Switch Service Entries

Range:	1 to 1024
Default:	200
Description:	Specifies the maximum allowed number of Switched Services entries. The CMEM value for this parameter determines the maximum number of new CMEM table entries. It may be necessary to increase the value of this parameter before adding new table entries.

Copying Device Records

Introduction

When configuring large numbers of BSC 3270 devices, on one physical Port, that have similar parameters, you can configure the first device and then copy the configuration to all subsequent devices. This process lets you complete repetitive configurations quickly and easily.

After copying you can only modify those device-specific parameters that are different from the ones copied.

Note

After copying the device records, you must change the BSC Device Address for each device that was copied since different devices can not have the same address.

Copying Records

This table describes how to copy records from one port device to another:

Step	Action	Result
1	Select Copy/Insert Record from the Main menu, and press Return.	The Copy/Insert Record menu appears.
2	Select Copy BSC/DSP3270 Device from the Copy/Insert Record menu, and press Return.	The Port Number prompt appears.
3	Enter the Port Number for the physical port you are connected to, and press Return.	The Source Device Number prompt appears.
4	Enter the Source Device Number, and press Return. This could be any configured device on the selected port.	The Destination Device Number prompt appears.
5	Enter the Destination Device Number, and press Return. This is the device number that you want to copy the configuration to.	This message appears: **Warning: Device BSC3270-1d## is already in configuration memory and will be overwritten.** **Proceed ? (y/n):**
6	Answer Yes to this prompt, and press return.	The Destination Device Number prompt for the next sequential device appears. This gives you the opportunity to copy the configuration from one device (on the same port) to as many devices as you have configured in the Port Record.
7	Change the BSC Device Addresses for each device copied.	
8	Preform a Port Boot.	The changes take effect.

Copy BSC/ DSP3270 Device Parameters

Figure 9 shows the parameters available from the Copy BSC/DSP 3270 Device option.

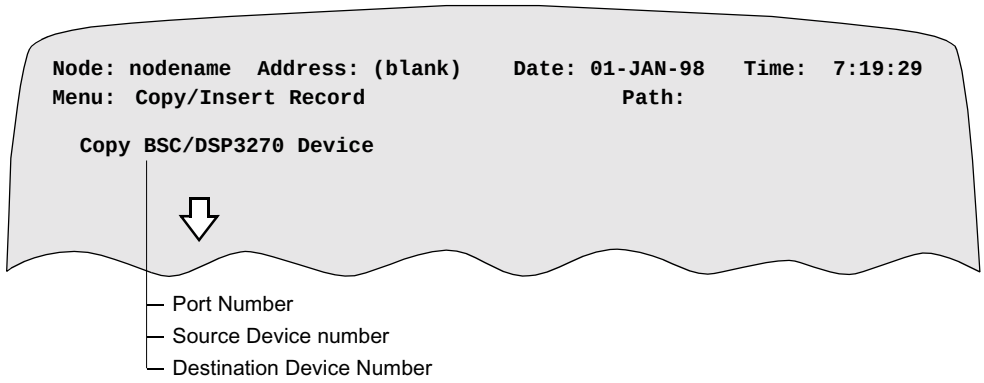


Figure 9. BSC 3270 Copy Device Record Configuration Parameters

Parameters

These tables describe the parameters available when configuring your Vanguard to copy configurations from one device to another. When an asterisk appears beside a parameter, a Node Boot is needed for any changes to that particular parameter to take effect:

Port Number

Range:	Platform dependent
Default:	1
Description:	Specifies the number corresponding to the physical port position at the rear of the unit.

Source Device Number

Range:	1 to 255
Default:	1
Description:	Specifies the number of the device on a multidrop line, from which the configuration is copied. **Note** The maximum allowable value for this parameter is dependent on the “*Number of Devices* configured for the port.

Destination Device Number

Range:	1 to 255
Default:	1
Description:	Specifies the number of the device on a multidrop line to which the configuration is copied. **Note** The maximum allowable value for this parameter is dependent on the "*Number of Devices* configured for the port.

BSC/DSP 3270 Device

Introduction

This section describes how to Enable or Disable a BSC/DSP 3270 device.

Enabling a Device

To enable a BSC/DSP 3270 Device:

Step	Action
1	Select Port/Station/Channel Control from the Main menu.
2	Select Enable BSC/DSP 3270 Device from the Port/Station/Channel Control menu.
3	Enter the number of the port to configure. ■ Note This number corresponds to the physical port position at the rear of the unit and is the Port Record reference number.
4	Press Return. ■ Note Enabling/disabling a device does not require a Port Boot to take effect. A device is enabled/disabled immediately after pressing Return.
5	Enter the Device number. ■ Note This is the number of the device on a multi-drop line.
6	Press any key to exit the menu.

Disabling a Device

Disabling a BSC/DSP 3270 device causes a TPAD to stop polling the device thereby disabling it instantly. This table describes how to disable a BSC/DSP 3270 device:

Step	Action
1	Select Port/Station/Channel Control from the Main menu.
2	Select Disable BSC/DSP 3270 Device from the Port/Station/Channel Control menu.
3	Enter the number of the port to configure. ■ Note This number corresponds to the physical port position at the rear of the unit and is the Port Record reference number.
4	Press Return.
5	Enter the Device number. ■ Note This is the number of the device on a multi-drop line.
6	Press any key to exit the menu.

BSC 3270 Port Record

What You See in This Record

The Port Record contains parameter values that define a port's BSC 3270 characteristics.

Figure 10 shows the parameters available from the BSC 3270 Port record.

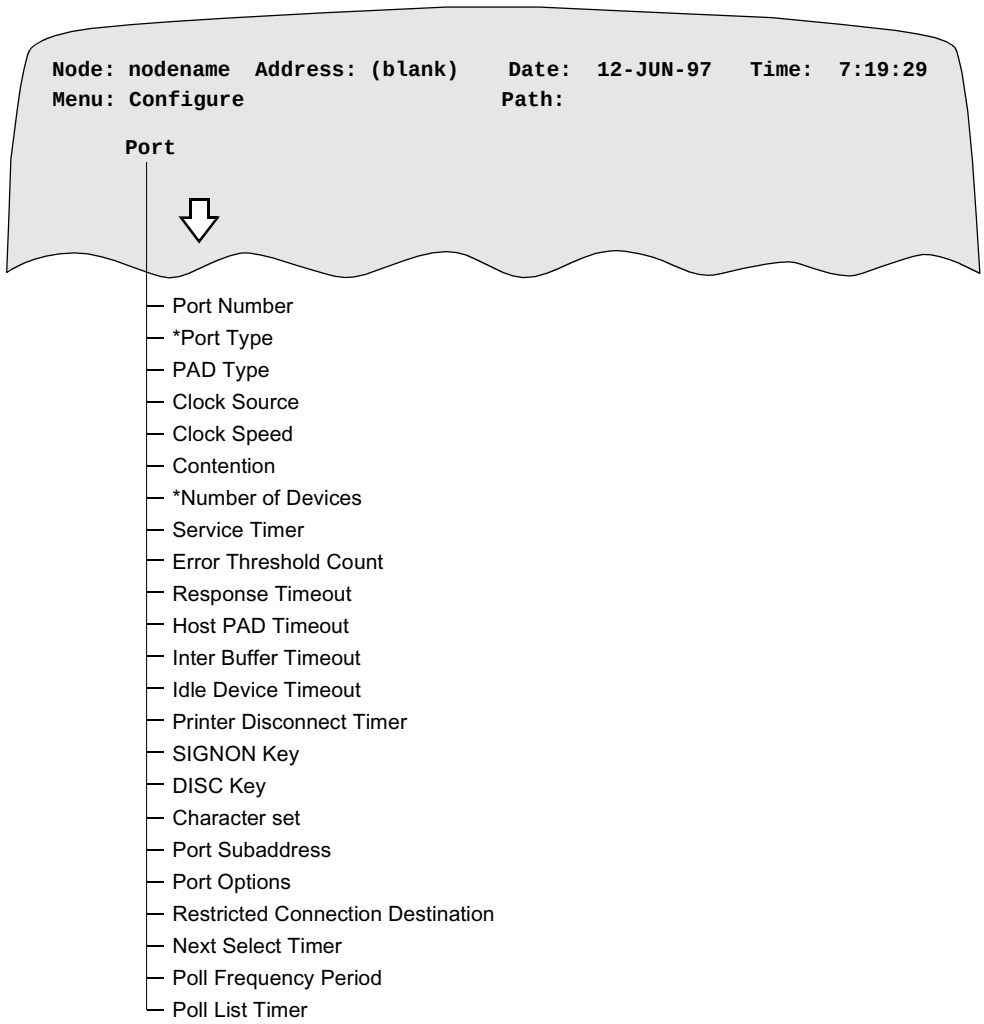


Figure 10. BSC 3270 Port Record Configuration Parameters

Configuring the Port Record

Before You Begin

Before you can configure parameters, you must log on to the local node's Control Terminal Port.

Steps to Configure the Node Record

Follow these steps to access the Node Record:

Step	Action	Result
1	From the CTP Main menu, select **Configure**.	The Configure menu appears.
2	Select **Port** from the Configure menu.	The first parameter appears, as shown in Figure 10.
3	Enter parameter values, and press ; when you finish.	This saves your changes to the Port record.
4	Press **<ESC>.**	The Configure menu appears.

Implementing Changes to Port Record Parameters

Follow these steps to implement changes to a record after entering parameter values:

Step	Action
1	Select **Boot** from the CTP Main menu.
2	Select **Warm Boot** from the Boot menu.
3	Select **<y>** when this prompt appears: **Booting the node will cause all current calls to be abnormally disconnected. This operation may result in lost data and disruption of network user sessions. Proceed <y/n>**
4	Press **<y>** to boot the node.

Port Parameters

Introduction

To configure the node for a BSC 3270 device, you must configure the desired port to connect to a 3270-type device.

Parameters

These tables describe the port configuration parameters. When an asterisk appears beside a parameter, a Node Boot is needed for any changes to that particular parameter to take effect.

Port Number

Range:	1 to 48
Default:	1
Description:	Enter the number of the port to configure. This number corresponds to the physical port position at the rear of the unit and is the Port Record reference number.

*Port Type

Range:	NULL, PAD, MUX, X.25, BSC3270 HPAD/TPAD
Default:	PAD
Description:	Specifies the type of port you are configuring: • NULL port • PAD port • BSC 2780/3780 • BSC 3270 HPAD/TPAD • XDLC port • FRI port • FRA port **Note** If the node does not accept BSC 2780 as a valid port type, then the BSC 2780 option is not installed on the node.

PAD Type

Range:	HPAD, TPAD
Default:	TPAD
Description:	Specifies how the port operates: • TPAD: Port is functioning as a Terminal PAD for direct connection to cluster controllers and devices. • HPAD: Port is functioning as a Host PAD and appears to the host as a collection of cluster controllers and devices.

Clock Source

Range:	INT, EXT
Default:	EXT
Description:	Specifies which clock source is used: • INT: Internal clock source • EXT: External clock source (required for hardware flow control)

Clock Speed

Range:	1200 - 19200
Default:	4800
Description:	Specifies the port speed in bits per second when using internal clocking.

Contention

Range:	FDX, HDX
Default:	FDX
Description:	Indicates whether half-duplex or full-duplex modem signals are being generated. • FDX: Full–duplex indicates communication is occurring in both directions, simultaneously, between devices. When FDX is chosen, the 6500 automatically sets CTS to High. • HDX: Half–duplex indicates transmission is occurring in both directions, but only in one direction at a time.

*Number of Devices

Range:	1 to 255
Default:	1
Description:	Specifies the number of physical devices on this line.

Service Timer

Range:	1 to 60
Default:	60
Description:	Specifies the interval of time in seconds between periodic servicing.

Error Threshold Count

Range:	1 to 255
Default:	5
Description:	Indicates the number of consecutive errors that can occur before a device is considered down. Errors that are counted consist of these: • timeouts • Negative Acknowledgments (NAKs) • unexpected End of Transmission (EOT) • incorrect Acknowledgment sequence.

Response Timeout

Range:	1 to 255
Default:	3
Description:	Specifies the amount of time (in seconds) that the TPAD waits for a response from a device before it attempts to re-poll the non-responding device. The TPAD continues to repoll the device until the Threshold Count is reached. The device is then polled based on the value of the Service Timer.

Host PAD Timeout

Range:	1 to 255
Default:	15
Description:	Specifies the amount of time (in seconds) that the HPAD waits for the host to poll a device. If the time limit is exceeded, the HPAD considers the device to be inactive, and does not permit any physical device on a TPAD to establish a call to that address on the HPAD. Please note that when the timeout occurs, the existing call is dropped. If all devices become inactive, the line is considered inactive.

Inter Buffer Timeout

Range:	1 to 255
Default:	30
Description:	Specifies the maximum amount of time in seconds that the PAD waits until the end of a multipacket message from the network. If this time is exceeded, the PAD aborts the entire message and request retransmission.

Idle Device Timeout

Range:	0 to 255
Default:	0
Description:	Specifies the amount of time (in minutes) that the TPAD waits for user data from a device after an X.25 call is established, before disconnecting the call. The parameter is applicable to terminal devices configured as Originators or TWO-WAY. This parameter does not bring down a device established in Autocall mode. We recommend that relatively inactive devices configured for Autocall be reconfigured for Fast Connect.

Printer Disconnect Timer

Range:	0 to 255
Default:	45
Description:	Specifies the amount of time (in seconds) that an X.25 call to a Printer device is disconnected after a period of inactivity. The Printer Disconnect Timer is valid only on devices connected to a Host PAD. You determine the type of device that is handling the 3270 communication when configuring the device.

SIGNON Key

Range:	PF1 to PF24
Default:	PF1
Description:	Allows assignment of a function key that is used to generate a connection. This parameter is applicable to a TPAD port only. This parameter is not applicable for devices configured for Autocall.

DISC Key

Range:	PF1 to PF24
Default:	PF3
Description:	Allows assignment of the function key needed to end the current session. This parameter is applicable to a TPAD port only. The parameter is not applicable for devices configured for Autocall.

Character set

Range:	EBCIDIC, ASCII
Default:	EBCIDIC
Description:	Indicates whether Terminal/Printer devices on this port support the ASCII or EBCDIC character set. The Character Set parameter(s) must match the value configured in the BSC host or BSC controller as applicable to the HPAD or TPAD, respectively.

Port Subaddress

Range:	0 to 3 decimal digits
Default:	Designated port number. (If port 1 is designated, 01 is the default)
Description:	Calls addressed to this node and with this subaddress are routed to this port. Press the space bar to blank the field.

Port Options

Range:	NONE, CESS, SINGLE, EPAD, CESS2, CESS3
Default:	NONE
Description:	Specifies the port type you are configuring: • 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. In the TPAD, devices that are configured for AUTO+ORG are not polled until the connection (SVC) to the remote HPAD is established. • 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. • 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.

Restricted Connection Destination

Range:	0 to 32
Default:	(blank)
Description:	Specifies where all calls originating from this port are rerouted to, irrespective of route selection table entries. For example, to route calls to Port 1, use P1. To route calls to Port 2, Station 4, use P2S4. Press the space bar to blank this field.

Next Select Timer

Range:	0 to 255
Default:	0
Description:	Specifies the time (in seconds) that the TPAD waits before it re-selects the device providing flow control to the TPAD. **Note** A value of zero (0) causes the TPAD to wait for a Device End status message before re-selecting the device.

Poll Frequency Period

Range:	0 to 5000
Default:	0
Description:	Specifies the time interval (in increments of 50 milliseconds) that occurs between polls. The value entered must be greater than the value entered for the Poll Frequency Period **Note** A value of zero (0) causes polling to occur immediately.

Poll List Timer

Range:	0 to 10000
Default:	0
Description:	Specifies the polling time interval (in 50-millisecond increments) that occurs between polled devices. The value entered must be greater than the value entered for the Poll Frequency Period. **Note** A value of zero (0) causes polling to occur immediately.

BSC 3270 (DSP) Device Parameters

Introduction

Once you have configured the node to connect to a BSC 3270 device, you must configure the parameters of that device. Each HPAD and TPAD port can support up to 32 devices. A maximum of 256 devices can be supported per node.

What You See in This Record

BSC 3270 (DSP) Device Parameters define the BSC 3270 characteristics for the port. Figure 11 shows the parameters available.

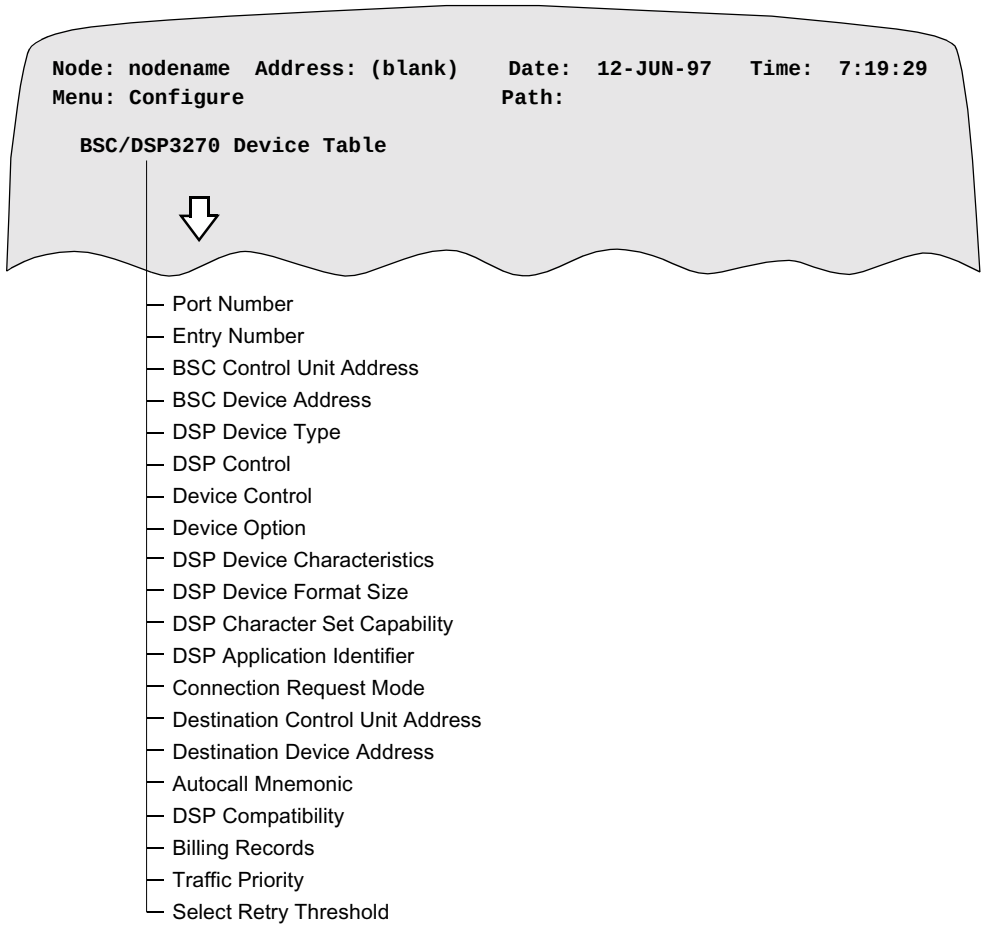


Figure 11. BSC 3270 DSP Device Configuration Parameters

Accessing the BSC/DSP3270 Device Record

To access the BSC 3270 Device record for configuring HPAD or TPAD ports:

Step	*Action*	*Result*
1	From the CTP Main menu, select **Configure**.	The Configure menu appears.
2	Select **BSC/DSP 3270 Devices** from the Configure menu.	The first parameter appears as listed below.
3	Enter parameter values, and press **;** when you finish.	This saves your changes to the Device Parameter.
4	Press **<ESC>.**	The Configure menu appears.

Parameters

These tables describe the device configuration parameters.

Note
Unless otherwise specified, a Node Boot is needed for any changes to these parameters to take effect.

Port Number

Range:	1 to 3
Default:	1
Description:	Specifies the number of the port to configure. This number corresponds to the physical port position at the rear of the unit and is the Port Record reference number.

Entry Number

Range:	1 to XX
Default:	1
Description:	Specifies the Entry Number used to reference this table record. **Note** XX is the number of devices as configured in the Port Configuration process.

BSC Control Unit Address

Range:	20 to D9 (hex)
Default:	40
Description:	This is the Poll address of the Control Unit that supports this configuration. It consists of two hexadecimal digits. Valid responses depend on the 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

BSC Device Address

Range:	20 to D9 (hex)
Default:	40
Description:	Specifies the Poll/Select address of the device, consisting of two hexadecimal digits. Valid responses depend on the 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 **Note** If you are copying configurations from one device to another, ensure that the addresses entered for this parameter are different.

DSP Device Type

Range:	TERM, PRIN
Default:	TERM
Description:	Specifies the type of device being connected to. • TERM: Device is a terminal. • PRIN: Device is a printer.

DSP Control

Range:	NONE
Default:	NONE, ORG, AUTO, FAST, ACK, TWO-WAY, DISABLE
Description:	Specifies device call control: • NONE: Device is not a call originator and is enabled. • ORG: Device is a call originator and is enabled. • AUTO: Automatic connection to preconfigured host. Note that this option acts with ORG. If you select AUTO you use ORG+AUTO. • FAST: A TPAD establishes a call to a preconfigured host when you press the sign on function key as determined while configuring the port for BSC 3270 operation. This is not applicable to HPAD. • ACK: Requires DSP acknowledgment for all messages. • TWO-WAY: Partial two-way calling - TPAD originates the call when it has to forward data from the device only if the previous connection had been brought down by TPAD on idle device timeout. This is not applicable to HPAD. • DISABLE: Disables the device. **Note** Some combinations of the above may be specified by summing (for example, ORG+AUTO). You cannot choose the values AUTO and FAST simultaneously. You cannot select TWO-WAY in combination with other values.

Device Control

Range:	NONE, GPOLL, PSPOLL, SPOLL, MSPOLL, NSERV, NSTAT, RVI, SPEOT, SPEND, NCMD
Default:	NONE
Description:	Specifies device control: • NONE: No option • 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. • 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. **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. For example, if CU40 has 4 devices, all devices must be GPOLL, SPOLL, or neither.

Device Option

Range:	NONE, SDISC
Default:	NONE
Description:	Specifies the device options used. • NONE: No option • SDISC: HPAD does not generate Intervention required status messages when the session is down.

DSP Device Characteristics

Range:	NONE, XPAR, COLOR, PRIN
Default:	NONE
Description:	Specifies the device character format used. • NONE: No option • XPAR: Device supports transparency. • COLOR: Device supports color. • PRIN: Printer is attached to a terminal device. For a CRM3 call, the HPAD uses this value in call matching to determine whether or not to accept the call for this device. **Note** The DSP Device Characteristic parameter must match the value configured in the BSC host or BSC controller as applicable to the HPAD or TPAD, respectively. Some combinations of the above may be specified by summing (for example, COLOR+PRIN).

DSP Device Format Size

Range:	480, 960, 1920, 2560, 3440, 3564
Default:	480
Description:	Specifies the maximum size of the terminal or printer message. For a CRM3 call, the HPAD uses this value in call matching to determine whether or not to accept the call for this device. **Note** The DSP Device Format Size parameter must match the value configured in the BSC host or BSC controller as applicable to the HPAD or TPAD, respectively.

DSP Character Set Capability

Range:	NONE, APL, TEXT
Default:	NONE
Description:	Specifies the character set capabilities • NONE: There is no indication of character set capability. • APL: Character set has APL capability. • TEXT: Character set has Text capability. For a CRM3 call, the HPAD uses this value in call matching to determine whether or not to accept the call for this device. **Note** The DSP Character Set Capability parameter must match the value configured in the BSC host or BSC controller as applicable to the HPAD or TPAD, respectively. Some combinations of the above may be specified by summing (for example, APL+TEXT).

DSP Application Identifier

Range:	0 to 255
Default:	0
Description:	Specifies the target application to which the device is connected, which should match the application ID of the host DSP device.

Connection Request Mode

Range:	1, 2, 3
Default:	2
Description:	Specifies which DSP Connection Request Mode (CRM) to use. • Fixed class CRM, connects a call to the device on a control unit with addresses that match the addresses of the call origin. • Specific class CRM, connects to a specific device as indicated in the destination control unit and device address. • Non-specific class CRM, connects to any device as indicated in the destination control unit address.

Destination Control Unit Address

Range:	00 to D9 (Hex digits)
Default:	40
Description:	Specifies the control unit address on remote PAD. It is used with Connection Request Modes 2 and 3. **Note** A value of 0 is a possibility and is a wild card. This entry matches any Cluster Control Unit.

Destination Device Address

Range:	00 to D9 (Hex digits)
Default:	40
Description:	Specifies the device address on the remote PAD. It is used with Connection Request Mode 2. **Note** A value of 0 is a possibility and is a wild card. This entry matches any Cluster Control Unit.

Autocall Mnemonic

Range:	0 to 8 alphanumeric characters.
Default:	(blank)
Description:	Specifies the mnemonic name used if this device is configured for AUTO or FAST calling. Press the space bar to blank this field.

DSP Compatibility

Range:	YES, NO
Default:	NO
Description:	Specifies whether the device is compatible with a DSP host or a 6507/6525 node (with Release 2.13 or higher software). • Select YES if the device connects to a DSP host or if it connects to a 6507/6525 node with Release 2.13 or higher software. • Select NO if the device connects to a 6507/6525 node with pre-2.13 release software.

Billing Records

Range:	OFF, ON
Default:	OFF
Description:	Controls whether billing records are created for calls on this device.

Traffic Priority

Range:	LOW, MED, HIGH, EXP
Default:	MED
Description:	Specifies the traffic priority of the 3270 device.

Select Retry Threshold

Range:	0 to 65000
Default:	0
Description:	Specifies the number of consecutive Select-WACK exchanges before TPAD deactivates the session. If the threshold is 0, TPAD accepts any number of consecutive Select-WACK exchanges without deactivating the session.

Call Routing

Introduction

Each BSC 3270 port within the 6507, 6525, or Vanguard node is a local resource. Routing of a call to such a port is accomplished in the same way as to other node resources, such as PAD ports, by matching the subaddress located in the call request packet to the configured subaddress of a BSC 3270 port. No entries in the Route Selection Table are needed to accomplish this type of routing to a destination port. Once a call has been routed to a valid BSC 3270 port, the call is connected to the proper BSC device by means of the DSP Connection Request Mode procedure.

Connection Request Mode

The Connection Request Mode (CRM) is a method of distinguishing between the different connection source and destination terminal address relationships. To take advantage of this connection capability, DSD must be entered in the Routing Table. The CRM informs the PAD how to interpret the information in the Destination Designator section of the User Data Field, Circuit Request, and Circuit Enable message.

The CRMs are implementation–dependent formats that typically provide unique terminal addresses and application identification data to the HOST PAD.

CRM Formats

These CRM formats relate to routing a call to a particular device:

1) Fixed Class CRM - The controller and device addresses of the destination must be the same as the physical terminal configuration (for example, the same controller and device addresses of the source). These addresses along with the X.25 subaddress define a unique terminal connection.

2) Specific Class CRM - The Source PAD provides the destination Control Unit and device address that is used for the session as configured in the device table.

3) Non-Specific Class CRM - The Destination PAD provides the destination terminal address at call setup time. For example, if the destination controller address is 00 and the destination device address is C1 in the device table, the PAD receiving the call attempts to connect the call to any Cluster Control Unit as long as the device address is C1.

Note

A value of zero signifies a non-specific request. At least one of these fields must be zero.

Statistics

Introduction

BSC 3270 provides detailed status reports concerning the various operations of the node.

Accessing Statistics Information

Use these steps to access the Detailed Port Statistics for your BSC 3270 port:

Step	Action	Result
1	Select **Status/Statistics** from the CTP Main menu.	Options for Status/Statistics appears.
2	Select **Detailed Port Stat** from the Status/Statistics menu.	A prompt appears.
3	Enter the number of the port you want statistics for, and press **Return**.	The Detailed Port Statistics screen for that port appears.

Detailed Port Statistics - Page One

Figure 12 shows the first page of the Detailed Port Statistics screens.

```
Node: nodename Address: 100          Date: 2-JUN-1997    Time: 22:48:32
Menu: Detailed BSC3270 Port Statistics: Port 3           Page: 1 of 2

   Port Number:3             Port Type: BSC3270 TPAD Port Status: Down
   Port Speed: 0             Port State: SEL/POL
   Port Utilization In: 0%   Port Utilization Out 0%

   Physical:
     CRC/DCC Errors:0

   Data Summary:          Last Statistic Reset: 3-JUN-1997 15:39:09

                          IN        OUT                       IN   OUT
   Characters:            0         0      Characters/sec:    0    0
   Message:               0         0      messages/sec:      0    0


Interface Summary: ISDN       U           INPUT              OUTPUT
                                       DTR RTS MB P14      DSR DCD RI CTS
   State: Connected (SIMPLE)


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

Figure 12. Detailed BSC 3270 Port Statistics - Page 1

Detailed Port Statistics - Page Two

Figure 13 shows the second page of the detailed statistics.

```
Node: Nodename  Address: 100           Date: 2-JUN-1997 Time: 23:15:03
Detailed BSC3270 Port Statistics: Port 5                  Page:  2 of  2

  Message Summary:
                                    IN             OUT
  Positive Acknowledgment:           9              0
  Negative Acknowledgment:           8              0
  Enquiry (ENQ):                     7              0

  Number of Messages Retransmitted: 0




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

Figure 13. Detailed BSC 3270 Port Statistics - Page 2

Note

The Number of Messages Retransmitted statistic refers to the number of messages retransmitted on the BSC line.

Description of Screen Parameters

This table describes screen parameters shown in Figures 12 and 13.

Parameter	Description
Port Status	Indicates whether or not the port switched on and is ready for operation. This field may be qualified by either UP, DN or DSBL. If the port is up and running, Up appears. If the port is down, Down appears. If the port has been disabled, DSBL appears.
Port State	The current operating state of the port: • DISC: No call is currently connected to the specified port. The port is idle. • PENDACC: Port is waiting to accept a call. • DATA: Port is busy. Data traffic is being passed between 3270 devices. • PENDACK: Port sent a message (test) or enquiry (ENQ) and is waiting for an acknowledgment (ACK). • EOT: Port received an End of Transmission (EOT). Port is waiting for a new line bid. • DRO: Outbound Data is restrained. • DRI: Inbound Data is restrained. • PENDISC: Port is waiting for a disconnection. The device sends and EOT prior to accepting a call.
Port Number	Shows the port number assigned to the configured BSC 3270 port.
Port Speed	Shows the configured speed for the BSC 3270 port.
Port Utilization In Port Utilization Out Physical: CRC/BCC Errors Data Summary Characters: In/Out Messages: In/Out Characters/sec: In/Out Messages/sec: In/Out last Statistic Reset: Positive Acknowledgments Negative Acknowledgment Enquiry (ENQ) Number of Messages Retransmitted:	

DSP/BSC3270 Statistics

Introduction

This section describes the DSP/BSC3270 device statistics implemented to display the BSC3270 device status and the DSP interface information details.

BSC/DSP3270 Device Statistics

The debug BSC3270 Port Statistics are used to display a summary of the BSC3270 device statistics parameters. However, more information is needed when inspecting each of the 255 devices of a BSC3270 port. The BSC/DSP3270 Device Statistics menu option provides further detailed information on the individual BSC3270 device status and DSP interface. This menu has the following two options:

- Detailed BSC/DSP3270 Device Statistics
- Reset BSC/DSP3270 Device Statistics

Generate and Reset Statistics

Detailed BSC/DSP3270 Device Statistics and Reset BSC/DSP3270 Device Statistics reside in the "DSP/BSC3270 Device Statistics" menu created under CTP Status/ Statistics menu. 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 **BSC/DSP3270 Device Statistics** from the **Status/ statistics** Menu.	The **BSC/DSP3270 Device Statistics** menu displays. The following selections are available: **Detailed BSC/DSP3270 Device Statistics** **Reset BSC/DSP3270 Device Statistics**

SNA Features Statistics Menu

Figure 14 shows the BSC/DSP3270 Device Statistics Menu.

```
Node: node100 Address: 100  Date:  9-JAN-2003   Time:  7:19:29
Menu: BSC/DSP3270 Device Statistics        Path: (Main.5.9.)

  1.  Detailed BSC/DSP3270 Device Statistics
  2. Reset BSC/DSP3270 Device Statistics




#Enter Selection:
```

Figure 14. BSC/DSP3270 Device Statistics Menu

Detailed BSC/ DSP3270 Device Statistics

To view the device statistics, enter the selection number (1). You are prompted for the BSC3270 port number and device number. The prompts are shown below:

```
Menu: BSC/DSP3270 Device Statistics Path: (Main.5.9.)

   1.  Detailed BSC/DSP3270 Device Statistics
   2. Reset BSC/DSP3270 Device Statistics




#Enter Selection: 1
Port Number: 2/2
Device Number: 1/1
```

Figure 15. BSC/DSP3270 Device Statistics

Figure 16 shows page one of the Detailed BSC/DSP3270 statistics of the existing BSC3270 DSP device of the BSC3270 port:

```
Node: node100   Address: 100                    Date:  9-JAN-2003  Time: 11:22:01
Detailed BSC3270 Device Statistics: Port 2   Device 1        Page:  1 of  2

Port Number:   2    Port Subtype: TPAD    Port State:   SEL/POL
Device Number: 1    Device Type:  TERM    Device State: Inactive

Device Status: None
BSC Control Unit Address/Device Address: 40 40

Data Summary:           Last Statistic Reset: 20-DEC-2002 12:13:43
            IN          OUT                              IN          OUT
 Characters: 0          0              Characters/sec: 0          0
 Messages:   0          0              Messages/sec:   0          0

Packet Summary:
                 IN          OUT              IN          OUT
 Call Requests:  0           0          ACK0: 0           0
 Call Accepts:   0           0          ACK1: 0           0
 Call Rejects:   0           0          WACK: 0           0
 Reset Requests: 0           0          NAK:  0           0
 SELECT:         0           0          RVI:  0           0
 SPOLL:          0           0          EOT:  0           0

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

Figure 16. Detailed BSC/DSP3270 Device Statistics - Page 1 of 2

Port Statistics Information

A detailed list of the displaying statistics parameters:

Screen Term	Description
Port Number	Specifies a specific port (physical port number) in the node.
Status Information	A.Status Information • BSC3270 Port Entry Number • BSC3270 DSP Device Entry Number • Port Subtype (HPAD or TPAD) • BSC3270 DSP Device Type • (TERM for terminal session or PRTR for printer session) • BSC3270 Port State • BSC3270 DSP Device State – Disabled - Device is disabled – Inactive - Device is enabled but in Idle mode – Active/Call Failed - Device responding to polls/pervious call failed – Calling – Connected – Unknown • Device Status: DSP Interface Status – Device Needs Specific Polls – Inbound Network Messages in Process – Outbound Network Messages in Process – Output Flow Control – Input Flow Control – Controller of Device is Responding – None • BSC Control Unit Address • BSC Device Address • Last Statistics Reset
Data Summary	• Characters In/Out • Characters per Sec In/Out • Messages In/Out • Messages per Sec In/Out

Screen Term	Description
Packet Summary	• Call Requests • Call Accepts • Call Rejects • Reset Requests • ACK0 • ACK1 • WACK • NAK • SELECT and RVI • SPOLL and ENQ

Figure 17 shows page two of the Detailed BSC/DSP3270 Device Statistics:

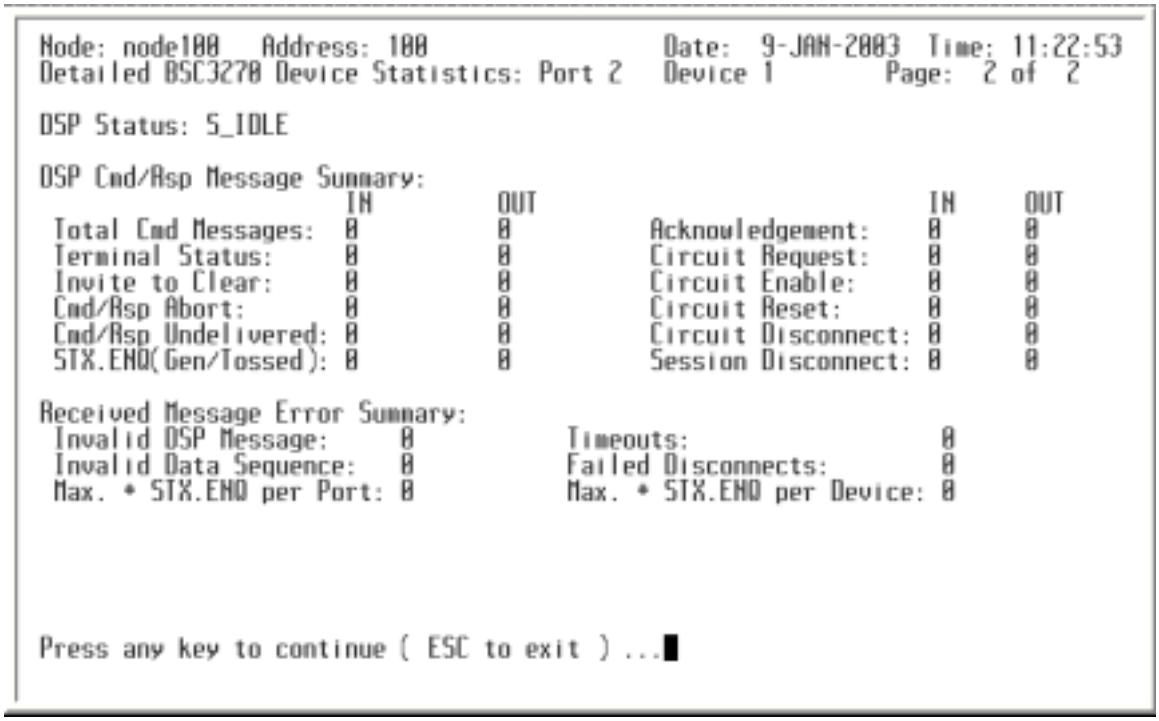


Figure 17. Detailed BSC/DSP3270 Device Statistics - Page 2 of 2

Screen Term	Description
BSC3270 DSP Status Statistics	• DSP Status: – S_IDLE: Idle, not calling/receiving calls – S_WCE: Waiting for Circuit Enable message – S_DT: Data Transfer – S_WCR: Waiting for Circuit Reset message – UNKNOWN: Invalid status
DSP Cmd/Rsp Message Summary	• Total Cmd Messages: Total # of DSP command messages • Terminal Status • Invite to Clear • Cmd/Rsp Abort • Cmd/Rsp Undelivered • Acknowledgment (ACK) • Circuit Request • Circuit Enable • Circuit Reset • Circuit Disconnect • Session Disconnect • STX.ENQ: – Generated STX.ENQ (internal abort at HPAD) – Tossed STX.ENQ (internal abort), when nothing to abort.
Received Message Error Summary	• Invalid DSP Message received • Timeouts waiting for Circuit Enable • Invalid Data Sequence received • # of Failed Disconnects • Maximum # STX.ENQ per Port: maximum # of generated STX.ENQ by all devices of the BSC3270 port • Maximum # STX.ENQ per Device: maximum # of generated STX.ENQ by device

Screen Term	Description
Packet Summary	• Call Requests • Call Accepts • Call Rejects • Reset Requests • ACK0 • ACK1 • WACK • NAK • SELECT and RVI • SPOLL and ENQ

Reset BSC/ DSP3270 Device Statistics

When the reset BSC/DSP3270 Device Statistics option is selected, the selected DSP device statistics are reset. A timestamp of the specific statistics reset are recorded and shown in the detailed device statistics. Enter selection number two from the BSC/DSP3270 Device Statistics menu. You are prompted for the BSC3270 port number and device number as shown below:

```
Menu: BSC/DSP3270 Device Statistics Path: (Main.5.9.)

   1.  Detailed BSC/DSP3270 Device Statistics
   2. Reset BSC/DSP3270 Device Statistics




#Enter Selection: 2
Port Number: 2/2
Device Number: 1/1
```

Figure 18. Reset BSC/DSP3270 Device Statistics

SNMP MIB Enhancement for EIA Monitoring

Introduction

The SNMP MIB has been enhanced to allow EIA summary information to be accessed via the SNMP manager station for the BSC 3270 protocol.

What Can You Monitor?

These statistics objects are now available through SNMP commands from the SNMP manager station.

SNMP Object	*EIA Parameter*
cdx6500StatEIAEntryPort Number	Port number of the applicable port.
cdx6500StatEIAEntryDimtype	Dim Type These can be any one of: • dim_type_none(0) • dim_type_not_installed(1) • dim_type_EIA_232_d(2) • dim_type_x21(3) • dim_type_v35(4) • dim_type_v36(5) • dim_type_v11(6) • dim_type_EIA_530(7) • dim_type_dsu(8)
cdx6500StatEIAEntryDimCfgn	Dim Configuration These can be any one of: • dim_cfgn_dte(0) • dim_cfgn_dce(1)
cdx6500StatEIAEntryEiaState	EIA State
cdx6500StatEIAEntrySignalStatus	EIA Signal Status
cdx6500StatEIAEntryConnType	EIA Connection Type

Example SNMP Commands

The following example commands show how to access the EIA information.

get cdx6500StatEIAEntryEiaState.2

This is a request to retrieve the value of EIA State for Port 2.

getnext cdx6500StatEIAEntrySignalStatus.1

This is a request to retrieve the value of EIA Signal Status for the first port number higher than 1 that has a connection to the EIA module.

getnext cdx6500StatEIAEntrySignalStatus

This is a request to retrieve the value of EIA signal status for the first port, on which EIA monitoring is supported.

Service Messages

Introduction

An advantage of using our implementation of the BSC 3270 protocol with a switching network stationed at terminals, is that you can configure the network to choose different destinations representing different applications. You configure the interface with the call control parameter set to ORG. In this case, a terminal server entity in the TPAD issues PAD service signals and accepts PAD commands from the terminal.

Do not confuse the terms **service message** and **PAD commands** in this context with the BSC protocol terms **COMMAND** and **RESPONSE**. The PAD service signals appear on the terminal as prompts or other locally significant information messages sent by the PAD to the terminal. PAD commands are commands you enter, which are usually responses to these prompts for information messages.

The network administrator can control the level of switch functionality allowed for terminal users. For example, it may be required that a given set of terminals access only a certain host, or a certain controller at the HPAD destination, in order to control which applications are to be made available. Under more stringent security, you may want to restrict the connection of devices at the TPAD to specific HPAD devices.

You can achieve these different levels of connection restriction by configuration of the Connection Request Mode parameter in the HPAD device table.

Connection/ Disconnection Service Signal

The Connection/Disconnection message appears as follows:

BSC 3270 PAD-PRESS F1 TO CONNECT,
F3 TO DISCONNECT

This message is issued to the terminal when the terminal sends a PAD command with Attention Identification (AID). For 3270 type terminals, you press the (Alt) Clear key.

Note

You can configure both the Connect and Disconnect keys. *Refer to the Vanguard Configuration Basics Manual,* Part Number T0113 for information regarding the configuration of the SIGNON and DISC keys.

When the terminal is prompted by this service message, you can enter one of two PAD commands, either the signon or disconnect key.

Pressing the signon key is valid when you want to establish a session to a remote destination. Only one session at a time is allowed, therefore, using this key requires that you disconnect any current session. If the connection request command is given, then the TPAD issues a further service that asks for the desired destination (see Request Service Signal). If the disconnection command is issued, then any current session and its corresponding network call are disconnected. The PAD issues a service signal to inform you that the session is disconnected.

You can obtain this service signal at any time, even while in session with a remote host, by pressing the **clear key** on the terminal. If you want the clear AID to be sent to the host, pressing the **clear key** a second time causes the PAD to forward the AID code to the host, rather than interpreting it locally. You must unlock the keyboard before any of the key pressing can be recognized. You can usually unlock the keyboard by pressing the reset key on the keyboard (3270-type terminal).

Request Service Signal

The Request Service message appears as follows:

BSC 3270 PAD - ENTER SERVICE:

The PAD issues this service signal in response to the connection request command of the terminal if the DSP control is set to ORG. The valid response is to enter a valid call mnemonic and press the Return key. The mnemonic represents a destination to which you want a connection.

The network administrator is required to set up the valid mnemonics in the Mnemonic Table. Refer to the *Vanguard Configuration Basics Manual,* Part Number T0113.

The mnemonic sent by the terminals interpreted by the TPAD and a call is made to the desired destination. The call is either connected, or rejected (because of network or destination problems or because of an unrecognized mnemonic). The PAD reports on the fate of the command by appropriate service signals (see SESSION ESTABLISHED and SESSION REJECTED service signals).

Session Established Service Signal

The Session Established message appears as follows:

SESSION ESTABLISHED

This service signal is issued when the terminal is successfully connected to the requested destination.

If the terminal is a screen, this message remains on the screen until overwritten by host or terminal data, or until you press the **clear key**.

Session Attempt Failure Service Signal

The **Session Attempt Failure** message appears as follows:

SESSION REJECTED

This service signal is issued when the terminal fails to successfully connect to the requested destination. The reason for the failure can be a network problem, or unavailability of the host, or because the entered mnemonic in the connection command was unrecognized.

This message remains on the screen until you press the **clear key**.

Invalid Function Signal

The **Invalid Function** message appears as follows:

INVALID FUNCTION

This service signal is issued when you enter unexpected input. For example, you may press the PF2 key when the connection/disconnection service signal is issued. The Invalid Function signal appears because the PAD is expecting either the PF1 (for signon), PF3 (for disconnect) or, if in session, the Clear key to be pressed.

This message remains on the screen until you press the **clear key**, or the message is overwritten by the host.

Sample Network

Introduction

To illustrate the use of configurable parameters and some of the characteristics of the HPAD and TPAD, a sample network is shown in Figure 19. This network has a single host supporting four applications with a collocated HPAD. The network involves two TPADs at remote locations, connected to the HPAD by an X.25 network.

Network Components

This table identifies the arrangement of equipment:

Equipment	*Description*
Host	Supports four applications: APPL1 – APPL4. Is connected to the HPAD via a Front–End Processor.
HPAD	Two 3270 BSC lines are connected to the host for access to applications. A third line accesses an ASCII terminal. The 3270 BSC line on Port 3 supports controllers that represent APPL1, APPL3, the printer attached to TPAD #1, and the first printer attached to TPAD #2. The 3270 BSC line on Port 4 supports controllers representing applications APPL2 and APPL4 and the second printer attached to TPAD #2. The X.25 line connects to an X.25 network.
TPAD#1	TPAD#1 supports several terminals and one printer. All devices are 3270 BSC. The line on Port 3 supports the printer. The line on Port 4 supports two clusters of 4 terminals, set up to auto connect to the APPL1 and APPL2, respectively. The X.25 line connects to the X.25 Network.
TPAD#2	TPAD#2 supports several terminals and two printers. All devices are 3270 BSC. The line on Port 3 supports two printers on separate controllers. The line on Port 4 supports ordinary BSC 3270 terminals. With these terminals, you can access either APPL3 or APPL4. The terminals are grouped into two clusters of four. In Figure 19, a third controller is shown on Port 4. This controller is actually a PC with a BSC option. When this terminal is acting as a BSC controller, it does not respond to general polls. It must be polled specifically. Of the nine terminals on the Port 4 line, only a maximum of four can be active at any one time. The line on Port 5 supports two clusters of 4 terminals, set up to auto connect to the APPL1 and APPL2, respectively. This is the same as line 4 of TPAD#1. The X.25 line connects to the X.25 Network.

Network Example

Figure 19 shows the sample network. The tables in these sections indicate Port records, Device Table configurations, and the Mnemonic Call tables for this hypothetical network.

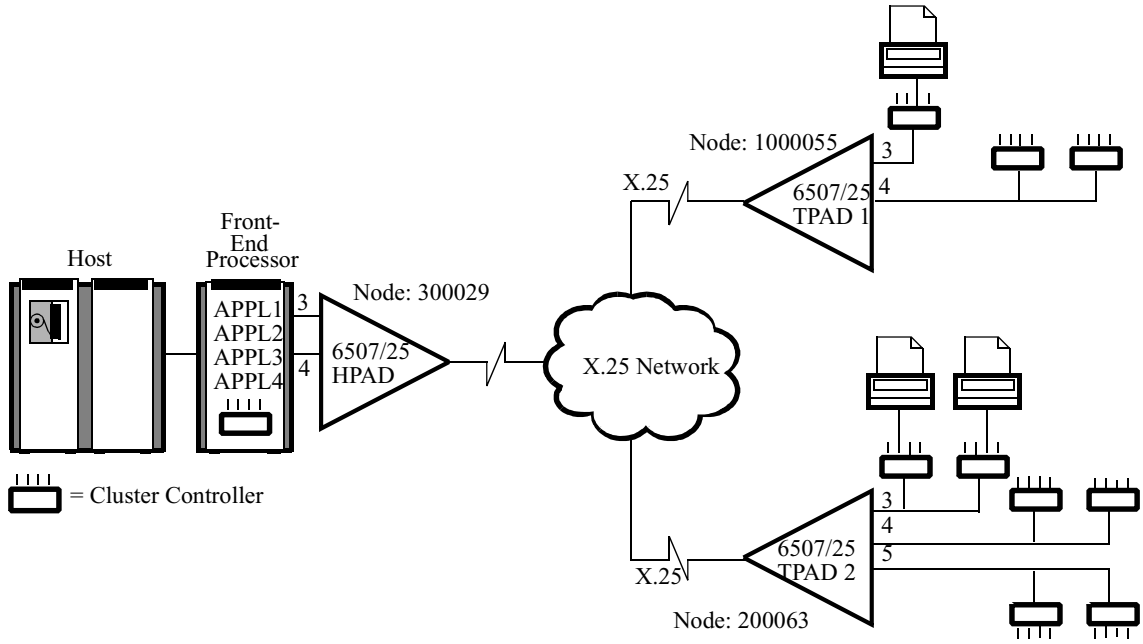


Figure 19. Device Configuration of Sample Network

Configuration of the HPAD

Introduction

The clocking for the HPAD of the BSC 3270 port is Internal. This ensures the Host receives clocking. A straight-through cable must be used.

HPAD

Figure 20 illustrates the device configuration of the HPAD.

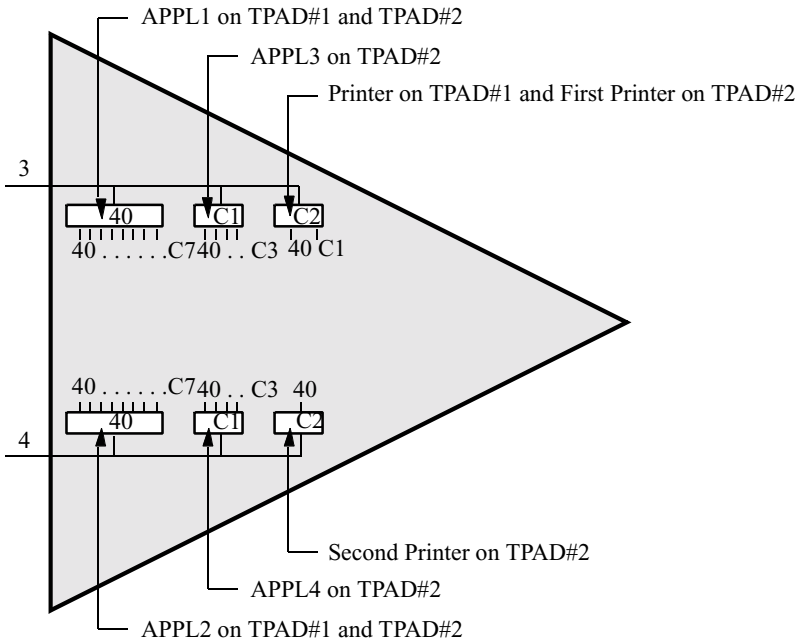


Figure 20. Device Configuration of the HPAD

Description of Devices

There are 14 devices on line 3. This represents the total number of devices on TPAD#1 and TPAD#2 that can connect to APPL1 and APPL3 (12) and the two printers that are used along with these applications. There are 13 devices on line 4. This represents 12 devices for APPL2 and APPL4. The 13th device is the second printer at TPAD#2. For both line 3 and line 4, there are four devices allocated to APPL3 and APPL4 since only a maximum of four users are active at one time (and they may be trying to access the same application at the same time).

Port Record

This table shows the parameters for port configuration for the HPAD. When an asterisk appears beside a parameter, a Node Boot is needed for any changes to that particular parameter to take effect.

Port Record	BSC 3270	HPAD
Port Number	3	4
* Port Type	BSC3270	BSC3270
PAD Type	HPAD	HPAD
Clock Source	INT	INT
Clock Speed	9.6	9.6
Contention	FDX	FDX
* Number of Devices	14	13
Service Timer	60	60
Error Threshold	5	5
Terminal PAD Timeout	—	—
Host PAD Timeout	15	15
Inter Buffer Timeout	30	30
Idle Device Timeout	0	0
Printer Disconnect Timer	45	45
SIGNON Key	—	—
DISC Key	—	—
Character Set	EBCDIC	EBCDIC
Port Subaddress	03	04
Port Options	NONE	NONE
Restricted Connection Destination	(blank)	(blank)

Device Table

This table shows the Device Table entries for the HPAD Line 3.

Port Number	3	3	3	3
BSC Control Unit Address	40	C1	C2	C2
BSC Device Address	40 – C1	40 – C1	40	C1
DSP Device Type	TERM	TERM	PRIN	PRIN
DSP Control	NONE	NONE	ORG	ORG
DSP Device Characteristics	NONE	NONE	NONE	NONE
DSP Device Format Size	2560	2560	480	480
DSP Character Set Capability	NONE	NONE	NONE	NONE
Connection Request Mode	2	2	2	2
Destination Control Unit Address	40	40	40	40
Destination Device Address	40	40	40	40
Autocall Mnemonic	(blank)	(blank)	PRINA	PRINB

Device Table

This table shows the Device Table entries for the HPAD Line 4.

BSC/3270 Device Table Configuration — HPAD Line 4

Port Number	4	4	4
BSC Control Unit Address	40	C1	C2
BSC Device Address	40 – C3	40 – C3	40
DSP Device Type	TERM	TERM	PRIN
DSP Control	NONE	NONE	ORG
DSP Device Characteristics	NONE	NONE	NONE
DSP Device Format Size	2560	2560	480
DSP Character Set Capability	NONE	NONE	NONE
Connection Request Mode	2	2	2
Destination Control Unit Address	40	40	40
Destination Device Address	40	40	C1
Autocall Mnemonic	—	—	PRINC

Device Records

Introduction

The default values are usually appropriate. The devices on Controller C2 are printers and therefore originates calls to remote printers when selected. Hence the DSP Device Type and Control values PRIN and ORG. The CRM is not applicable to the terminal devices (since they do not originate calls) but the printers attempt to connect to their appropriate destinations in the TPADs (40, 40 in both TPAD#1 and TPAD#2). Since the printers are at different destinations, different autocall mnemonics PRINA and PRINB are used. The second printer on TPAD#2 is on Controller C1, Device 40, so these values must be used in the line 4 printer device in the HPAD.

Mnemonic Table

This table shows the Mnemonic Table entries for the HPAD.

Entry Number	*Mnemonic Name*	*Call Parameters*
1	PRINA	10005503
2	PRINB	20006303
3	PRINC	20006303

Port Record

This table shows the Port Record entries for the HPAD.

Parameter	*Description*
Port Type	X.25
Connection Type	SIMP
Clock Source	EXT
Clock Speed	9.6
Link Address	DTE
Number of PVC Channels	0
Starting PVC Channel Number	1
Initial Frame	SABM
T1 Transmission Retry Timer	30
T4 Poll Timer	40
N2 Transmission Tries	10
Frame Sequence Counting	NORM
K Frame Window	7
Packet Sequence Counting	NORM
W Packet Window	2
P Packet Size	128
Restart Timer	180
Reset Timer	180

Parameter (continued)	Description
Call Timer	200
Clear Timer	180
Facilities to Delete From Outbound Calls	NONE
Facilities to Add to Outbound Calls	NONE
X.25 Options	NONE
Number of Routing Digits in Call User Data	5
Number of Prefix Address Digits Stripped from Outgoing Calls	
Restricted Connection Port Number	5
Port Address	01
CUG Membership	--,--,--,--,--,--,--,--
Billing Records	Off

SVC Channels

The 26 SVC channels are used as follows:

- 18 for AUTOCALL to APPL1, APPL2
- 4 for calls to APPL3, APPL4
- 3 for connections to printers
- 1 for remote CTP access

Port Record

This table shows the Port Record entries for TPAD #1.

When an asterisk appears beside a parameter, a node boot is needed for any changes to that particular parameter to take effect.

Parameter	Port 3	Port 4
* Port Type	BSC 3270	BSC 3270
PAD Type	TPAD	TPAD
Clock Source	INT	INT
Clock Speed	9.6	9.6
Contention	FDX	FDX
* Number of Devices	1	8
Service Timer	60	60
Error Threshold	5	5
Terminal PAD Timeout	3	3
Host PAD Timeout	15	15
Inter Buffer Timeout	30	30
Idle Device Timeout	0	0
Printer Disconnect Timer	45	45

Parameter (continued)	Port 3	Port 4
SIGNON Key	PF1	PF1
DISC Key	PF3	PF3
Character Set	EBCDIC	EBCDIC
Port Subaddress	03	04
Port Options	NONE	NONE

Mnemonic Table

This table shows the Mnemonic Table entries for TPAD #1.

Entry Number	Mnemonic Name	Call Parameters
1	APPL1	30002903
2	APPL2	30002904

Device Table Record

This table shows the Device Table entries for TPAD #1. When an asterisk appears beside a parameter, a node boot is needed for any changes to that particular parameter to take effect.

Parameter	Port 3	Port 4	
BSC Control Unit Address	40	40	C1
BSC Device Address	40	40 – C3	40 – C3
DSP Device Type	PRIN	TERM	TERM
DSP Control	NONE	ORG and AUTO	ORG and AUTO
DSP Device Characteristics	NONE	NONE	NONE
DSP Device Format Size	1480	2560	2560
DSP Character Set Capability	NONE	NONE	NONE
Connection Request Mode	2	2	2
Destination Control Unit Address	40	40	40
Destination Device Address	40	40 – C3	40 – C3
Autocall Mnemonic	(blank)	APPL1	APPL2

Device Table Record

This table shows the Device Table entries for TPAD #2.

Parameter	Port 3	Port 4	Port 5
* Port Type	BSC 3270	BSC 3270	BSC 3270
PAD Type	TPAD	TPAD	TPAD
Clock Source	INT	INT	INT
Clock Speed	9.6	9.6	9.6
Contention	FDX	FDX	FDX
* Number of Devices	2	9	8
Service Timer	60	60	60
Error Threshold	5	5	5
Terminal PAD Timeout	3	3	3
Host PAD Timeout	15	15	15
Inter Buffer Timeout	30	30	30
Idle Device Timeout	0	255	0
Printer Disconnect Timer	45	45	45
SIGNON Key	PF1	PF1	PF1
DISC Key	PF3	PF3	PF3
Character Set	EBCDIC	EBCDIC	EBCDIC
Port Subaddress	03	04	04

Device Table Record

This table shows the Device Table entries for TPAD #2.

Parameter	Port 3		Port 4		
BSC Control Unit Address	40	40	40	C1	C2
BSC Device Address	40	C1	40 – C3	40 – C3	40
DSP Device Type	PRIN	PRIN	TERM	TERM	TERM
DSP Control	NONE	NONE	ORG	ORG	ORG and SPOLL
DSP Device Characteristics	NONE	NONE	NONE	NONE	NONE
DSP Device Format Size	480	480	2560	2560	2560
DSP Character Set Capability	NONE	NONE	NONE	NONE	NONE
Connection Request Mode	2	2	3	3	3

Parameter (continued)	Port 3		Port 4		
Destination Control Unit Address	40	40	C1	C1	C1
Destination Device Address	40	40	00	00	00
Autocall Mnemonic	(blank)	(blank)	(blank)	(blank)	(blank)
Channel Route	0	0	0	0	0
Port Number	5	5			
BSC Control Unit Address	40	C1			
BSC Device Address	40 – C3	40 – C3			
DSP Device Type	TERM	TERM			
DSP Control	AUTO and ORG	AUTO and ORG			
DSP Device Characteristics	NONE	NONE			
DSP Device Format Size	2560	2560			
DSP Character Set Capability	NONE	NONE			
Connection Request Mode	2	2			
Destination Control Unit Address	40	40			
Destination Device Address	C4 – C7	C4 – C7			
Autocall Mnemonic	APPL1	APPL2			
Channel Route	0	0			

Mnemonic Table

This table shows the Mnemonic Table entries for TPAD #2.

Entry Number	Mnemonic Name	Call Parameters
1	APPL1	30002903
2	APPL2	30002904
3	APPL3	30002903
4	APPL4	30002904

Worksheets

Introduction

Before attempting online configuration of your network, we strongly recommend that it first be planned on paper. Properly completed worksheets are a useful configuration tool and also provide a permanent record of the operating characteristics and configuration of your network.

Enter the characteristics for your configuration onto the appropriate worksheet before attempting online configuration of your network. Should you require extra copies of any worksheet to record the operating characteristics and configuration of your network, photocopy additional blank node worksheets, as required, before recording any information. These worksheets may be used with Firmware Revision 2.10.

Port Record

This table shows the parameters in the Port record. Refer to “Port Parameters” section on page 37 for descriptions of the parameters.

Form 1. Port Record — (Type BSC 3270)

Port Number					
* Port Type					
PAD Type					
Clock Source					
Clock Speed					
Contention					
* Number of Devices					
Service Timer					
Error Threshold					
Terminal PAD Timeout					
Host PAD Timeout					
Inter Buffer Timeout					
Idle Device Timeout					
Printer Disconnect Timer					
SIGNON Key					
DISC Key					
Character Set					
Port Subaddress					
Port Options					
Packet Size					

Device Table

This table shows the parameters for the Device Table. Refer to “BSC 3270 (DSP) Device Parameters” earlier in this guide for descriptions of the parameters.

Form 2. BSC 3270 Device Configuration

Port Number					
Entry Number					
BSC Control Unit Address					
BSC Device Address					
DSP Device Type					
DSP Control					
Device Control					
DSP Device Characteristics					
DSP Device Format Size					
DSP Character Set Capability					
Connection Request Mode					
Destination Control Unit Address					
Destination Device Address					
Autocall Mnemonic					
Channel Route					

DSP Elements and Definitions

Introduction

Basic 3270 DSP service is provided by the basic set of protocol elements. These elements permit an EBCDIC 3270-type device (display or printer) to establish a logical connection (virtual circuit) to a host computer.

Extended service features are provided by optional protocol elements in addition to the required elements. The optional elements permit ASCII terminal support, requesting end-to-end acknowledgment via the ACK bit and host–initiated connection.

Because the basic set of 3270 DSP service is provided, a common communications mode for various 3270 DSP implementations is allowed.

Supported Elements

Supported elements include:

- EBCDIC character set support
- ASCII character set support
- ACK-bit acknowledgment
- Limited Conversation Mode (Read command) processing
- Command and message sequencing
- STATUS message processing
- Error recovery
- Single logical connection per virtual circuit using X.25 Call Request
- Forward Abort
- Setting of ACK-bit
- Host–initiated call request

Unsupported Elements

Unsupported elements include:

- Command chaining
- Multiple logical connection per virtual circuit using Circuit Enable

DSP Definitions

DSP definitions include:

Terminal PAD

This term refers to the processes interfacing the 3270-type control unit to the network. These processes reside in the node for ports configured as BSC 3270 with the PAD type parameter set to TPAD.

Host PAD

This term refers to the processes interfacing the host computer applications to the network. These processes reside in the node for ports configured as BSC 3270 with the PAD type parameter set to HPAD.

Device

This term refers to a Terminal Device that is attached to a Cluster Controller. Typical devices include printers and terminals.

Messages

All messages in this protocol are contained in the user data field of X.25 Data (Q=0) or Data Qualified (DQ, Q = 1) packets. Only one message is contained in each packet sequence, but a single **COMMAND** or **RESPONSE** message may fill more than one X.25 data packet.

- A **COMMAND** message is used to convey commands (data) from the host to the 3270 type device.
- A **RESPONSE** message is used to convey data (except Status/Sense data) from the 3270 type device to the host.

The X.25 M-bit (More Data) is set when the length of a message to be transmitted over an X.25 interface is longer than the data field in the X.25 packets being used. The M-bit is set in a packet to indicate that the data is being continued in the next packet. It is not set for the last packet of a packet sequence.

In 3270 DSP, the M-bit may occur only in **COMMAND** and **RESPONSE** messages. As discussed later, each block of a Response message is transmitted in separate packets. Thus, the M-bit is only used if the packet size is smaller than the block size.

The X.25 Q-bit (Data Qualified) is used to separate control information from data. All Data Qualified messages must be contained in only one packet. Only **COMMAND** and **RESPONSE** messages have Q = 0.

DSP Messages

Message Formats

This table lists the **DSP COMMAND** and **RESPONSE** messages.

Message Name	*ID Byte*
Invitation to Clear	X'01'
Command/Response Undelivered	X'10'
Command/Response Aborted	X'11'
Status	X'12'
ACK	X'14'
Circuit Enabled	X'20'
Circuit Reset	X'21'
Circuit Request	X'22'
Circuit Disconnect	X'24'

COMMAND Message

The **COMMAND** message is used to convey commands (data) to the 3270 device. Any BSC framing characters (STX and ETX, or DLE, STX and DLE, ETX) must be removed, so that the first character of the **COMMAND** to be transmitted is ESC.

User Circuit Number (UCN)	*Value*	*Description*
First or Subsequent segment FS – bit 0	0	Indicates the first segment of a **COMMAND** message.
	1	Indicates a **COMMAND** segment other than the first.
UCN bits 1-7	The UCN for all single user circuits is zero.	

Control Byte	*Value*	*Description*
LCM - bit 0	0	No limited conversational response is expected.
	1	Limited conversational response is expected.
ACK - bit 1	0	No acknowledgment (**ACK**) message is expected.
	1	Delivery of this message must be acknowledged with an **ACK** message.
XPR - bit 2	0	This message does not contain transparent line code.
	1	This message contains transparent line code.

Sequence Number

The Sequence Number allows the receiver to detect missing or out of order messages. The Sequence Number is sent in the **COMMAND** message header, which is contained in the first **COMMAND** message segment. This number must be one greater than the Sequence Number of the preceding **COMMAND** message (except during error recovery). A **COMMAND** received out of sequence is treated by the DSP 3270 PAD as an unrecognizable packet. The range is 0 to 255.

Data

The Data field is of varying length as required by the Host. It begins with ESC (FS = 0) and ends with a trailer byte of ETB, ITB, ETX, or ENQ.

RESPONSE Message

The **RESPONSE** message conveys non-status/sense data from the 3270 device to the host.

Data from a 3270 device consists of one or more blocks of up to 256 bytes. The BSC framing characters (STX or DLE, STX) and the address bytes (CU, DV) in the first block are replaced by the three header bytes of the Format 1 **RESPONSE** message. Subsequent blocks, if present, use Format 2 with only the BSC framing characters replaced by the User Circuit Number byte.

If the **RESPONSE** is a Test Request message (TRQ = 1), the Format 1 header replaces the three-byte BSC header (SOH, '%', '/'), such that the first character of the data field is STX. A Test Request **RESPONSE** message cannot contain transparent text.

If a first or subsequent data block ends in ETB or DLE,ETB, the trailer byte of the **RESPONSE** segment is set to an ETB. For a final data block ending in ETX or DLE,ETX, the trailer byte of the **RESPONSE** is set to ETX.

User Circuit Number (UCN)	*Value*	*Description*
First or Subsequent segment FS – bit 0	0	Indicates the first segment of a **RESPONSE** message.
	1	Indicates a **RESPONSE** segment other than the first.
UCN bits 1-7	The UCN for all single user circuits is zero.	

Control Byte	*Value*	*Description*
LCM - bit 0	0	No limited conversational response is expected.
	1	Limited conversational response is expected.
ACK - bit 1	0	No acknowledgment (**ACK**) message is expected.
	1	Delivery of this message must be acknowledged with an **ACK** message.

Control Byte	Value	Description (continued)
XPR - bit 2	0	This message does not contain transparent line code.
	1	This message contains transparent line code.
TRQ - bit 3	0	The message is **Data Response**.
	1	The message is a **Test Request**.

Sequence Number

The Sequence Number allows the receiver to detect missing or out of order messages. The Sequence Number is sent in the **RESPONSE** message header, which is contained in the first **RESPONSE** message segment. This number must be one greater than the Sequence Number of the preceding **RESPONSE** message (except during error recovery). A **RESPONSE** received out of sequence is treated as an unrecognizable packet. The range is 0 to 255.

Data

The Data field is of varying length and ends with an ETB or ETX. Use of Forward Abort results in the data ending with an ENQ.

INVITATION TO CLEAR Message

The **INVITATION TO CLEAR** message requests that the other end of the call transmit an X.25 Clear Request Packet. Its use ensures that the virtual circuit clears after all data in transit has been delivered.

Reason (Message Identifier)	Value	Description
	00	Undefined
	01	User Initiated
	10	Unidentified DQ Packet
	11	Invalid State Transition
	12	Invalid DQ Format
	13	Invalid Data Packet Format
	20	Timeout
	21	Facility Failure

Note
Hex 01 defines message as **Invitation To Clear**.

COMMAND/ RESPONSE UNDELIVERED Message

When an unrecoverable error condition occurs during the delivery of a command/ response, (other than a total communications failure, which may cause the call to be cleared or the user circuit to be disconnected), a **COMMAND/RESPONSE UNDELIVERED** message is returned. A **COMMAND/RESPONSE UNDELIVERED** message may also be sent if data is lost during an X.25 reset, or for any other occurrence that results in lost data.

User Circuit Number (UCN)	*Value*	*Description*
All single-user circuits	0	Hex 10 defines a message as **COMMAND/ RESPONSE UNDELIVERED**.
Sequence Number: The Sequence Number allows the receiver to detect missing or out of order messages. The Sequence Number is that of the failing message that is being reported. The range is 0 to 255.		

COMMAND/ RESPONSE ABORTED Message

The **COMMAND/RESPONSE ABORTED** message may be sent when a **COMMAND** or **RESPONSE** message sequence must be aborted before completion.

User Circuit Number (UCN)	*Value*	*Description*
All single-user circuits	0	Hex 11 defines a message as **COMMAND/ RESPONSE ABORTED**. **Note** Optionally, the UCN can select up to 128 individual 3270 devices on a single virtual circuit for multiple user circuit support.
Sequence Number: The Sequence Number allows the receiver to detect missing or out of order messages. The Sequence Number is that of the last **COMMAND/ RESPONSE** message sent. The range is 0 to 255.		

LCM/Error Code	*Value*	*Description*
LCM - bit 0	0	Data not sent in response to the message with LCM-bit set.
	1	Data sent in response to the message with LCM-bit set.

Error Code	Value (Hex)	Mnemonic	Description
Bits 1 - 7	03	FF	Facilities failure detected.
	04	TIMEOUT	Failure to respond to a message.
	05	NAK	Message undelivered due to receipt of NAK.
	0A	STE	3270 device repeatedly sent STX... SUB... ENQ sequence due to terminal–related problem.
Status/Sense Bytes: When present, this field contains the sense and status bytes as received from the 3270 device. These STATUS/SENSE bytes are only present in a **RESPONSE ABORTED** message.			

STATUS Message

The **STATUS** message conveys Status/Sense information from the 3270 device to the Host PAD.

User Circuit Number (UCN)	Value	Description
All single-user circuits	0	Hex 12 defines a message as **STATUS.** **Note** Optionally, the UCN can select up to 128 individual 3270 devices on a single virtual circuit for multiple user circuit support.
Status/Sense Bytes: The two–byte status field contains the Status/Sense bytes 0 and 1 as received from the 3270 device		

ACK Message

An ACK message is sent in response to a **COMMAND/RESPONSE** message with the ACK-bit set.

User Circuit Number (UCN)	Value	Description
All single-user circuits	0	Hex 14 defines a message as **ACK**. **Note** Optionally, the UCN can select up to 128 individual 3270 devices on a single virtual circuit for multiple user circuit support.
Sequence Number: The sequence number of the **COMMAND** or **RESPONSE** being acknowledged. The range is 0 to 255.		

CIRCUIT ENABLED Message

The **CIRCUIT ENABLED** message is sent in response to an X.25 **Call Request** or a **Circuit Request** message to confirm the circuit is established and to pass information concerning the configuration in use.

Parameter	*Description*
User Circuit Number (UCN)	The UCN is zero for all single user circuits. Optionally, the UCN can select up to 128 individual 3270 devices on a single virtual circuit for multiple user circuit support.
Message Identifier	Hex 20 defines message as **CIRCUIT ENABLED**.
Source Control Unit Address	This is the controller address as seen by the PAD originating the connection. Poll address graphic characters are used.
Source Device Address	This is the controller address as seen by the PAD originating the connection. Poll address graphic characters are used.

Control Byte	*Value*	*Description*
CR - Circuit Request Usage - bit 0	0	All information for call establishment is contained in the User Data Field of the Call Request Packet.
	1	Further information for session establishment is contained in a **CIRCUIT REQUEST** message.
SM - Single/Multiple User Circuit Request - bit 1	0	Sends a **Single User Circuit Request** message.
	1	Sends a **Multiple User Circuit Request** message.
TT - Transparent Text - bit 2	0	Request is for a 3270 device that does not support Transparent Text.
	1	Request is for a 3270 device that supports Transparent Text.
EA–EBCDIC/ASCII - bit 3	0	Request is for an EBCDIC device.
	1	Request is for an ASCII device.

CIRCUIT RESET Message

The **CIRCUIT RESET** message is exchanged between the Host PAD and Terminal PAD.

Feature	Description
User Circuit Number (UCN)	The UCN is zero for all single user circuits. Optionally, the UCN can select up to 128 individual 3270 devices on a single virtual circuit for multiple user circuit support.
Message Identifier	Hex 21 defines message as **CIRCUIT RESET**.
RESPONSE Sequence Number	PAD reports the expected **RESPONSE** sequence number.
COMMAND Sequence Number	PAD reports the expected **COMMAND** sequence number.

CIRCUIT REQUEST Message (Optional Element)

The **CIRCUIT REQUEST** message is sent to request service on the user circuit specified. It contains information describing the device configuration and the type of service required at the requesting location.

Parameter	Description
User Circuit Number (UCN)	The UCN is zero for all single user circuits. Optionally, the UCN can select up to 128 individual 3270 devices on a single virtual circuit for multiple user circuit support.
Message Identifier	Hex 22 defines message as **CIRCUIT REQUEST**.
Source Control Unit Address	This is the controller address as seen by the PAD originating the connection. Poll address graphic characters are used.
Source Device Address	This is the device address as seen by the PAD originating the connection. Poll address graphic characters are used.
Control Byte	See Control Byte definition for **CIRCUIT ENABLED** message.
Device Information	See Device Information for **CIRCUIT ENABLED** message.
Connection Request Mode	This byte is a sub-protocol identification whose definition is implementation-dependent.
Destination Designators	This is a variable length field containing data defining the PAD–to–PAD terminal mapping relationship and the host application being used for the connection. The field size is ’n’ bytes where ’n’ is defined to be 0_n_ (packet size - 7).

CIRCUIT DISCONNECT Message (Optional Element)

The **CIRCUIT DISCONNECT** message deactivates the specified user circuit.

Parameter	Description
User Circuit Number (UCN)	The UCN is zero for all single user circuits. Optionally, the UCN can select up to 128 individual 3270 devices on a single virtual circuit for multiple user circuit support.
Message Identifier	Hex 24 defines message as CIRCUIT DISCONNECT.

Reason Code	Value	Description
	0	Undefined
	1	User Initiated
	10	Unidentified DQ Packet
	11	Invalid State Transition
	12	Invalid DQ Format
	13	Invalid Data Packet Format
	20	Timeout
	21	Facility Failure

User Data Field of the Call Request Packet

This field is the last part of the X.25 Call Request Packet. It is used to identify the call as a 3270 call and to communicate information to the host on the mapping relationship identity of the 3270 device and the host with which it desires to communicate.

Feature	*Description*
Protocol ID	Hex 56 defines Host Initiated calls Hex 57 defines Remote Terminal Initiated calls
Source Control Unit Address	This is the controller address as seen by the PAD originating the connection. Poll address graphic characters are used.
Source Address Device	This is the device address as seen by the PAD originating the connection. Poll address graphic characters are used.
Control Byte	See Control Byte definition for **CIRCUIT ENABLED** message (in the “CIRCUIT ENABLED Message” section on page 85.
Device Information	See Device Information for **CIRCUIT ENABLED** message (in the “CIRCUIT ENABLED Message” section on page 85).
Connection Request Mode	This byte is a sub-protocol identification whose definition is implementation dependent.
Destination Designators	This is a variable length field containing data defining the PAD to PAD terminal mapping relationship and the host application being used for the connection. The field size is ‘n’ bytes where ‘n’ is defined to be 0_n_10

The remaining ’m’ bytes of the User Data Field are reserved for future PAD-to-PAD functions.

The value ’m’ is defined to be 0_m_ (10-n).

Routing Configuration Example

Introduction

In Figure 21, the HPAD is connected to the TPAD via an X.25 PDN. The HPAD has node address 10100 and the TPAD has node address 10200. The HPAD node has two BSC HPAD lines. Port 1 has two controllers, 40 and C1, with four and five devices respectively. The logical devices and their characteristics (such as color, transparency, screen size, and so on) must match the configuration of the devices in the BSC host.

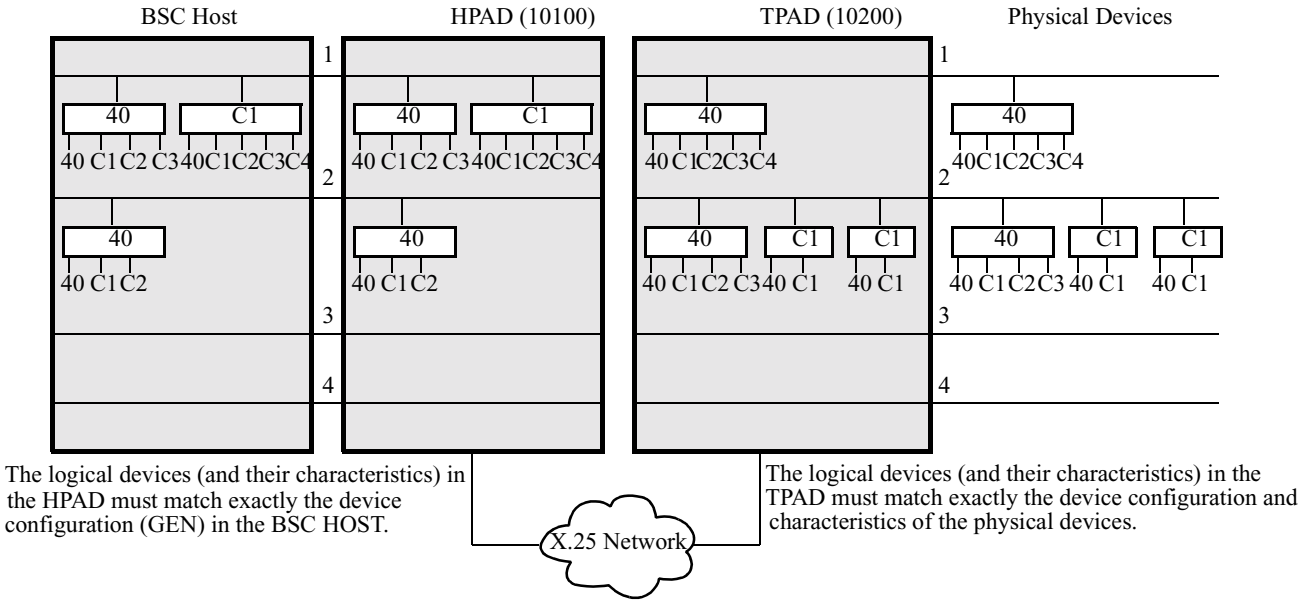


Figure 21. HPAD Connected to TPAD Using X.25 PDN

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