Vanguard Managed Solutions

Vanguard Applications Ware
Serial Feature Protocols

TPDU Protocol

Notice

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Transaction Protocol Data Unit (TPDU) Protocol

Overview

Introduction

This manual describes the Transaction Protocol Data Unit protocol option for Vanguard nodes.

Related Documentation

Refer to these related documents for additional information:

- *Vanguard Configuration Basics Manual*: this manual (Part Number T0113) details how to configure and maintain a node.
- *Feature Protocols Manual*: this series of binders contains user's manuals that describe options and protocols designed for the Vanguard Applications Ware you are authorized to use.

In This Manual

The TPDU Option

What is TPDU

The Transaction Protocol Data Unit (TPDU) is a connection-less, packet-based protocol designed for transaction-oriented applications. It provides an efficient means of concentrating a large number of access devices onto one or more host connections with a maximum of 512 connections per node.

The TPDU option is available for all Vanguard products. TPDU consists of these software components:

- Router software
- Several protocol adapter software packages

TPDU Router

The TPDU Router is a software option that provides support for routing TPDU packets. With the appropriate protocol adapter option, it provides termination of popular serial access transport protocols (for example, 3270/DSP) to allow data from serial access devices (for example, BSC3270 POS devices) to be transported and routed in TPDU packets.

TPDU Protocol Adaptor

A TPDU Protocol Adapter (TPA) is a software component that provides conversion between the TPDU protocol and the native transport protocols used by the access devices (for example, BSC3270/DSP or SDLC/QLLC). A specific TPA exists for each supported access protocol.

Features

Key TPDU features include:

- Concentration of large numbers of Vanguard devices onto one Host connection
- Simplification of host programming and reduction of host CPU loading via a common transaction-oriented TPDU protocol
- Protocol conversion that allows the host to support new protocols with a minimum of modification
- Flexibility resulting from TPDU conversion at either the host or access end
- Improved transaction times, versus a HPAD/TPAD solution, by removal of the HPAD poll cycle delay
- Access protocol data exchange provided by routing data from one serial protocol adaptor to another (for example, BSC3270 data to async port)
- Session and Flow Control to provide a reliable transport mechanism between host and device

Note

The SNMP management of the TPDU feature is not supported. Effective Release 6.0.R000 and greater, FRA TPA is no longer supported as a TPDU Protocol.

Product Support

TPDU is supported by these Vanguard products:

- 6500*PLUS*
- Vanguard 100
- Vanguard 200
- Vanguard 300/305
- Vanguard 320
- 650D
- Vanguard 6520
- Vanguard 6560
- Vanguard 6400 Series
- Vanguard 34x Series

Note

The Vanguard 7300 Series supports SDLC full duplex only.

Supported Access Protocol Adaptors

Each product (except for the Vanguard 7300 Series) supports the standard TPDU protocol and these access protocols:

- BSC3270/DSP[1]
- SDLC/QLLC (includes PU2/LU0 support)
- X.25
- TCP
- UDP
- BSC2780

Note

Some images may not support the full adapter set.

Theory of Operation

Introduction

This section describes the operation of the TPDU.

TPDU Message Format

A TPDU message has the following format:

- Protocol ID: Identifies the access protocol associated with the data in this TPDU message.
- Destination Address: Specifies the information required to route the message to its destination.
- Source Address: Specifies the information required to route the message response back to the originator.

Figure 1 illustrates the TPDU protocol packets.

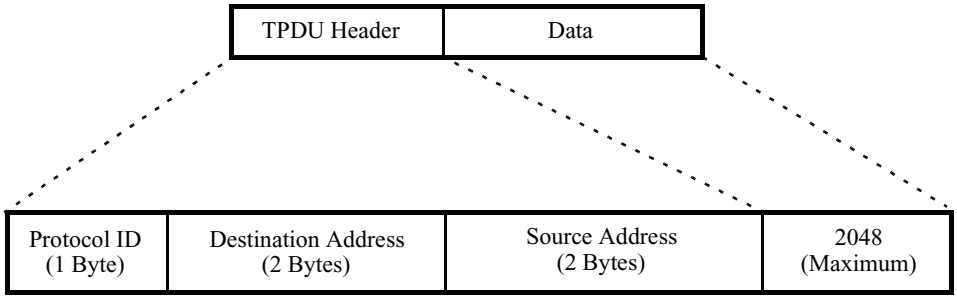


Figure 1. TPDU Header Format

TPDU Router Architecture

Figure 2 illustrates TDPU router architecture, which is a TPDU router core surrounded by slots you configure to function as any of the supported TPDU Protocol Adapters (TPAs). The TPA converts protocols to the TPDU format and performs any connection or session maintenance required by the access protocol. Each slot on the router can support one connection of the type configured for the slot.

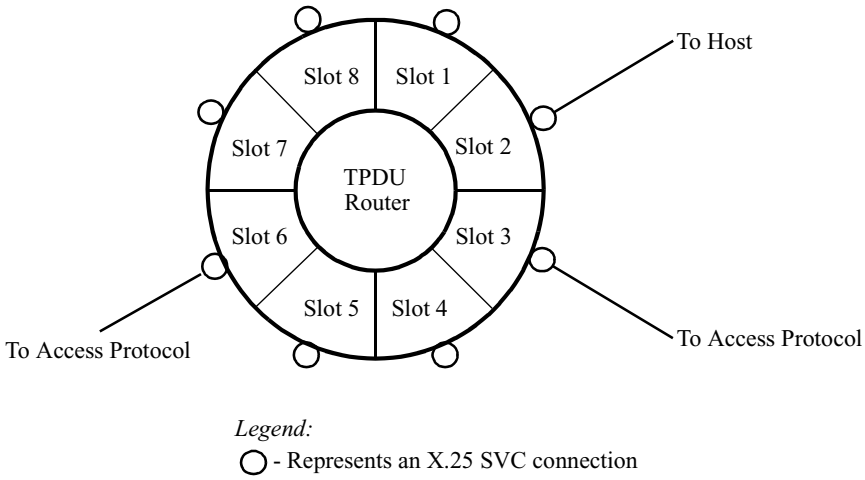


Figure 2. TPDU Router Architecture

Local or Remote Conversion

The typical TPDU network involves concentrating a large number of terminal devices into a small number of host connections. Usually, conversion to TPDU is done at the access point, although there may be cases where termination of the access protocol on the TPDU server, at the host, is either required or desirable.

Consider the following when deciding where to do the conversion:

- Distribution of process (conversion) to the access nodes versus the host site node
- The value of reducing the number of connections through the network by aggregating at the access node
- Availability of software in a specific image
- Reducing the memory and processing resources at a node by minimizing the number of connections (the number of slots) terminating at that node

TPDU Addressing; Address Structure

TPDU address consists of a 2-byte field that is further sub-divided into bit fields as part of network configuration. Each router that a TPDU packet may encounter on its way through the network must have a unique field of bits allocated for it in the address field. The value in the bit field directly maps to the slot number to which the packet is routed, as shown in the table below. As part of the TPDU router node configuration, you must specify the base address (0-15). This defines the starting bit position of the address field for that node.

Note

This is counted from left to right.

Additionally, you must specify the number of bits to be used for the address field for that node.

Note

Allocate enough bits to account for the number of slots configured on the server.

Address Field Bit Interpretation

Figure 3 illustrates the allocation of address space to a node that has 7 slots (3-bits) and, therefore, requires at least three bits. The base address in this example is 9.

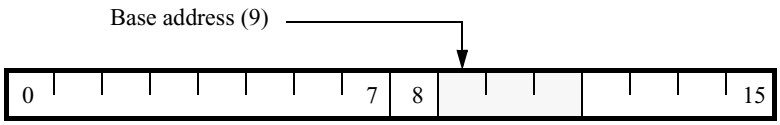


Figure 3. Address Structure

This table describes the bits in the address field shown in Figure 3, and identifies the corresponding slots.

bit 9	bit 10	bit 11	Route to Slot
0	0	0	Reserved
0	0	1	slot 1
0	1	0	slot 2
0	1	1	slot 3
1	0	0	slot 4
1	0	1	slot 5
1	1	0	slot 6
1	1	1	slot 7

Destination Address

The destination address is specified by the sender at the point where the TPDU packet enters the TPDU network (the part of the TPA configuration that does the conversion). This address specifies the destination, and the route to the destination. Each access protocol TPA allows the configuration of the destination address for the TPDU packets generated by that adaptor.

Source Address

The source address is constructed as the packet traverses the network. Each router places the number of the slot from which the packet arrived, in the appropriate bit field in the source address of packet before sending it out. When the TPDU packet reaches the final destination, the source address contains the complete route taken to reach the destination.

Host Address Processing

The host typically swaps the source and destination addresses of the incoming packet when sending the response.

TPDU Routing

Introduction

This section briefly explains how TPDU addressing and routing functions.

Routing Structure

Figure 4 illustrates the hierarchical routing structure of a fairly complicated 3 node TPDU network. The routing address map is shown at the top of Figure 4.

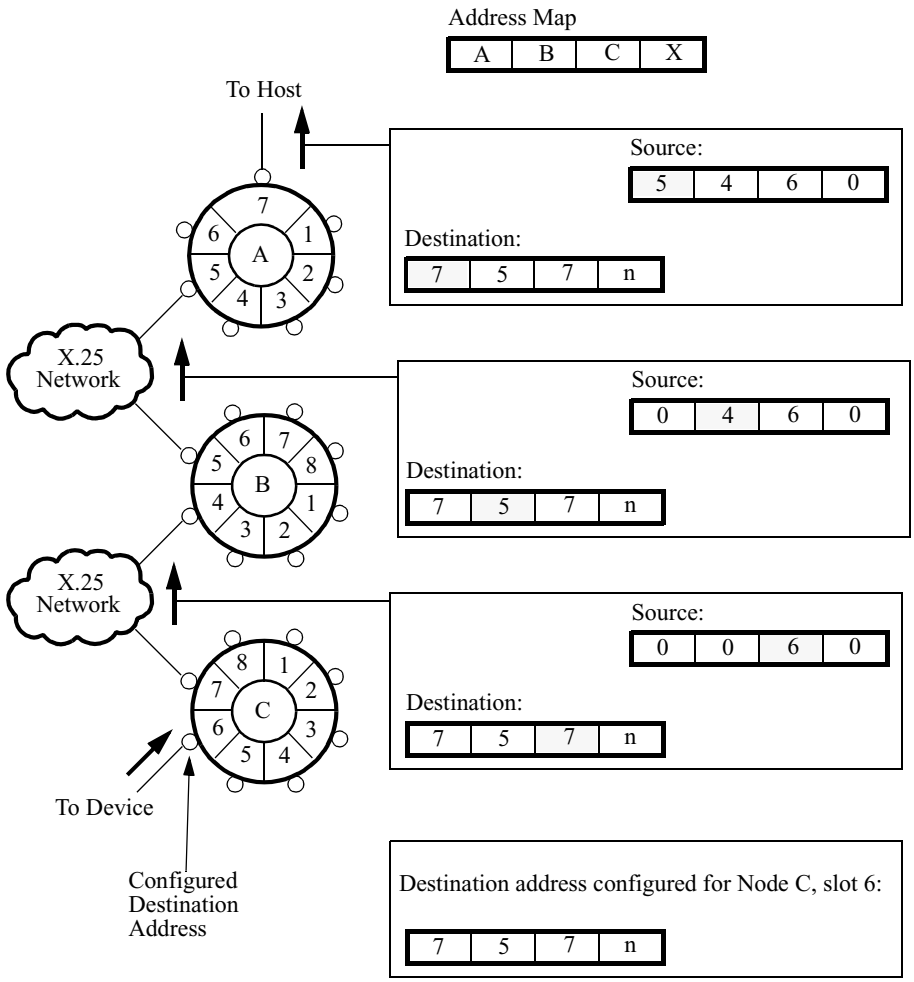


Figure 4. TPDU Routing Example

In this example each node is assigned a 4-bit address field according to the following table.

Node	Base Address	Address Size
A	0	4
B	4	4
C	8	4

The access protocol from the access device is terminated on the Node C slot. The inter-node connections, and the connection to the host, are all X.25 TPAs with TPDU header parameter set to ON so that the TPDU header is sent.

Access Device to Host Routing

The destination address is specified as part of the configuration of the adapter slot that terminates the access protocol connection (at the adapter slot).

Each router examines the value in the assigned field of the TPDU packet destination address and forwards the packet to the slot associated with that value.

The TPDU source address is modified by each TPDU router it passes through on the way to the host.

Host Address Processing

When the host processes a TPDU packet, it generates the header for the response TPDU by swapping the source and destination address from the received TPDU packet.

Host to Access Device Routing

Routing back to the access device is based on the destination address that was the source address that was constructed on the path to the host. At each TPDU router, the destination slot number is extracted from the destination address field configured for that router, and is passed to the specified slot.

Connection Management

Automatic Connection

A properly configured TPA can automatically initiate a connection whenever the TPA is booted or reset. To configure a TPA in this way, the Autocall Mnemonic parameter must be configured and the Autocall Establishment set to ON.

Call on Data

A properly configured TPA initiates a connection whenever data is routed to it. To configure a TPA in this way, the Autocall Mnemonic parameter must be configured and the Autocall Establishment must be set to OFF. This feature is typically used with the idle timeout so that a call is cleared after a configured idle period.

Note

TCP and UDP TPAs do not have an Autocall Mnemonic. These TPAs use a combination of Destination IP Address and Destination Port number for making a call or sending datagrams.

Routing to TPAs

Routing calls to TPAs is dependent on the TPA type as listed below:

TPA	*Description*
X.25 SDLC	All calls routed to these TPAs must have a routing table entry with a destination of TPR. When a call comes to the router it extracts the last 3 digits from the called address and interprets them as the slot number to which the call should be routed. The slot address can be anything from 1 to 512. **Note** Assign the TPR an address that is different than the node address to avoid conflict with sub-addresses used by other resources in the node. For example, if 200 is the node address and the TPR address is 201, you can configure the routing table with routing entry for address 201* as a destination of TPR.
BSC3270 BSC2780	All calls being routed to BSC3270 TPAs must have a routing table entry with a destination of “TPA3270.” For BSC2780 TPAs, the entry is TPA2780. Routing to individual TPAs is based first on a match of the called address to the individual TPAs “Address” parameter. For BSC3270, when the Address parameter is the same for more than one TPA, the controller and device addresses are used based on the CRM mode selected. TPAs should not share the same address in case of BSC2780. **Note** Each BSC3270/2780 TPA must have a valid Address parameter value configured.
TCP UDP	All calls to TCP and UDP TPAs use the combination of IP address and TCP/UDP port number. Each TPA has the Source IP Address and the Source Port Number configurable parameters. **Note** All datagrams destined for the UDP TPA are determined by the IP address and port number. Usually the TPA source IP address is configured with the same value as the node IP address.

Rejecting Call Requests

Call requests can be rejected for the following reasons:

- The slot does not exist.
- The slot is disabled.
- The slot is connected.
- The call request Protocol ID does not match the configured value.

Each TPA compares the configured protocol ID with the protocol ID in the call request packet. If they match, the call is accepted. This check is not done if the protocol ID is not configured.

Note

TCP and UDP TPAs do not support Protocol ID matching.

Call Clearing

The call can be cleared by either side when the following occurs:

- Boot the Port/TPA/Router/Node
- X.25/IP network (network problems)
- Idle time out (if configured)

Data Handling

Session Control

TPDU is a datagram protocol which, by itself, does not provide a reliable transport mechanism. However, with Session Control and Flow Control parameters enabled, TPDU provides a reliable connection-oriented transport mechanism between two adjacent TPAs. This is illustrated below, in Figure 5, by the established connection between TPAs. Data arriving at a router node may be discarded if Session Control and Flow Control are disabled, and the data is destined for a link that is unavailable or is in a flow controlled state.

With Session Control, a TPA receiving a Call Request from a host (or device), delays sending the Call Accept reply. This delay continues until the adjacent TPA completes its connection to the device or host. After both connections come up, data transfer takes place.

Figure 5 shows the connection establishment process involving an X.25 host connecting to a 3270 TPAD through an X.25 TPA and a 3270 TPA.

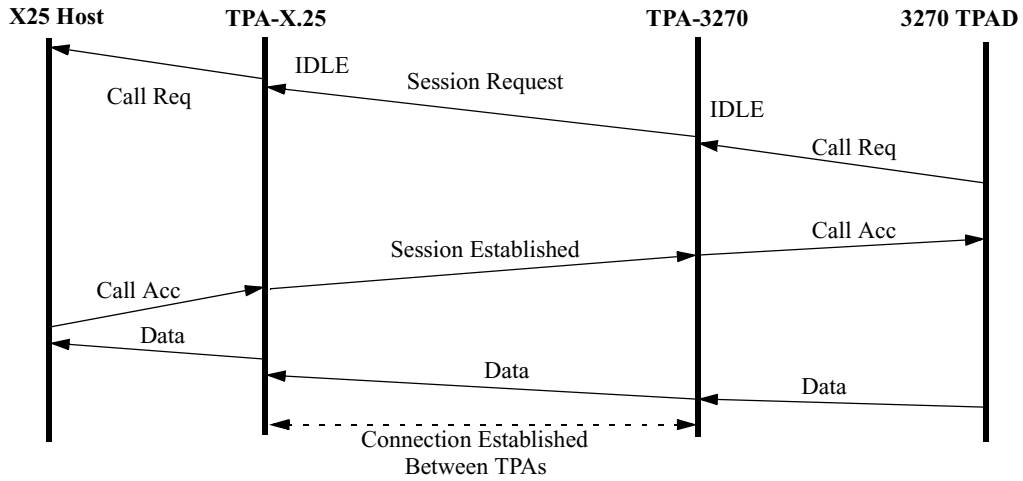


Figure 5. Session Enhancement Between X.25 and BSC3270 TPAs

Figure 6 shows the same example as Figure 5, without Session Control.

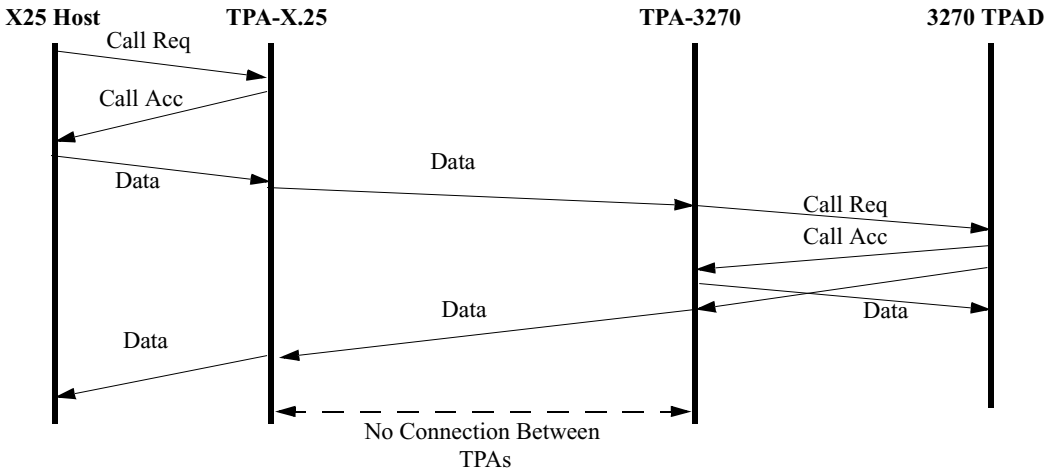
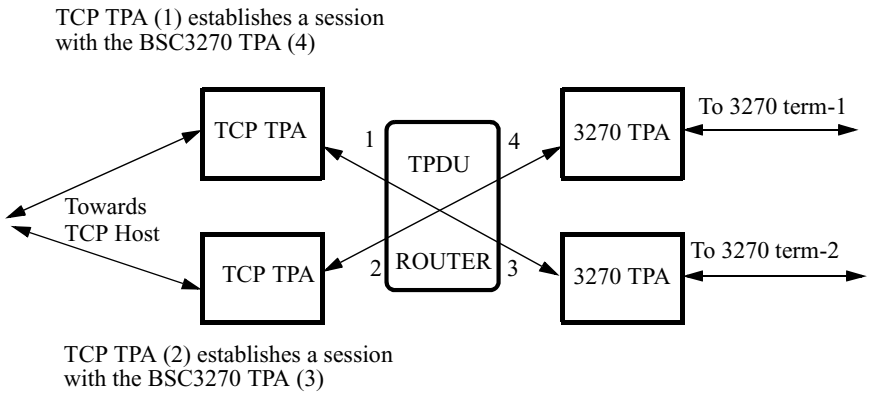


Figure 6. Session Enhancement Without Session Control

When...	Then...
Session Control is disabled	The TPAs work in a connectionless, many-to-one mode. Each TPA can send and receive data from any TPA and, depending on the destination address in the TPDU header, the TPDU router sends data packets through the individual TPAs.
Session Control is enabled	A connection must exist between the TPAs before they can send data to each other. This connection is one-to-one mode connection, that is, one TPA can support only one session at a time. See Figure 7.



TPA	Slot No.	Destination Address
TCP	1	3000
TCP	2	4000
3270	3	2000
3270	4	1000
One to One Mapping is enforced between TPAs using Destination Addresses. This configuration assumes that the base address is Ô0Õ and the address length is 4 bits.		

Figure 7. One-to-One Mapping in Session Establishment

Flow Control

Each TPA does Flow Control with the adjacent TPA, with the host, and with the device. In this way, data packets are not lost due to queue overflowing. If Session Control is enabled, but Flow Control is disabled, a connection is still established between the TPAs. However, data packets are discarded if the TPA queues overflow.

In case of a TCP TPA, after the TCP host connection is established, the TPA attempts to establish a session with the adjacent TPA. If the session attempt is unsuccessful the TCP connection is cleared (Figure 8).

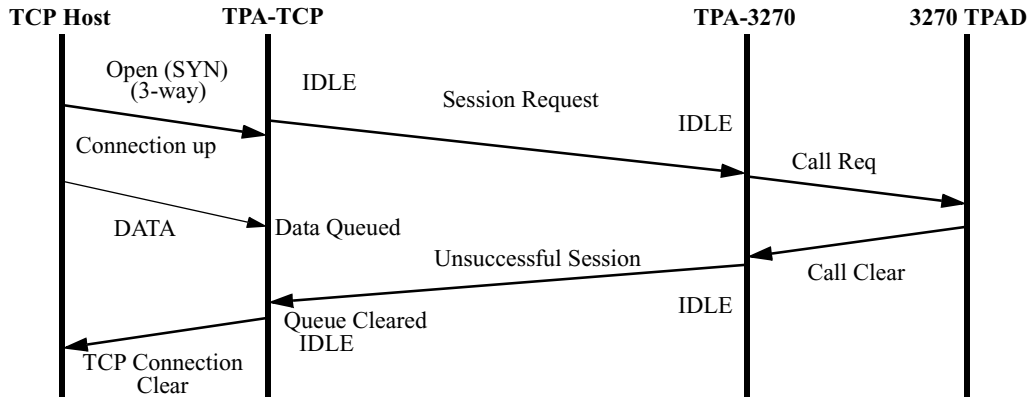


Figure 8. Example Unsuccessful Session Between TCP and BSC3270 TPAs

Establishing a Session with Different TPAs

Figures 9 and 10 show different scenarios of the session establishment between different TPAs.

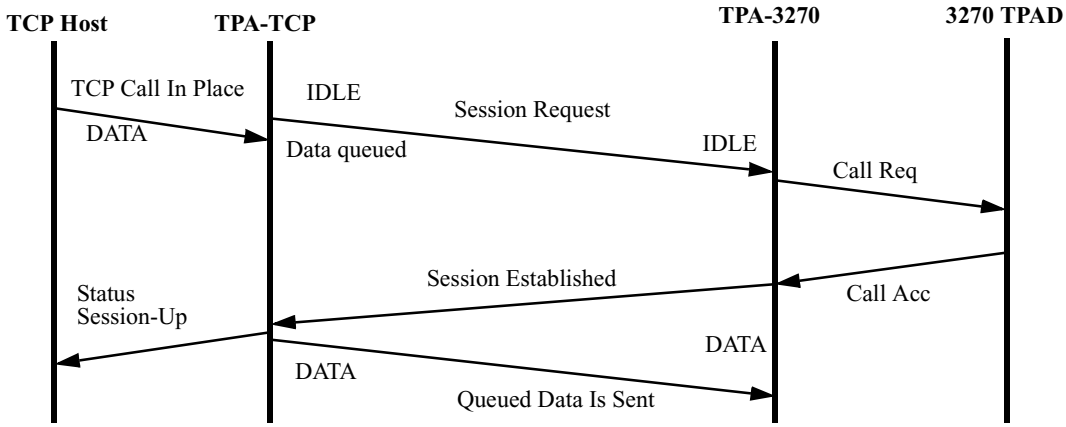


Figure 9. Successful Session Establishment - TCP Call in Place

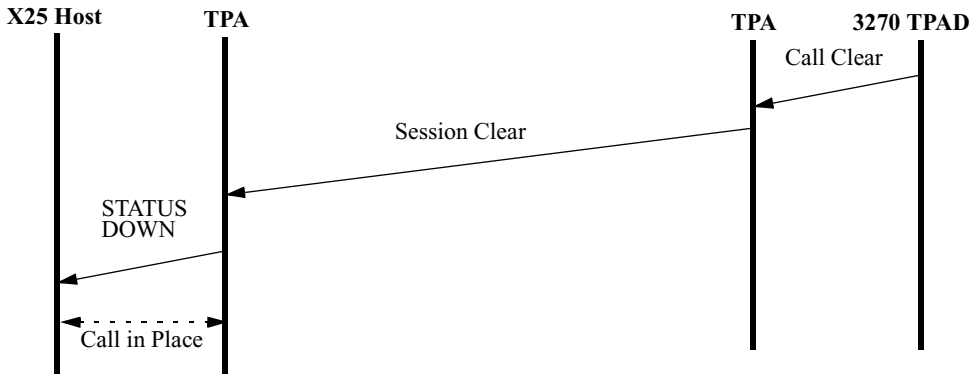


Figure 10. Session Clear - X25 Configured NOT to Close Connection

The term Call In Place means a connection is established. When a data packet arrives from the host, the TPA attempts to establish a session. This happens only when the TPA parameter Call in Sync with Session is disabled (OFF). If this parameter is OFF when the session is cleared, the protocol connection towards the host/device is not cleared and the session is activated the next time it is triggered by a data packet.

Once the connection is established, and the Forward Status Messages parameter is enabled, the TPA sends a status message (SESSION -UP) to the host.

Status Messages

The host differentiates between data and status messages by the first byte in TPDU header (Protocol ID). This byte is set by the TPAs Session Control ID parameter, in the TPDU router configuration record. This byte also differentiates between data messages and session control messages sent by the TPAs. These messages become the payload in the TPDU packet.

SC-Stat (0X07)	Length	Status Field	Status String
(1 Byte)	(1 Byte - Specifies the length of the Status Code Field)	(Status Encoding)	

Status Codes:

0X00 = Reserved
0X01 = Status Up
0X02 = Status Down
0X03 = Device is up
0X04 = Device is Down

Figure 11. TPDU Status Message Format

Status String Format

This table defines the Status String format.

Name	Code	String format
Status Up	0x01	SESSION UP
Status Down	0x02	<X25 Cause Code>, <X25 Diag Code>, SESSION CLOSED
Device Up	0x03	<Ctrl>, <Dev>, DEVICE UP **Note** This is only generated by the BSC3270 TPA.
Device Down	0x04	<Ctrl>, <Dev>, DEVICE DOWN **Note** This is only generated by the BSC3270 TPA.

Note

Cause code, Diagnostic code and Controller and Device addresses are specified in ASCII formatted hex values (for example 0x05). If the Controller and Device addresses are not present in the protocol, they are set to 0x00.

Error Recovery

There is no error recovery facility between TPAs on a router. Error recovery procedures between TPAs and access protocols are specific to the adapter.

Applications

Introduction

This section provides examples of applications that illustrate the capabilities and features of the TPDU Router software option.

Common Protocol Interface

Use the TPDU to provide a common interface at the host for a variety of common access protocols.

Figure 12 illustrates an application with a variety of POS devices accessing a host for transaction processing. The native access protocols used by the POS devices are adapted to a single X.25 interface to the host. The TPDU protocol identifies the access protocol and the source device (TPA) and lets the host route responses back to the devices.

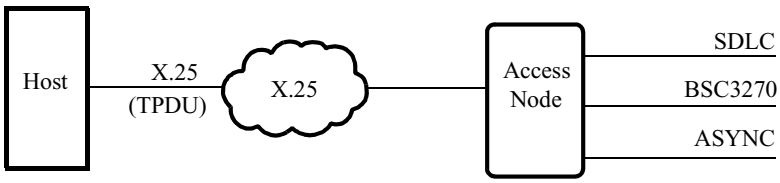


Figure 12. POS Devices and Host Transaction Processing

Note

The data packets received by the host have the same character set and message format as the original access protocol. Refer to individual TPA sections for specific formats.

Concentration

Use the TPDU to concentrate a large number of remote connections onto a single connection to the host. Figure 13 illustrates an application that concentrates messages from a number of remote sites onto a single async host port.

Note

In this case the host cannot send messages back to the async devices because the TPDU header is not enabled on the link to the host. The host, therefore, has no way to address the individual devices.

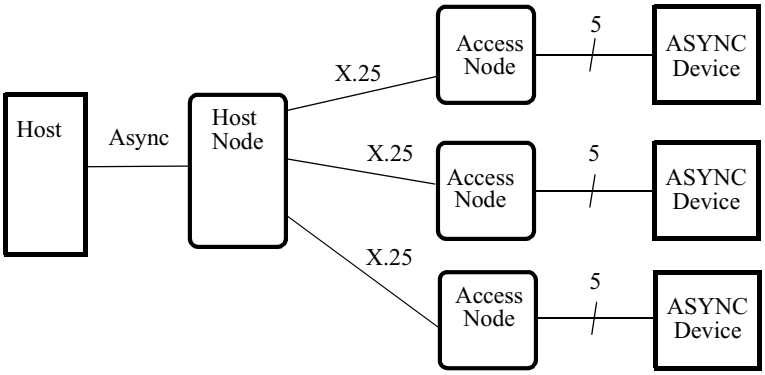


Figure 13. Alarm Message Concentration

Example TPDU Configuration

Configuration

Figure 14 illustrates an example TPDU configuration; important configurable parameters are shown below. Note that the Session and Flow Control parameters are not shown. The following sessions explain how to configure them.

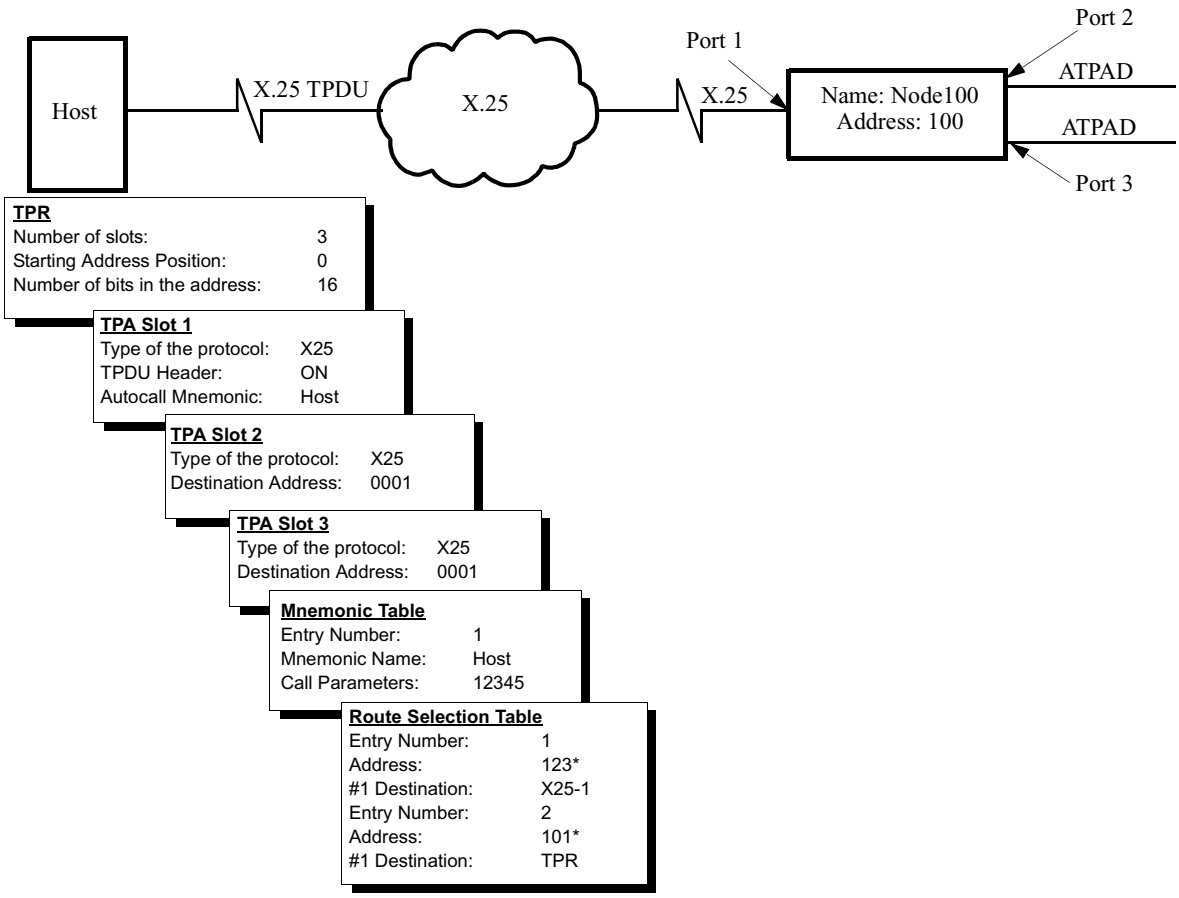


Figure 14. Sample TPDU Configuration

Router Configuration and Control

Introduction

This section describes the TPR Router Configuration and Control parameters, as found in the CTP's TPR Configure menu.

What You See in This Record

Figure 15 shows the parameters available from the TPR Conf menu.

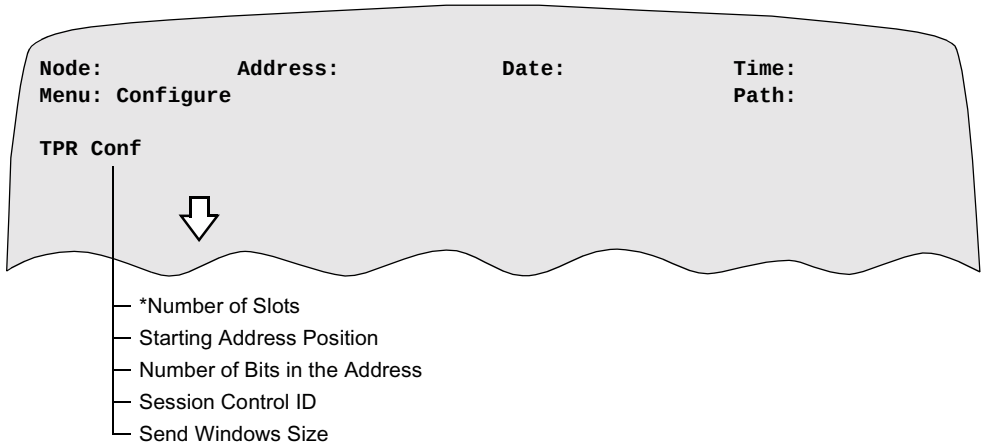


Figure 15. TPDU TPR Configuration Parameters

Parameters

When configuring the router, you can modify the following parameters:

Note

Unless otherwise indicated, you must perform a TPDU Router boot for changes to these parameters to take effect.

Number of Slots

Range:	1 to 512
Default:	2
Description:	Specifies the number of slots configured on this router.
Boot:	Perform a Node boot for changes to this parameter to take effect.

Starting Address Position

Range:	0 to 15
Default:	0
Description:	Specifies the bit position in the TPDU address at which the address bits reserved for this router start. It is counted from left to right (for example, xxxx yyyy yxxx xxxx) where y is the address bits reserved for this TPDU Router and x is the address bits reserved for other TPDU Routers.

Number of bits in the address

Range:	1 to 16
Default:	4
Description:	Specifies the size of the address reserved for this TPDU router (for example, xxxx yyyy yxxx xxxx) where y is the address bits reserved for this TPDU Router and x is the address bits reserved for other TPDU Routers.

Session Control ID

Range:	0 to 2 (hex)
Default:	0xFF
Description:	Separates Control messages from data messages being passed between TPAs. **Note** This parameter is part of the session control message Protocol ID field and should be different from the configured value of protocol ID field of the TPAs.

Send Window Size

Range:	8 to 32
Default:	8
Description:	Provides flow control, in conjunction with the Flow Control parameter, of data packets being sent to adjacent TPAs without an internal acknowledgment from the TPDU. The adjacent TPA sends an acknowledgment for a data packet when it sends the data to the device to which it is connected. **Note** Issues to be considered when this parameter is defined include: • The number of TPAs configured • The delay in sending out the packets by each TPA. This applies because the “Send Window Size” actually defines the maximum queuing capacity required by each individual TPA towards the network side.

Configuration and Control Facilities

Introduction

This section identifies the TPDU configuration and control facilities.

Examining Configurations

You can examine router and slot records by selecting the following menu items in the Examine menu:

- TPR Exam: Specifies router record examination.
- TPA Exam: Specifies slot record examination.

Listing Configurations

You can list router and slot records by selecting the following menu items in the List menu:

- TPR List: Specifies router record listing.
- TPA List: Specifies slot record listing.

Copying Configuration Records

You can copy slot records using the Copy menu. TPA Copy is for slot record listing.

Router Boot Functions

Boot functions are supported at the router level. Booting the router clears all existing calls for all slots configured on the router, and boots all slots (see Slot Control Functions). The CMEM record is read again. If the number of slots changes, the TPR boot is aborted after displaying an error message. All new configurations take effect after a successful TPR boot.

The Boot command fails if you change the number of slots configured. This requires a node boot. All other router configuration changes take effect during TPR boot.

The Boot command is located in the CTP's TPR Boot menu.

Slot Control Functions

Boot/Enable/Disable functions are supported at the slot level. Booting or disabling a slot clears the current call for that slot. Once disabled, the slot is inactive and does not accept calls.

You can change a slot's disabled state by performing one of the following actions at the CTP:

- Slot enable
- Slot boot
- TPR (router) boot
- Node boot

The Slot Boot fails if you change the protocol type. If this occurs, perform a node boot. All other slot configuration changes takes effect during slot boot.

Statistics

Introduction

This section describes the format of the Router and Slot statistics screens and provides the definition of each statistic.

Caution

All the statistics are stored in 4 Byte counters. Since the statistics are cumulative, counters can overflow and result in an automatic reset. You do not receive a notification about this incident.

Displaying TPR Statistics

To display the TPR Statistics menu:

Step	*Action*	*Result*
1	Select **Status/Statistics** from the CTP Main menu.	The Status/Statistics menu is displayed.
2	Select **TPR Statistics** from the Status/Statistics menu.	The TPR Statistics menu is displayed.
3	Select **Display TPR Stats**.	The TPDU Router Statistics menu is displayed. This may appear similar to that shown in Figure 16.

```
Node:                Address:            Date:               Time:
TPDU Router Statistics                                       Page 1 of 1


 Transaction Summary:
                             IN                  OUT
Characters:              000000000           000000000
TPDUs:                   000000000           000000000
Discarded TPDUs:         000000000           000000000

Slot Summary:
      Number of Connected Slots: 0000

Slot Summary
Slot No.      Protocol       State          Link Status      Calling TPDU
    1         SDLC           ENABLED        DOWN
    2         X25            ENABLED        DOWN


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

Figure 16. TPDU Router Statistics Screen

TPR Statistics Screen Terms

All statistics are computed since the last statistics reset or node boot. These statistics are the sum of individual slot statistics. A Slot Statistics Reset, therefore, effects the router statistics. This table describes the terms found in Figure 16.

Term	*Indicates...*
Characters IN/OUT	Total number of characters received/transmitted by all slots.
TPDUs IN/OUT	Total number of TPDU packets received/ transmitted by all slots.
Discarded TPDUs IN	Total number of incoming TPDUs discarded by the router due to an invalid address in the TPDU header
Discarded TPDUs OUT	Total number of TPDU packets discarded by all slots. This counts only those TPDUs discarded by the destination slot because it is blocked, disabled, or because the packet was an unexpected incoming control (SDLC) packet only. Packets discarded due to an invalid destination address are not counted. **Note** The number of packets discarded due to invalid address is not included in the discard count.
Number of connected slots	Total number of slots in the connected state
Slot No	Number of the slot (Range 1 to 512)
Protocol	Type of TPA used for this slot
Poll address	Address of the device/terminal/controller that is connected to this slot. This address is only relevant to the SDLC–PU2/LU0, BSC3270 TPAs.
Status	Operational status of the slot: • Connected • Disconnected • Dead (not initialized)

Resetting TPR Statistics

To reset the TPR statistics:

Step	Action	Result
1	Select **Status/Statistics** from the CTP Main menu.	The Status/Statistics menu is displayed.
2	Select **TPR Statistics** from the Status/Statistics menu.	The TPR Statistics menu is displayed.
3	Select **Reset TPR Stats**.	The prompt **TPR Statistics Rest Proceed (y/n):** is displayed.
4	Press y to reset the statistics screen or n to leave the current statistics unchanged.	The TPR Statistics menu is displayed.

Displaying TPA Slot Statistics

To display the TPA Slot Statistics:

Step	Action	Result
1	Select **Status/Statistics** from the CTP Main menu.	The Status/Statistics menu is displayed.
2	Select **TPR Statistics** from the Status/Statistics menu.	The prompt '**Enter the slot number:**' is displayed.
3	Enter the desired slot number.	The Detailed Slot Statistics menu is displayed. This may appear similar to that shown in Figure 17.

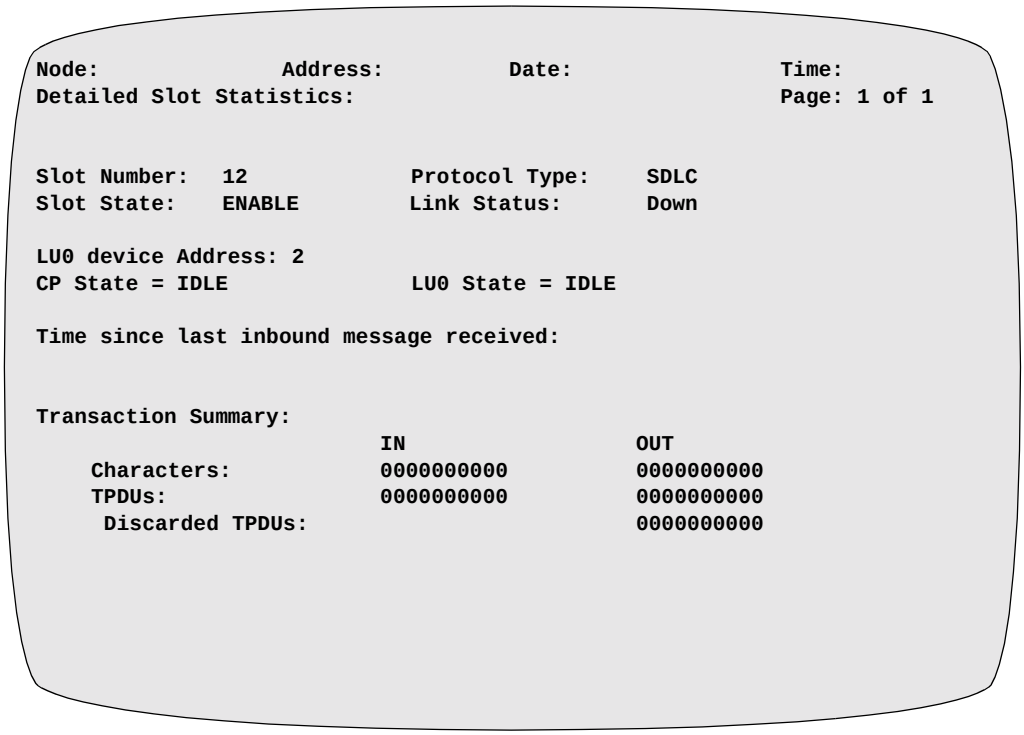


Figure 17. TPDU Slot Statistics Screen

TPA Statistics Screen Terms

This table describes the terms found in Figure 17.

Term	*Indicates...*
Slot State	Indicates the current state of the slot
Protocol Type:	Type of TPA used for this slot
TPDUs IN/OUT	Total number of TPDU packets received/ transmitted by all slots
Link Status	The current status of the data link
Discarded TPDUs OUT	Total number of TPDU packets discarded by all slots. This counts only those TPDUs discarded by the destination slot because it is blocked, disabled, or because the packet was an unexpected incoming control (SDLC) packet only. Packets discarded due to an invalid destination address are not counted. **Note** The number of packets discarded due to invalid address is not included in the discard count.
Last inbound message received at:	The time at which the last inbound message was received by the TPDU slot.

Resetting TPA Statistics

To reset the TPA statistics:

Step	Action	Result
1	Select **Status/Statistics** from the CTP Main menu.	The Status/Statistics menu appears.
2	Select **TPR Statistics** from the Status/Statistics menu.	The TPR Statistics menu appears.
3	Select **Reset TPA Stats**.	This prompt appears: **TPA Statistics Reset** **Enter the slot number:** **Proceed (y/n):**
4	Enter the desired slot number and press **Return**.	This prompt appears: **Proceed (y/n):**
5	Press y to reset the statistics screen or n to leave the current statistics unchanged.	The TPR Statistics menu appears.

Protocol Adaptors

Introduction

Effective with Release 5.1, these TPAs are supported:

- X.25 TPA
- SDLC TPA
- BSC3270 TPA
- BSC2780 TPA
- TCP TPA
- UDP TPA

Each of these TPAs are described in detail in the next three sections.

Protocol Adaptor Configuration

Introduction

This section describes the TPR Router Configuration and Control parameters, as found in the CTP's TPR Configure menu.

What You See in This Record

Figure 15 shows the parameters available from the TPA Conf menu.

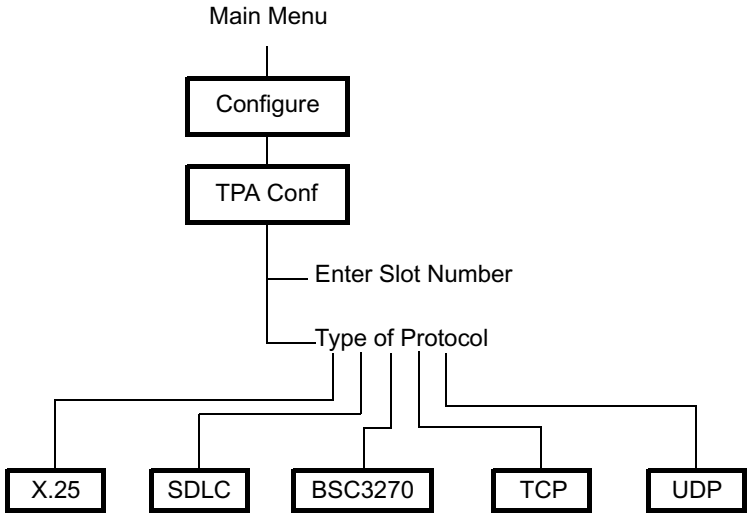


Figure 18. TPDU TPR Configuration Parameters

Session and Flow Control Configuration

Introduction

Each TPA has its own session and flow control configuration parameters. By modifying these parameters, session and flow control can be enabled or disabled in each TPA.

Note

Session and Flow Control can be enabled or disabled independently. Although there is no dependency between them, it is recommended that both be enabled to prevent data loss due to queue overflow.

Parameters

For Session and Flow control to work properly, configure the destination address of each TPA such that TPA packets, sent to the TPDU router are routed to the adjacent TPA, with which the source TPA wants to establish a session.

For example, if two TPAs (slot 1 and slot 2) want to establish a session (as shown in Figure 7, the destination addresses of slot 1 and slot 2 TPAs should be 2000 and 1000, respectively (assuming the base address is 0 and the length of address bits is 4). If the destination address of slot 2 were configured incorrectly, say 3000, the session is still established if the session request is from slot 1. However, data packets sent from slot 2 are routed to slot 3 due of the incorrect address.

X.25 Protocol Adaptor

Introduction

The X.25 TPA connects a TPDU router to an X.25 device or host, and converts the data packets from the X.25 SVC to the TPDU datagram packets, and vice versa. By allowing the "Strip TPDU Header" to be configured as OFF or ON, the X.25 TPA can support X.25 connections to either TPDU or non-TPDU devices.

An X.25 TPA, as shown in Figure 19, provides protocol conversion between the X.25 data received from the X.28 PAD and the TPDU protocol required by the host. TPA1 and TPA2 are both X.25 TPAs. The only difference is the setting of the TPDU Header parameter.

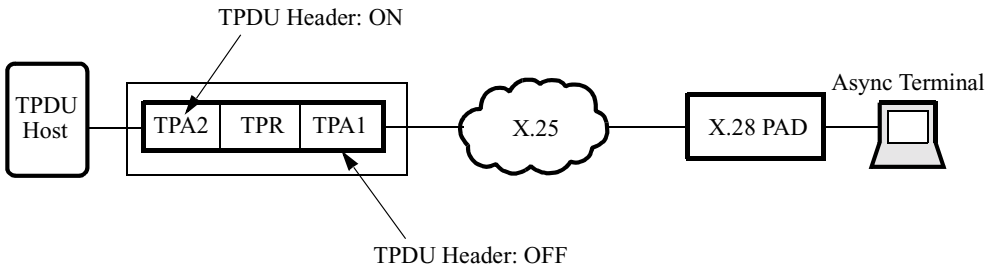


Figure 19. X.25 TPA Network Diagram

Call Establishment

An X.25 TPA can make or accept a call. For each SVC there is a corresponding X.25 TPA that performs TPDU conversion and gives connectivity to the TPDU router. Refer to the "Connection Management" section on page 9.

Call Clearing

Refer to the "Call Clearing" section on page 10 for additional information.

Data Passing

The Q bit field of the data packet from the X.25 device is ignored. It is considered a normal packet and the data is sent to the TPDU router.

X.25 TPA Configuration

Introduction

Each X.25 TPA has its own configuration parameters, as shown in Figure 20.

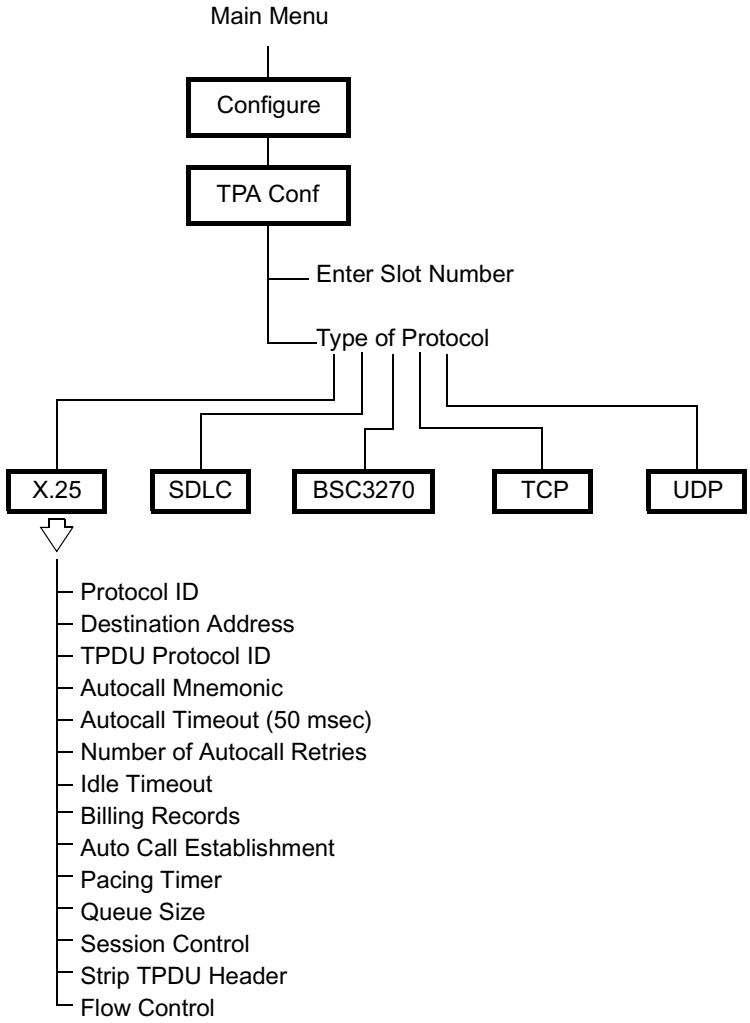


Figure 20. X.25 TPA Configuration Parameters

Parameters

These tables identify parameters that are specific to the X.25 TPA.

Note

You must perform a Slot boot after changing these parameters for the changes to take effect.

Protocol ID

Range:	0 to 8 (hex). Use the space character to blank the field.
Default:	(blank)
Description:	Specifies the Protocol Identifier in the first four bytes of the call user data.

Destination Address

Range:	0000 to FFFF (hex)
Default:	0000
Description:	Specifies the Destination TPDU address in hex, which is to be inserted before routing the packets received from the X.25 or APAD.

TPDU Protocol ID

Range:	00 to FF (hex)
Default:	FF
Description:	Specifies the Protocol Identifier. This is the first byte in the TPDU packet header. The TPDU host uses this field to identify the protocol carried in this TPDU packet. The host might be supporting multiple protocols.

Autocall Mnemonic

Range:	0 to 8 alphanumeric characters. Use the space character to blank fields
Default:	(blank)
Description:	Identifies the entry in the Autocall Mnemonic table that specifies the X.25 call request parameters for this station. If this parameter is configured, the next two parameters appear.

Autocall Timeout (50 msec)

Range:	5 to 1000
Default:	60
Description:	Specifies the time to wait between subsequent autocall attempts on this station. (This is measured in 50ms increments, for example, 10 means 600 msec). **Note** This parameter is only displayed if the Autocall Mnemonic parameter is configured.

Number of Autocall Retries

Range:	0 to 10
Default:	10
Description:	Specifies the number of times that the TPR attempts to autocall a remote destination. A value of zero allows unlimited attempts. **Note** This parameter is only displayed if the Autocall Mnemonic parameter is configured.

Idle Timeout

Range:	0 to 3660
Default:	300
Description:	Specifies the time (in seconds) that there is no data before the SVC is cleared. • 0: Timer disabled • 1 to 3600: Idle Timer value in 1 second increments

Billing Records

Range:	OFF, ON
Default:	OFF
Description:	Specifies whether to generate billing records for the SVC associated with this station.

Auto Call Establishment

Range:	OFF, ON
Default:	OFF
Description:	Specifies whether to establish the call before receiving any transaction.

Pacing Timer

Range:	0 to 20
Default:	0
Description:	Specifies the time to wait before sending the next data packet to the host. (This is measured in 50 millisecond intervals, for example, 4 means 200 msec). A value of zero means no delay in sending.

Queue Size

Range:	1 to 10
Default:	10
Description:	Specifies the maximum number of packets that can be buffered before they are sent to the host. **Note** This parameter does not appear if the Pacing Timer parameter is set to a value of 0. If session or flow control is also enabled, the value that is greater between the two (“Send Window Size” and “Queue Size”) is selected as the maximum queue size towards the host/device end.

Session Control

Range:	OFF, ON
Default:	OFF
Description:	Specifies whether or not Session Control messages should be used.

Strip TPDU Header

Range:	OFF, ON
Default:	ON
Description:	Strips (or adds) the TPDU header containing the Protocol ID, Source, and Destination Address of a message that goes to, or comes from, the host device. • OFF: The TPDU header is not stripped from the packet going to the host or device so the TPA is able to talk with a TPDU host. • ON: The X25 TPA is able to communicate with the X.25 and APAD devices. The BSC3270 and BSC2780 TPAs do not have this parameter. They always strip the TPDU header of the packet that is sent to the device. **Note** If status messages are to be sent when Session is enabled, this parameter should be set to OFF. **Note** If this parameter is OFF, the TPDU host is expected to send data along with the TPDU header. If Session Control is activated, the session is established using the configured Destination Address not the Destination Address in the TPDU header received from the host. However, once the session is established, data messages are routed using the Destination Address in TPDU header. Consequently, if a mismatch has occurred between the configured Destination Address that is in the TPDU header (from the host) data packets may get routed to the wrong destination and be discarded.

Flow Control

Range:	OFF, ON
Default:	OFF
Description:	Specifies whether the Flow Control is on or off. This should be enabled on the adjacent TPA. **Note** TPA uses the “Send Window Size” in the TPDU Router configuration to do the flow control. When the number of packets that have not received any acknowledgment from the adjacent TPA exceeds a particular threshold (75% of “Send Window Size”), the TPA blocks the device with which it is connected.

SDLC Protocol Adaptor

Introduction

The SDLC TPA connects a TPDU router to an SDLC TPAD. It terminates the QLLC session with the TPAD and converts data packets to TPDU format, and vice versa.

The SDLC TPA, as shown in Figure 21, provides the protocol conversion between QLLC and TPDU protocols. This allows an SDLC device to talk to a host that supports TPDU.

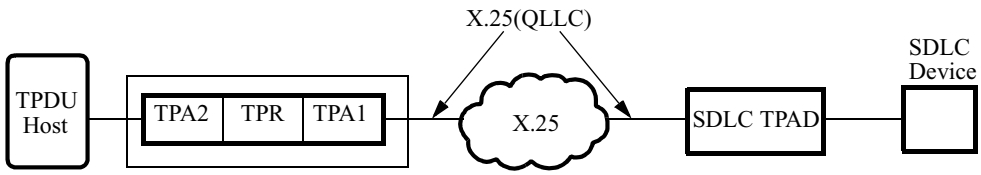


Figure 21. SDLC TPA Scenario

Note

The SDLC TPA cannot be connected to SDLC HPAD and does not support CUG verification.

Call Establishment

The SDLC TPAD must call the SDLC TPA. Each SDLC station to be connected to the TPDU router must have an SDLC TPA for its exclusive use.

When TPAD initiates the call, the TPA acts as a QLLC primary link and does the QLLC handshaking with the remote TPA. If the handshaking fails, it tries again. The call is cleared if the handshaking attempt fails after 10 continuous attempts.

Note

When you are configuring your nodes, you must enable the XID and RNR parameters (QLLC) for the SDLC station configuration.

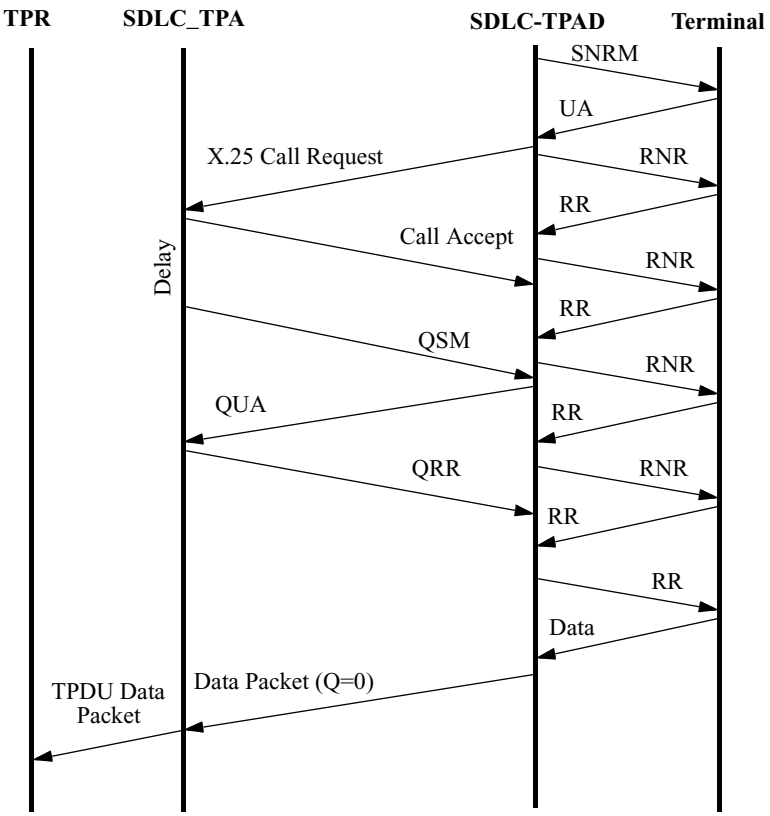


Figure 22. SDLC TPA Timing Diagram

Call Clearing

The SDLC TPA clears a call if a Q-packet is unexpectedly received. The SDLC TPA does not expect a Q-packet once it is in the data transfer state after the initial QLLC handshake. Refer to Call Clearing for additional detail.

Data Passing

Whenever a data packet (Q=0) arrives from the SDLC TPAD, the TPA constructs the TPDU header and attaches it to the packets. It then submits the data to the TPR for routing. When a packet arrives from the TPR, the TPDU header is removed and the data is given to TPAD. If the slot is not connected, the TPR packets are discarded.

SDLC Protocol Adapter with PU2/LU0 Option Enabled

Introduction

The SDLC TPA connects a TPDU router to an SDLC TPAD. It terminates the QLLC session followed by a PU2/LU0 session with the TPAD. It converts PU2/LU0 frames to TPDU format, and vice versa.

Note

The SDLC TPA cannot be connected to SDLC HPAD and does not support CUG verification.

What Is PU2/LU0

SNA Subarea networking is hierarchical networking with peripheral terminal controllers (often called cluster controllers (CCs) or control units (CUs)) connected to host-based processors. Host-based processors contain: the application while the terminals have only low level capabilities such as display and print, a major networking control point component that controls the entire networking environment, and the topology definition. Host-based processors control the activation of communication links and devices in the network.

Each of the physical systems shown in Figure 23 is a Physical Unit in terms of SNA.

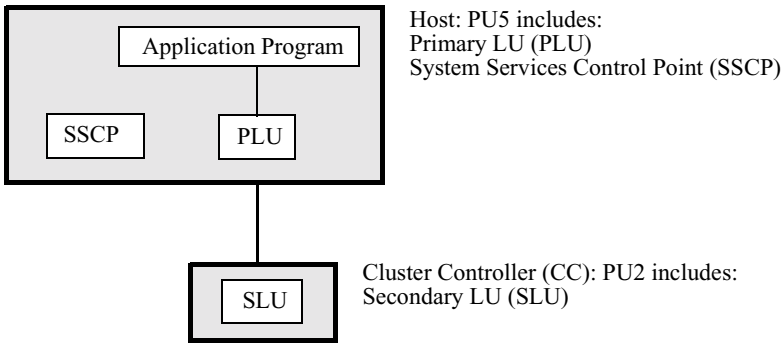


Figure 23. SDLC TPA With PU2/LU0 Scenario

A node is a Physical Unit (PU). Different node types are given different PU type numbers to identify what they are, and what their capabilities are. Control Units used in conjunction with display screens and printers are type 2, PU2.

In SNA, the architected end user is an entity called a Logical Unit (LU) that resides inside a PU. The LU represents a standardized way of viewing an end user by defining a precise set of rules that cover all upper layer aspects of operation in a way that is implementation independent. For example, the 3270 type terminal can be either a PC running a 3270 emulation software package or an IBM 3270 terminal.

Both devices appear as a display system LU in an SNA network despite different appearances. Since there are many types of end user functionality, LUs come in different varieties. The differences are given LU type numbers. For example, the 3270 type LU is type 2 and peer to peer transaction programs use LU type 6.2.

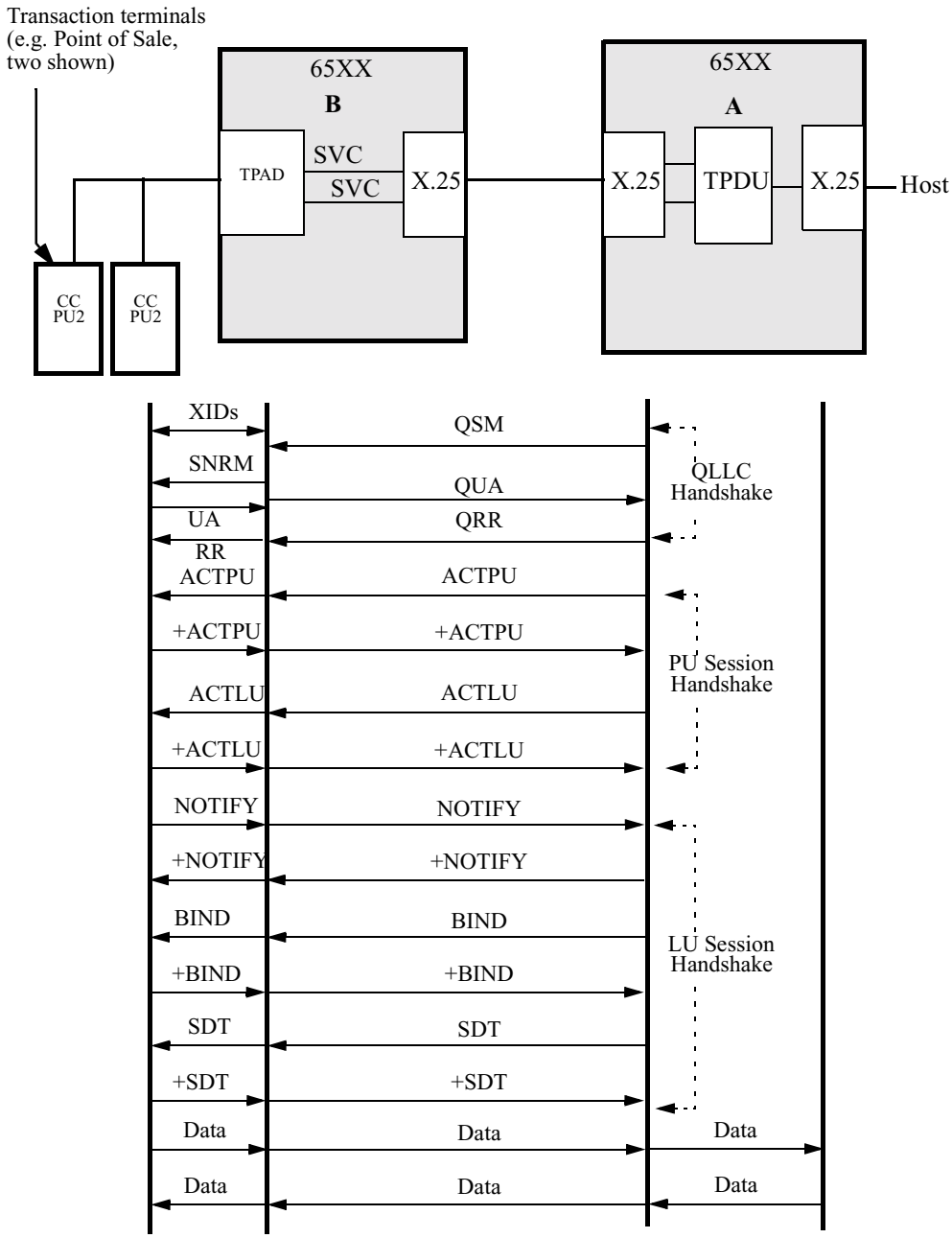


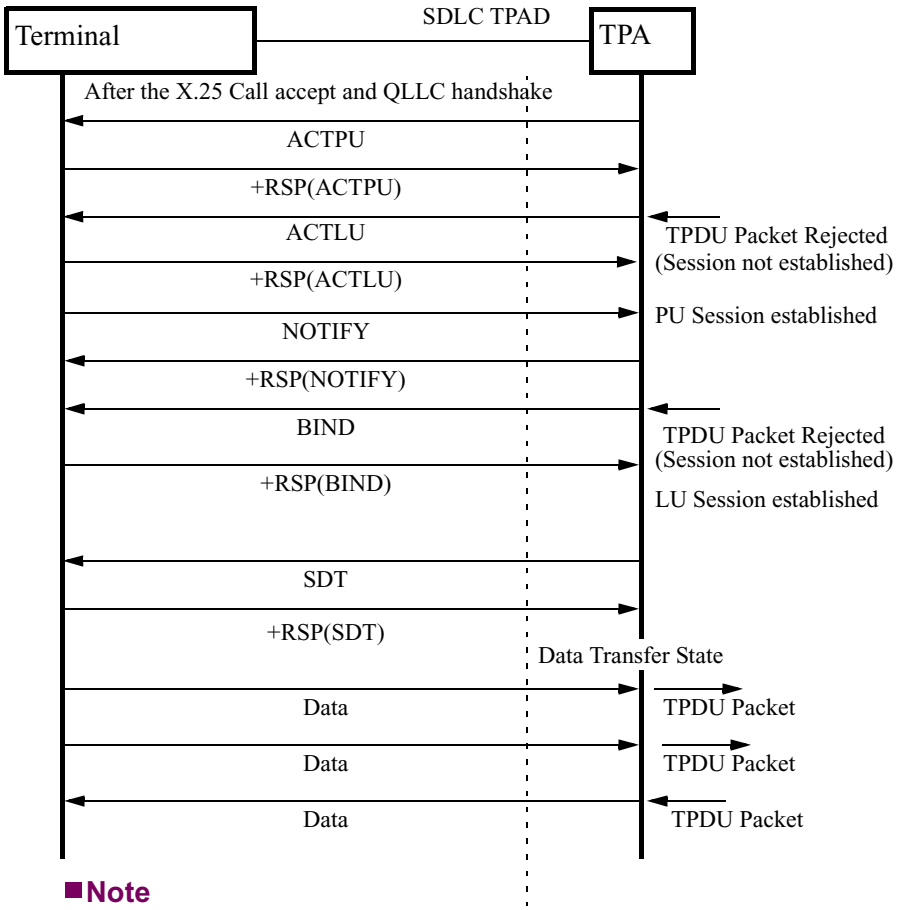
Figure 24. Basic PU2 LU0 Support by SDLC TPA

Call Establishment

The SDLC TPAD must call the SDLC TPA; each SDLC station to be connected to the TPDU router must have an SDLC TPA for its exclusive use.

When the TPAD initiates a call, the TPA acts as a QLLC primary link and does the QLLC handshaking with the remote TPA. If the handshaking fails, the TPA tries again. The call is cleared if the handshaking attempt fails after 10 continuous attempts.

Once the QLLC handshake is established, the PU-to-PU setup takes place, followed by LU-LU setup. When both setups are successful, the data transfer takes place where the PU2/LU0 data frames received from the SDLC device are converted into TPDU data packets and vice versa. Figure 25 shows sample traces of the PU2/LU0 protocol exchange between SDLC TPA and a terminal controller. This takes place before the data transfer can occur.



Note

For clarity, this diagram does not show the data link level.

Figure 25. SDLC TPA (with PU2/LU0 Enabled) Timing Diagram

Note

When you are configuring your nodes, enable the XID and RNR parameters (QLLC) for the SDLC station configuration.

There are variations of the PU2/LU0 terminals that results in different message transfers as shown in the following diagrams. For Figure 27 the “Acquire Session” parameter should be ENABLED. Figure 28 is a special case of terminals where the LU is not active, so the terminal keeps on sending the negative BIND. If the configured BIND retries are over, the PU session is aborted followed by call clear by SDLC TPA.

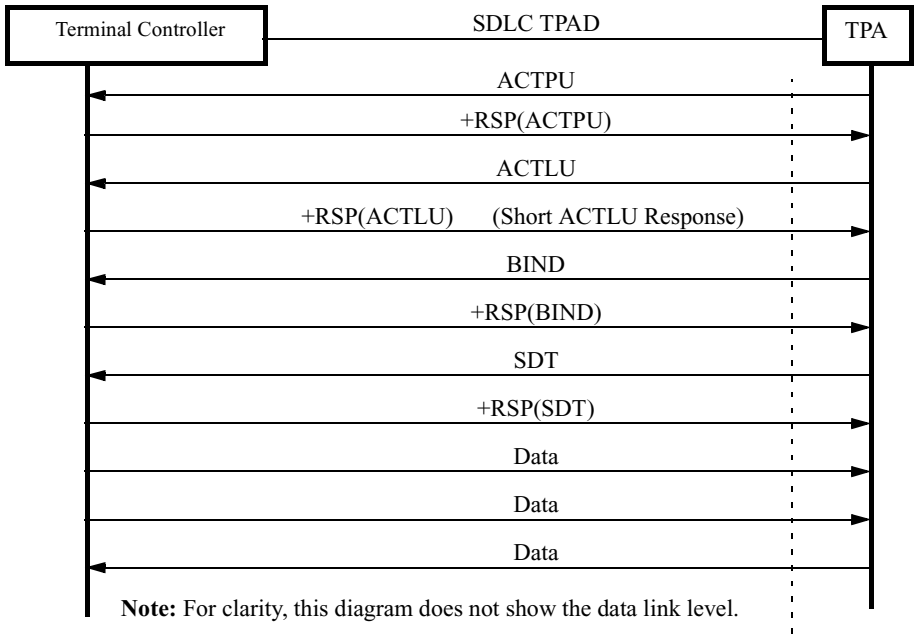


Figure 26. Message Traces - Short +RSP(ACTLU)

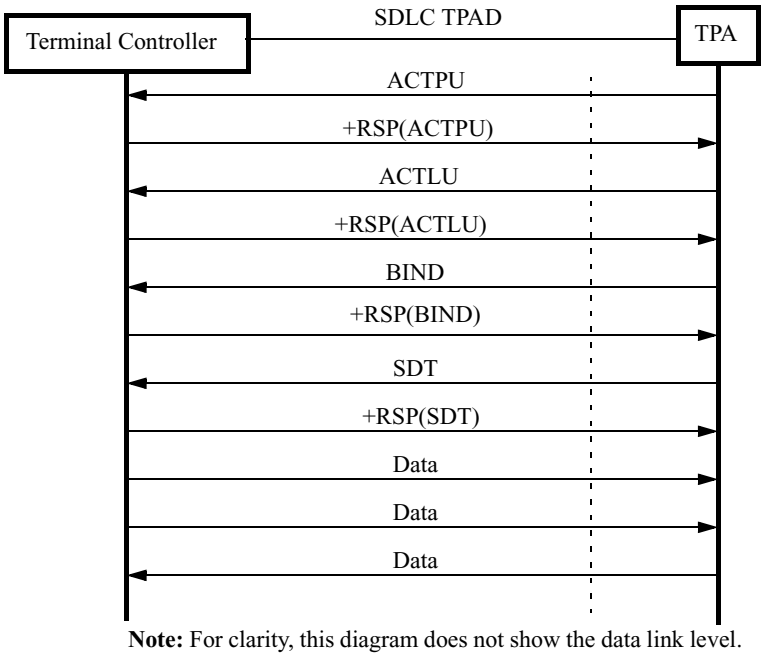
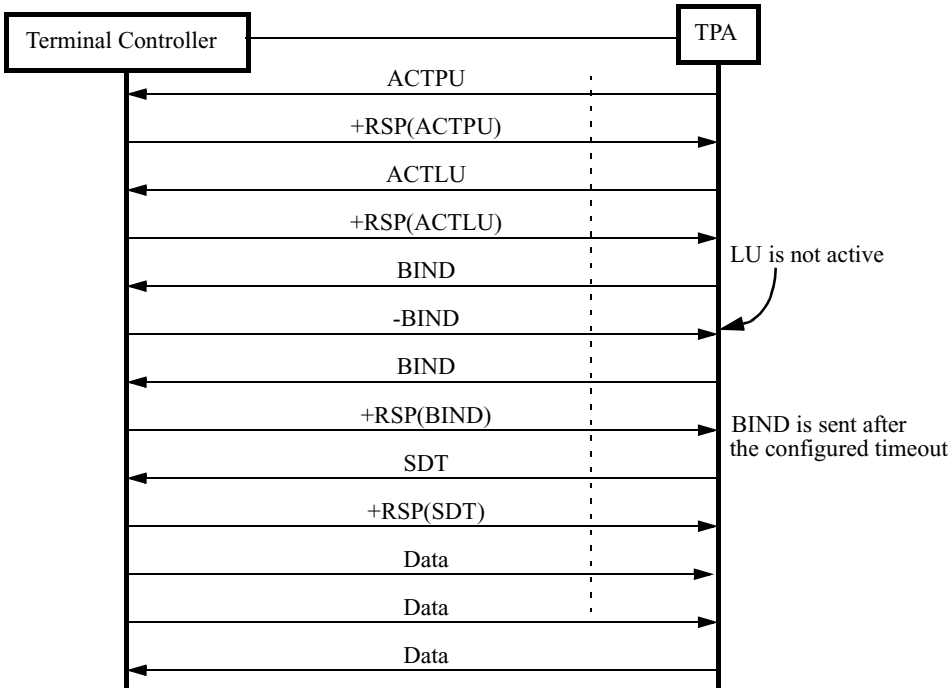


Figure 27. Message Traces - SLU Capability in +RSP(ACTLU)



Note

For clarity, this diagram does not show the data link level.

Figure 28. Message Traces - SLU Capability in +RSP(ACTLU) with Negative BINDs

Call Name	*Value*
ACTPU	TH: 2D-00-00-00-00-01 RH: 6B-80-00 RU: 11-01-01-05-00-00-00-00-01
+RSP(ACTPU)	TH: 2D-00-0000-00-01 RH: EB-80-00 RU: 11-01-40-40-40-40-40-40-40-40
ACTLU	TH: 2D-00-02-00-00-01 RH: 6B-80-00 RU: 0D-01-01
+RSP(ACTLU) (See Figure 27)	TH: 2D-00-00-02-00-01 RH: EB-80-00 RU: 0D-01-01-00-85-80-00-00-0C-06-03-00-01-00-00-00
+RSP(ACTLU) (Short ACTLU Response - See Figure 26)	TH: 2D-00-00-02-00-01 RH: EB-80-00 RU: 0D-01

Call Name	***Value*** *(continued)*
+RSP(ACTLU) (See Figure 28)	TH: 2D-00-00-02-00-01 RH: EB-80-00 RU: 0D-01-01-00-85-00-00-00-0C-06-03-00-01-00-00-00
NOTIFY	TH: 2C-00-00-02-FF-FF RH: 0B-80-00 RU: 81-06-20-0C-06-03-00-01-00-00-00
+RSP(NOTIFY)	TH: 2C-00-02-00-FF-FF RH: 8B-80-00 RU: 81-06-20
BIND	TH: 2D-00-02-01-00-01 RH: 6B-80-00 RU: 31-01-04-04-30-10-80-00-00-00-85-85-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00
-BIND	TH: 2D-00-02-01-00-01 RH: EF-90-00 RU: 08-45-00-00-31
+RSP(BIND)	TH: 2D-00-01-02-00-01 RH: EB-80-00 RU: 31
SDT	TH: 2D-00-02-01-00-01 RH: 6B-80-00 RU: A0-00
+RSP(SDT)	TH: 2D-00-01-02-00-01 RH: EB-80-00 RU: A0
Data	TH: 2C-00-01-02-00-01 RH: 03-90-00 RU: data bytes
Data	TH: 2C-00-01-02-00-02 RH: 03-90-00 RU: data bytes
Data	TH: 2C-00-02-01-00-01 RH: 03-90-00 RU: data bytes

Call Clearing

Call clearing takes place under these conditions:

- The SDLC TPA clears a call if a Q-packet is unexpectedly received after the QLLC exchange (session established). The SDLC TPA does not expect a Q-packet once it is in the data transfer state after the initial QLLC handshake. Refer to the "Call Clearing" section on page 10 for additional detail.
- The SDLC TPA clears the call when a PU2/LU0 protocol violation (unsupported messages, out of sequence messages, or a negative message) occurs. In such cases, violation reports are generated.
- The SDLC TPA clears the call when unsupported PU2/LU0 messages are received (refer to the list given in the following section for unsupported features of the PU2/LU0).
- The SDLC TPA clears the call when no PU2/LU0 message is received for 60 seconds (non-configurable timer).
- The SDLC TPA clears the call when the Idle timer expires

Data Passing

Whenever a data packet (Q=0) arrives from the SDLC TPAD, the TPA constructs the TPDU header and attaches it to the packets. It then submits the data to the TPR for routing. When a packet arrives from the TPR, the TPDU header is removed and the PU2/LU0 header is inserted. Then data is given to the TPAD. If the slot is not connected, the TPR packets are discarded.

PU2/LU0 Message Structure

Figure 29 shows the PU2/LU0 frame format.

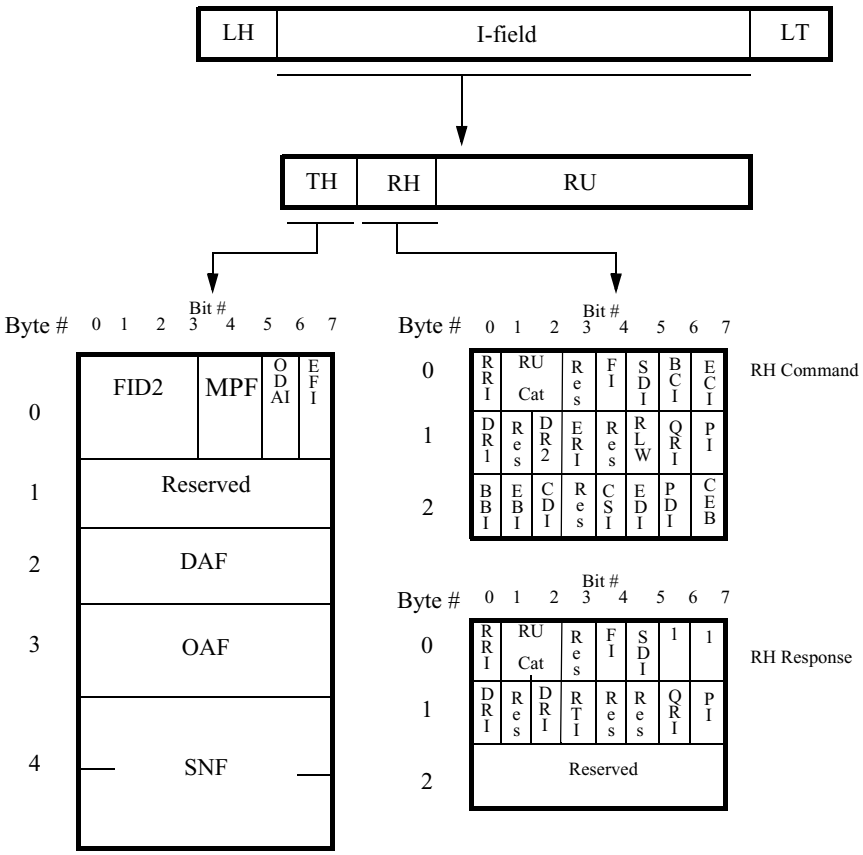


Figure 29. PU/LU Message Structure

Message Headers

This table defines the headers used in PU/LU messages.

Header Type	*Description*
(LH) Link Header	This header is used for the link control procedures. In this application, QLLC is used.
(TH) Transmission Header	This header is maintained principally by the path control component of SNA. It consists of 6 bytes.
(RH) Request/ Response Header	This is a 3 byte header used by higher levels of SNA.
The RU portion of the message is either an SNA control message or user data. Examples of SNA control messages are shown in 29.	

TH Header

This table shows the values of the bits/bytes of the TH for the implementation described in this document. Bytes of a header or field are numbered starting from 0. Bits are numbered starting with 0 for the left-most bit.

Byte No.	Bit No.	Supported Values	Description
0	0-3	0010	Format Identification (0010=FID 2) always used for PU2
	4-5	11	Whole Basic Information Unit (BIU) presents the only value supported in this implementation. Other values (not supported) are: • x'10' - First segment of a multi-segment BIU • x'00' - Middle segment of a multi-segment BIU • x'01' - Last segment of a multi-segment BIU
	6	0	Reserved value (ODAI is used in PU2.1 only)
	7	0 normal, 1 expedited	Expedited Flow Indicator (1). Session application data is always normal (0) flow. Depending on what the message is, SNA control messages may or may not use Expedited (Exp) flow.
1	0-7	0	Reserved
2	0-7	see Figure 29	Destination Address Field (DAF). See Figure 29.
3	0-7	see Figure 29	Origin Address Field (OAF). See Figure 29.
4-5	0-15	0 to 65535	Sequence Number Field (SNF) for session data starts at 1 and increments for each BIU sent and wraps through zero. EFI flows and normal flows use a different number space for SNF values.

RH Header

For the RH, two slightly different formats are defined in SNA corresponding to whether the RH is a request or a response. This table shows the values of the bits/bytes of the RH Request for the implementation described in this document.

Byte No.	Bit No.	Value	Description
0	0	0	Request/Response Indicator (RRI) equals 0 for Request
	1-2		Request/Response Unit (RU) Category
		00	Function Management (FM) data (FMD)
		01	Network Control (NC)
		10	Data Flow Control (DFC)
		11	Session Control (SC)
	3	0	Reserved value
	4		Format Indicator (FI). See Figure 28.
		0	For flows between PLU and SLU, FI is set to 0 and no RU header is present. FM headers on LU-LU sessions are not supported in this implementation, except for indicating Sense Data.
		1	For SC, NC, DFC category RUs, FI is always set to 1. For FMD messages, flows between SSCP and PUs/LUs FI are set to 1. This indicates that a Network Services (NS) header and message is present.
	5		Sense Data Indicator
		0	No sense data included
		1	Sense data included
	6-7		Begin Chain Indicator and End Chain Indicator (BCI and ECI):
		10	First RU in chain
		00	Middle RU in chain
		01	Last RU in chain
		11	Only RU in chain. This is the only value sent by this implementation. Messages received normally have 11, but the implementation tolerates any value. It does not perform reassembly for values other than 11.

Byte No.	Bit No.	Value	Description (continued)
1	0, 2-3	100	Definite response requested - used for session control.
		101	Exception response requested - used for session data
	1	0	Reserved value
	4	0	Reserved value
	5	0	Request larger window indicator (RLWI)
	6	0	Queued Response Indicator 0 equals bypass TC queues
	7	0	Pacing Indicator 0 equals no pacing indication
2	0	0	Begin Bracket Indication 0 equals no begin bracket
	1	0	End Bracket Indication 0 equals no end bracket
	2	0	Change Direction Indicator 0 equals no change direction
	3	0	Reserved value
	4	0	Code Selection Indicator 0 equals code 0
	5	0	Enciphered Data Indicator 0 equals no enciphered data
	6	0	Padded data Indicator 0 equals no padded data
	7	0	Conditional End bracket 0 equals no conditional end bracket

RH Request Format and Values

This table shows the values of the bits/bytes of the RH Response for the implementation described in this document.

Byte No.	Bit No.	Value	Description
0	0	1	Request/Response Indicator (RRI) equals 0 for Request
	1-2		RU Category
		00	Function Management (FM) data (FMD)
		01	Network Control (NC)
		10	Data Flow Control (DFC)
		11	Session Control (SC)
	3	0	Reserved value
	4	0	See the FI description of the Request.
	5		Sense Data Indicator (SDI) - For responses generated by this implementation, if Sense Data is included in the response RU (a negative response to a request), the sense data is the only data in the RU. The RTI bit must also be set to indicate a negative response.
		0	No sense data included
		1	Sense data included
	6-7	0	See the BCI, ECI description of the Request.

Byte No.	Bit No.	Value	Description *(continued)*
1	0	10	Definite response ■Note Handling responses is covered in a separate section of this document.
	1	0	reserved value
	2	10	Exception response ■Note Handling responses is covered in a separate section of this document.
	3		Response type indicator (RTI):
		0	0 = positive (requires that SDI equals 0)
		1	1 = negative (requires that SDI equals 1)
	4	0	Reserved value
	5	0	Reserved value
	6	0	Queued Response Indicator 0 equals bypass TC queues
	7	0	Pacing Indicator 0 equals no pacing indication
2	0-7	0	Reserved value

ACTLU Format (SDLC TPA to SDLC Terminal)

This message is used to establish sessions between SSCP and the LU. The parameter values in the message refer to those for the SSCP to LU session.

Byte No.	Bit No.	Value(s)	Description
0	0-7	0D	Request code
1	0	0	Reserved value (for enhanced address management)
	1	0	Sender considers the LU address to be static, not dynamic
	2-5	0	Reserved value
	6-7	1	Activation type requested b’01’ equals cold (retired SNA value)
2	0-3	0	FM profile 0
	4-7	1	TS profile 1

Byte No.	Bit No.	Value(s)	Description (continued)
3-n			These bytes are control vectors containing the name of the network. They are not present in the message sent by the TPDU router.

RSP (ACTLU) Format (SDLC Terminal to SDLC TPA)

This table shows the possible message formats and values when the Terminal responds to the ACTLU.

Byte No.	Bit No.	Value(s)	Description
0	0-7	0D	Request code
1	0-7		Activation type requested
		1	1 equals cold (retired SNA value)
		2	2 equals ERP activation
2	0-3	0	FM profile 0. A value of FM 6 is defined by used with PU4/5.
	4-7	1	TS profile 1, should match the request
3-m			Control vectors are • x'00' SSCP-LU Session Capabilities • x'0C' LU-LU Session Services Capabilities • Both ignored by TPDU router

Some equipment may have a short form of +RSP(ACTLU) where the Control Vectors are omitted (Figure 27). In such a case, the byte sequence of the response is x0D01. In this case, the implicit assumption is that the SLU can support sessions (accept a BIND).

The long form of +RSP(ACTLU) usually has the two Control Vectors (CVs) x'00' and x'0C' (Figure 26). Without going into the details of the CV formats, see the "NOTIFY Format (SDL Terminal [PLU] to SDLC TPA [PU])" section on page 54, for rules governing the use of NOTIFY in relation to the +RSP(ACTLU).

ACTPU Format (SDLC TPA to SDLC Terminal)

This message is used to establish sessions between SDLC TPA(PU) and the SDLC terminal (PU). The parameter values in the message refer to those for the SSCP to PU session.

Byte No.	Bit No.	Value(s)	Description
0	0-7	11	Request code
1	0-3	0	No control vectors present in message
	4-7	1	Activation type requested 1 equals cold (retired SNA value)
	2-5	0	Reserved value
	6-7	1	Activation type requested 01 equals cold (retired SNA value)
2	0-3	0	FM profile 0
	4-7	1	TS profile 1
3-8			A 6 byte field indicating the ID of the SSCP issuing the ACTPU
	0-3	0000	Format equals 0000. This is the only value defined
	4-7	0101	Type of node containing the SSCP 5 equals host
	8-47	00-00-00-00-01	SSCP ID equals1 arbitrary value

RSP (ACTPU) Format (SDLC TPA to SDLC Terminal)

The SDLC Terminal (PU) sends response ACTPU to SDLC TPA (PU). The possible message formats and values are shown below.

Byte No.	Bit No.	Value(s)	Description
0	0-7	11	Request code
1	0-3	0 - 3	Format type by number, only format 0 supported, other values ignored and TPDU router acts as if format 0 received.
	4-7	1 - 3	IPL type, 0 equals no IPL needed, the only value supported, other values ignored and TPDU router acts as if 1 received.
2-9			Load Module 8 character name in EBCDIC, usually set to eight x'40' (space). This is ignored in all cases.

Byte No.	Bit No.	Value(s)	Description *(continued)*
10-n			Control vectors that are not supported if present

BIND Format (SDLC TPA to SDLC Terminal)

This message is used to establish sessions between SDLC TPA (LU) and the SDLC Terminal (LU). The parameter values in the message refer to those for the LU-to-LU session.

Byte No.	Bit No.	Value(s)	Description
0	0-7	31	Request code
1	0-7	01	Format 0 and parameters are not negotiable.
2	0-7	4	FM profile 4
3	0-7	4	TS profile 4
4	0	0	Single RU chains from primary LU
	1	0	Request control mode 0 = immediate
	2-3	11	Primary FMD request chain response: definite or exception
	4	0	Sync point not applicable
	5	0	Reserved value
	6	0	SCB compression not applicable
	7	0	Primary does not send EB (End Bracket)
5	0	0	Single RU chains from secondary LU
	1	0	Request control mode 0 equals immediate
	2-3	01	Secondary FMD request chain response: exception
	4	0	Sync point not applicable
	5	0	Reserved value
	6	0	SCB compression not applicable
	7	0	Secondary does not send EB (End Bracket)

Byte No.	Bit No.	Value(s)	Description (continued)
6	0	1	BIU segmentation is not supported
	1	0	FM Headers are not allowed
	2	0	Brackets are not used
	3	0	Bracket termination rule not applicable
	4	0	Alternate code set not applicable
	5	0	Sync point not supported
	6	0	BIS not sent, BIS not applicable
	7	0	BIND not to be queued
7	0-1	00	Normal flow mode is full-duplex
	2	0	Contention not applicable
	3	0	Contention not applicable (winner/loser)
	4-5	00	Alternate code not applicable
	6	0	No control vectors in SLU name
	7	0	Half duplex flip flop not applicable (reset)
8	0-7	0	Session level pacing not supported, not applicable
9	0-7	0	Adaptive session level pacing not supported, not applicable
10	0-7	85	Secondary RU send size is 256 bytes
11	0-7	85	Primary RU send size is 256 bytes
12	0-7	0	Session level pacing not supported, not applicable
13	0-7	0	Session level pacing not supported, not applicable
14	0-7	0	LU type equals LU 0
15-36		00	All bytes set to x’00’ for basic support of LU 0.

RSP (BIND) Format (SLU to PLU

The SDLC Terminal (LU) responds to the BIND. The possible message formats and values are shown below.

Byte No.	Bit No.	Value(s)	Description
0	0-7	31	Request code
1-m			All following fields are not supported and are ignored if they are present.

NOTIFY Format (SDL Terminal [PLU] to SDLC TPA [PU])

The SDLC TPA never sends this message but does accept and respond to the message.

Byte No.	Bit No.	Value(s)	Description
0-2		810620	NS header
3	0-7	0C	LU-LU Session services Capabilities vector
4-m			Ignore any values present

RSP(NOTIFY) Format (SDLC TPA (PU) --> SDLC Terminal (PU))

NOTIFY is used to notify the Control Point of the change of status of an LU. In certain older controllers, the +RSP(ACTLU) can have the short form x0D01. In this case the implicit assumption is the SDLC Terminal (LU) is capable of accepting sessions (accepting BIND) and no NOTIFY follows the +RSP(ACTLU).

If the +RSP(ACTLU) indicates the SDLC Terminal (LU) is incapable of sessions, the SDLC TPA (LU) must not send a BIND to the SLU. The SDLC Terminal (LU) sends a NOTIFY to update the LU-LU Session Capability when it is ready to accept BINDs.

Byte No.	Bit No.	Value(s)	Description
0-2		810620	NS header
3	0-7	0C	LU-LU Session services Capabilities vector

SDT (START DATA TRAFFIC)

The SDLC TPA (LU) sends this message to the SDLC Terminal (LU) once the session established with BIND exchange.

SDT Format (SDLC TPA (PU) ---> SDLC Terminal (LU))

Byte No.	Bit No.	Value(s)	Description
0		A0	Request/response code

RSP(SDT) Format (SDLC Terminal (LU) --> SDLC TPA (PU))

Byte No.	Bit No.	Value(s)	Description
0		A0	Request/response code

UNBIND

The SDLC TPA sends this message whenever an error message, such as receiving a message that is undefined, occurs.

UNBIND Format (SDLC TPA (LU) --> SDLC Terminal (LU))

Byte No.	Bit No.	Value(s)	Description
0		32	Request code
1	0-7	FE	UNBIND type. For this implementation only x'FE' supported which means session failure.
2-5		cc-00-00-00	Sense Data.

RSP(UNBIND) Format (SDLC Terminal(LU)-->SDLC TPA (LU))

Byte No.	Bit No.	Value(s)	Description
0-2		32	Request code

SNA Messages Not Supported by PU2/ LU0 Implementations

The messages listed in this table are defined for SNA but are not supported in this implementation of LU0 support. The table is organized by messages in different RU categories. RU category is indicated in the RH header by bits1 and 2. The value of the bits for each category is shown in the table. The code value is the value of the first byte(s) in the RU.

RU Category	Message Name	Code Value	Flow	Description
FMD NS (00)	INIT-SELF	010681 810681	LU-->SSCP Norm	Initiate self, format 0 Initiate self, format 1
	TERM-SELF	010683 810683		Terminate self, format 0 Terminate self, format 1
	NMVT	41038D	PU->SSCP	Network Management Vector Transport
NC (01)				
DFC (10)	LUSTAT	04	LU--> LU|SSCP, Norm	LU Status
	RTR	05		Ready to Receive
	BIS	70	LU-->LU. Norm	Bracket Initiation Stop
	SBI	x'71'		Stop Bracket Initiation
	QEC	x'80'		Quiesce at End of Chain
	QC	x'81'		Quiece Complete
	RELQ	x'82'		
	CANCEL	x'83'	LU-->LU, Norm	Cancel chain
	CHASE	x'84'	LU-->LU, Norm	
	SHUTD	x'C1'		
	RSHUTD	x'C2'		
	BID	x'C8'		
	SIG	x'C9'		

RU Category	Message Name	Code Value	Flow	Description (continued)
SC (11)	CLEAR	x'A1'	PLU--->SLU, Exp	
	STSN	x'A2'		
	RQR	x'A31'		
	CRV	x'C0'	PLU--->SLU, Exp	Cryptographic Verification
	DACTLU	0x0E	SSCP->SLU	Deactivate LU
	DACTPU	0x12	SSCP-->PU	Deactivate PU

SDLC TPA With Session Option Enabled

Introduction

This section describes how the SDLC TPA works when a Session and PU2/LU0 are enabled.

This mode is used whenever the end-to-end devices should know about the status of the remote connection. If the remote connection (TCP or X.25 connection with the Host) is lost, the local connection with SDLC TPAD must be cleared.

Session Establishment

The SDLC TPAD initiates a session request, to the adjacent TPA, only when it receives a Call Request from the SDLC TPAD and is followed by QLLC handshake (if PU2/LU0 is disabled).

Figure 30 shows that a Session Request received from the adjacent TPA is always be rejected back by the SDLC TPA (adjacent TPA session requests are not supported) with/without the PU2/LU0 option.

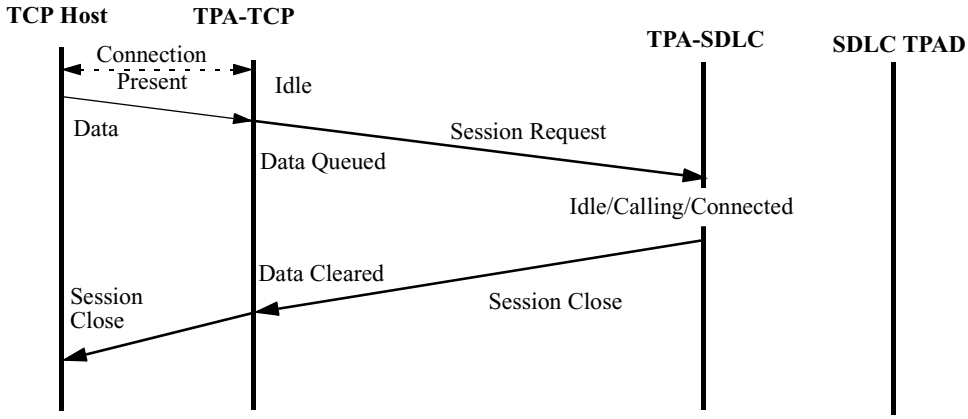


Figure 30. SDLC TPA (Without PU2/LU0) With Session On

Figure 31 shows that a Session Request is issued only after receiving QUA from the SDLC TPAD. On receipt of Session Established from adjacent TPA, QRR is transmitted to SDLC TPAD to enable the data transfer state.

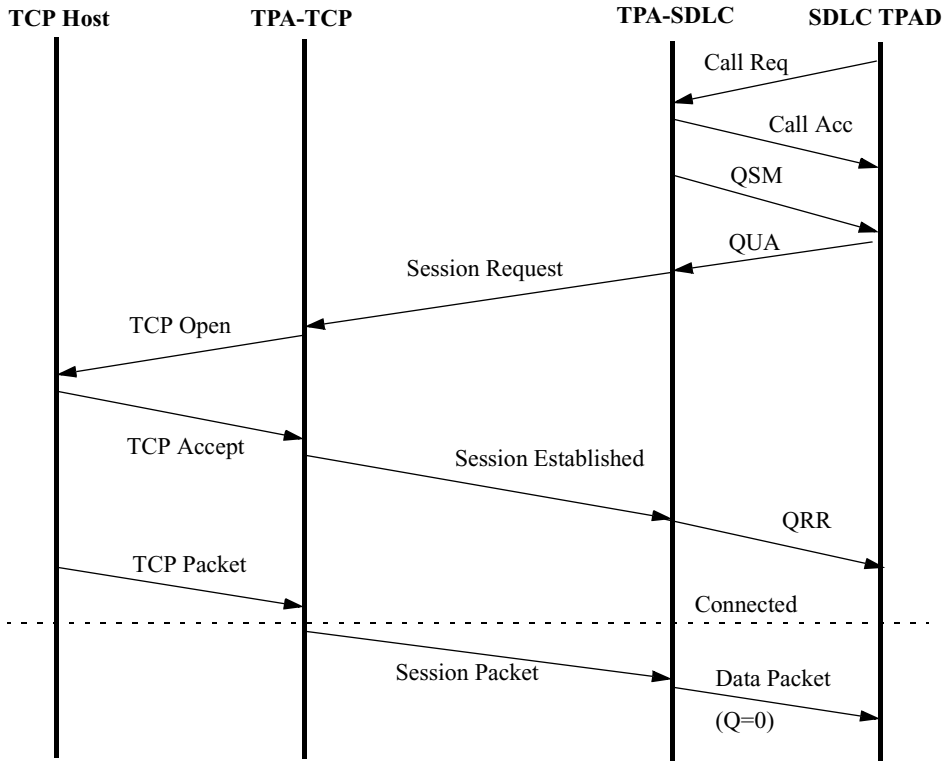


Figure 31. SDLC TPA (Without PU2/LU0) With Session On

Figure 32 shows that a Session is Closed due to receipt of Q bit packets after the SDLC TPA is in the connected state.

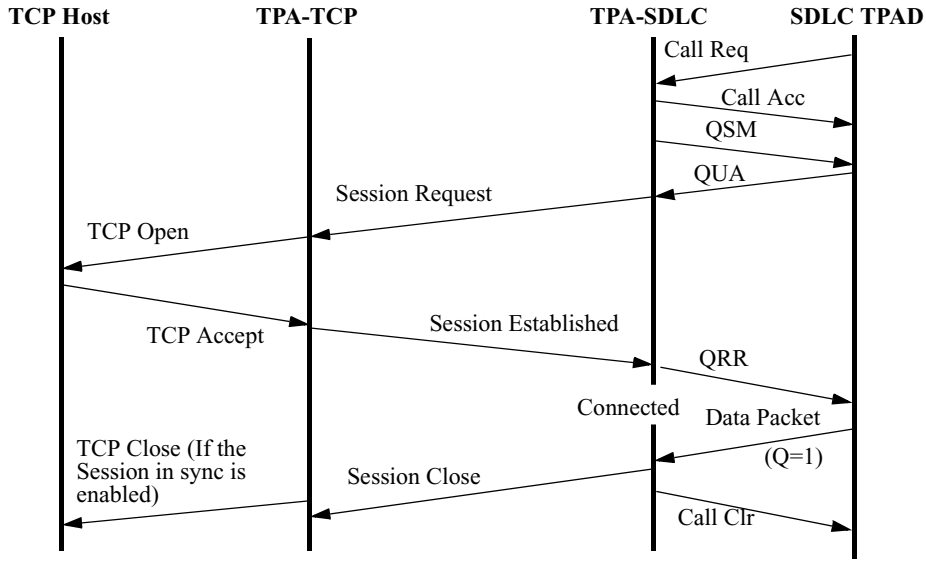


Figure 32. SDLC TPA (Without PU2/LU0) With Session On

If Session Close is received, from the adjacent TPA, the connection towards gets cleared if the ‘Session in Sync’ parameter is enabled (Figure 33).

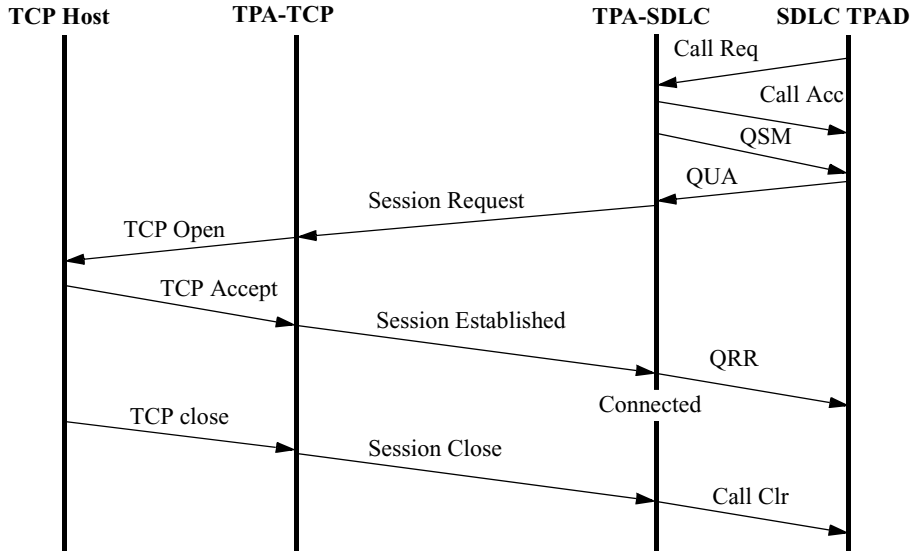


Figure 33. SDLC TPA (Without PU2/LU0) With Session On

Figure 34 shows Session establishment when PU2/LU0 option is enabled.

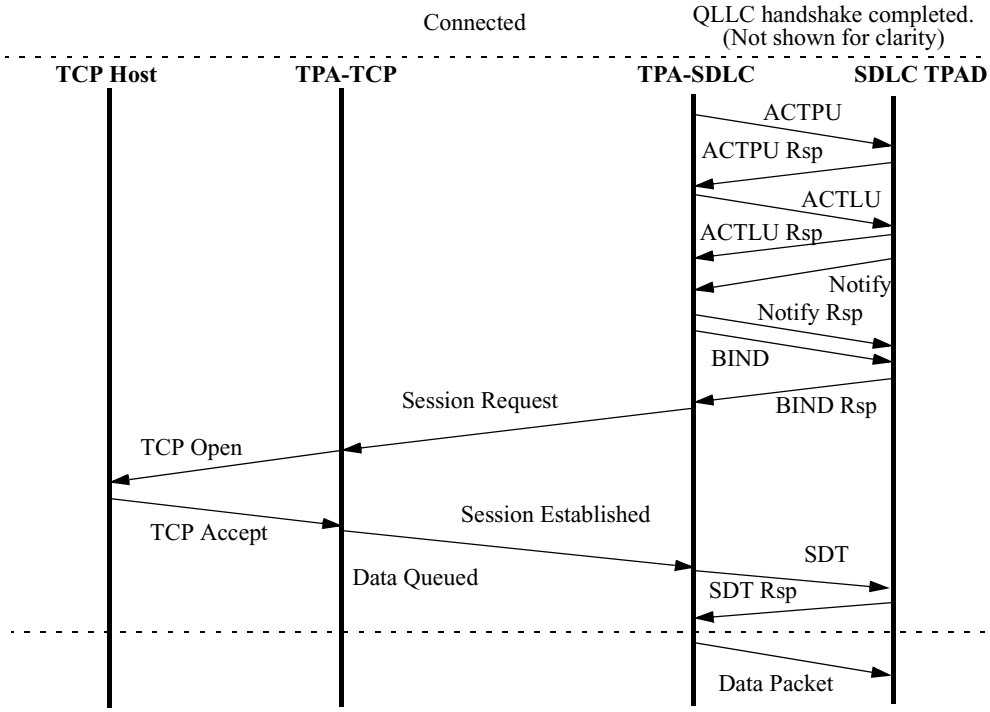


Figure 34. SDLC TPA (With PU2/LU0) With Session ON

If an Invalid PU/LU packet is received from the SDLC terminal, the Session is cleared (Figure 35). The SDLC TPA sends the UNBIND and it waits until receipt of an UNBIND response from the SDLC terminal, or for 60 seconds. On receipt of the UNBIND response, or the 60 second timeout, the Call is cleared towards the SDLC TPAD and the PU/LU sessions is cleared.

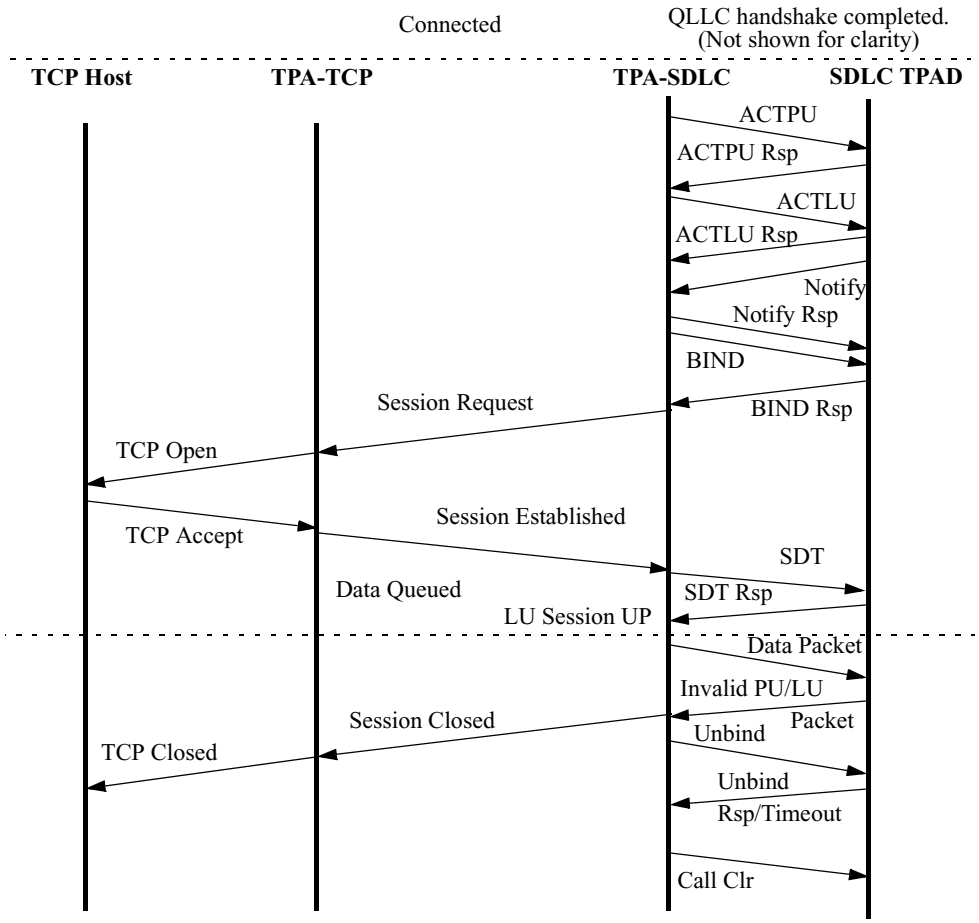


Figure 35. SDLC TPA (With PU2/LU0) With Session ON

Figure 36 shows how, if Session Close is received from the adjacent TPA, the connection towards the SDLC TPAD is cleared and the Session in Sync parameter is enabled. The SDLC TPA sends the UNBIND and then waits until UNBIND responses from the SDLC terminal are received, or for 60 seconds. On receipt of the UNBIND response (or the 60 second timeout), the Call is cleared towards the SDLC TPAD and the PU/LU sessions are cleared.

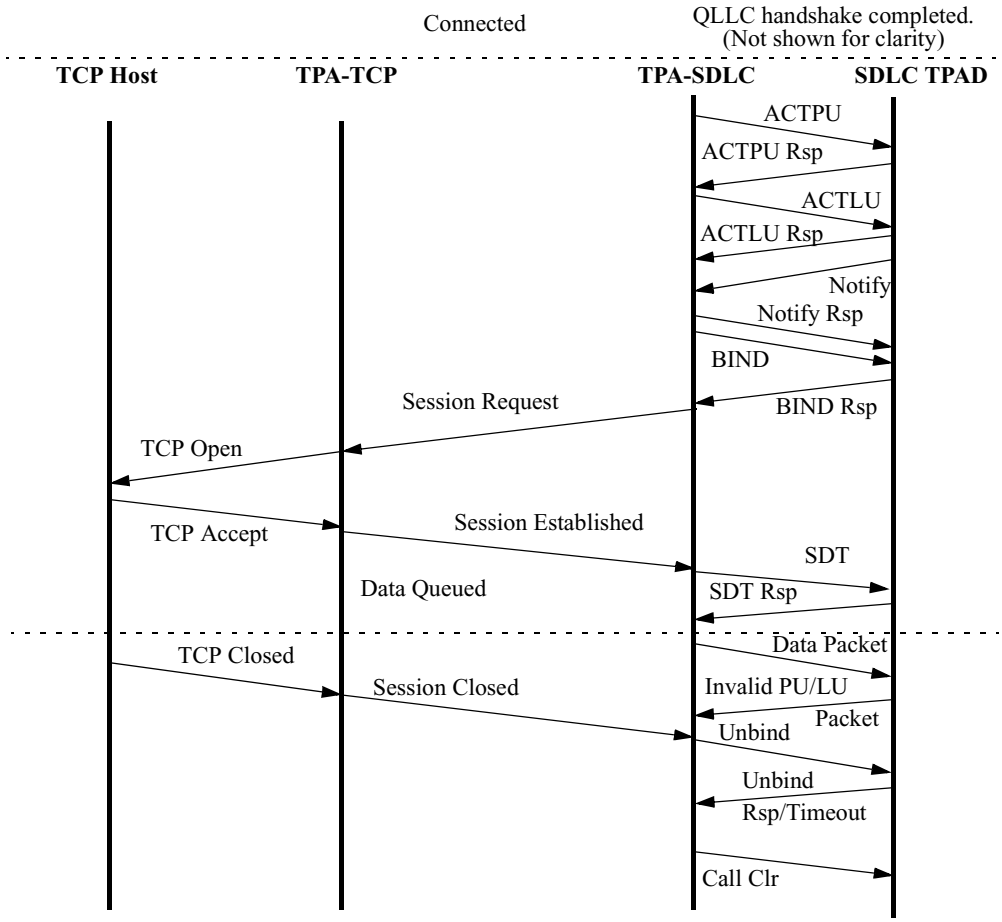


Figure 36. SDLC TPA (With PU2/LU0) With Session ON

SDLC TPA Configuration

Introduction

Each SDLC TPA has its own configuration parameters, as shown in Figure 37.

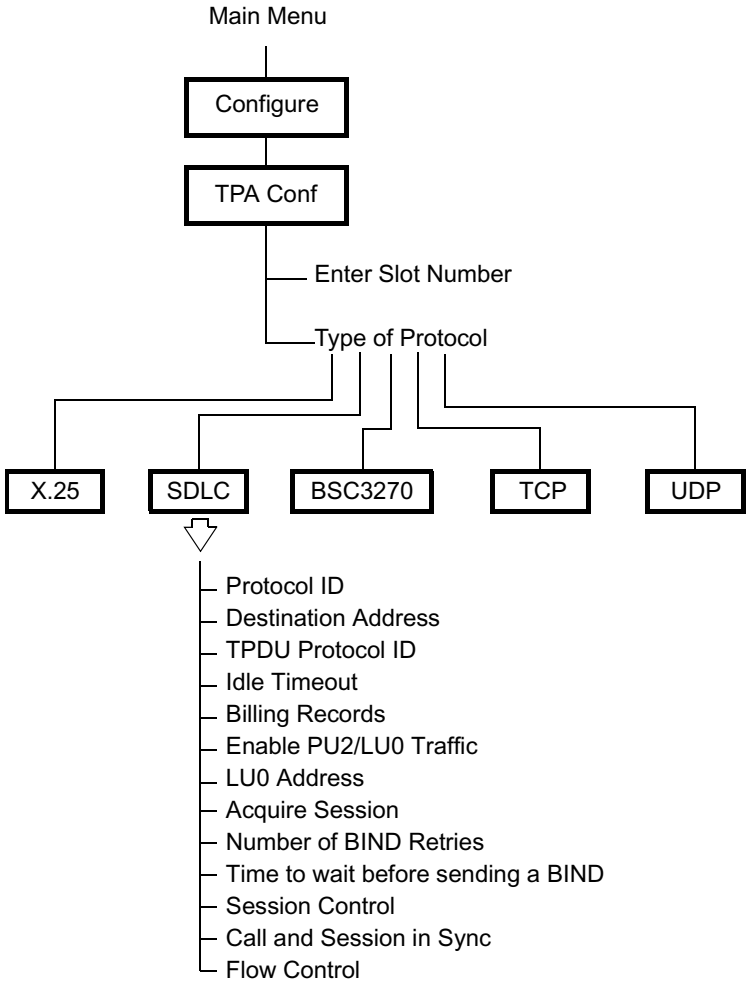


Figure 37. SDLC TPA Configuration Parameters

Parameters

These tables identify parameters that are specific to the SDLC TPA.

Note

You must perform a Slot boot after changing the following parameters for the changes to take effect.

Protocol ID

Range:	0 to 8 (hex), <space> blanks the field
Default:	C3000000
Description:	Specifies that the Protocol Identifier is the first four bytes of the call user data. The SDLC TPA accepts a call only if the Protocol ID in the call packet matches what is configured here.

Destination Address

Range:	0000 to FFFF (hex)
Default:	0000
Description:	The Destination TPDU address in hex inserted before routing the packets received from the SDLC TPAD.

TPDU Protocol ID

Range:	00 to FF (hex)
Default:	77
Description:	Specifies the first byte in the TPDU packet header. The TPDU host uses this field to identify the protocol that is carried in this TPDU packet. The host might be supporting multiple protocols.

Idle Timeout

Range:	0 to 3600
Default:	300
Description:	Specifies the time (in seconds) that there is no data before the SVC is cleared. • 0: Timer disabled • 1 to 3600: Idle Timer value in 1 second increments.

Billing Records

Range:	OFF, ON
Default:	OFF
Description:	Specifies whether to generate billing records for the SVC associated with this station.

Enable PU2/LU0 Traffic

Range:	OFF, ON
Default:	ON
Description:	Terminates the PU2/LU0 session at the TPDU router and the SNA message (specific to the PU2/LU0 session) is not forwarded to the TPDU host.

LU0 Address

Range:	00 to FF
Default:	02
Description:	Enter the address for the LU0 device. This parameter only appears if the parameter Enable PU2/LU0 Traffic Records equals ON. ■ **Note** This parameter only appears if Enable PU2/LU0 Traffic = ON.

Acquire Session

Range:	DISABLED, ENABLED
Default:	DISABLED
Description:	Causes the BIND to be issued immediately after the +RSP(ACTLU) even if the indication is that the secondary LU is not capable of processing BINDs, that is, the TPA does not wait for a NOTIFY. ■ **Note** This parameter only appears if Enable PU2/LU0 Traffic = ON.

Number of BIND Retries

Range:	0 to 255
Default:	60
Description:	Specifies the number of times that the TPA resends BIND in response to a -RSP(BIND). A value of zero allows unlimited attempts. ■ **Note** This parameter appears only if the parameter Acquire Session = ENABLED.

Time to wait before sending a BIND

Range:	1 to 255
Default:	10
Description:	Specifies the time that the TPA should wait before sending a BIND in response to a -RSP(BIND).

Session Control

Range:	OFF, ON
Default:	OFF
Description:	Specifies whether or not the Session Control messages is be used.

Call and Session in Sync

Range:	OFF, ON
Default:	ON
Description:	Controls calls to the access protocol. If this parameter is configured ON, then the call is terminated when the session is closed from the adjacent TPA. Otherwise, the connection remains in place (Call in Place) so that when a Session request comes from the adjacent TPA next time, the session is immediately established. There is no delay in call processing towards the native protocol connection. Also whenever a data packet is received through the existing connection, the session is established again. **Note** This parameter appears only if Session Control = On..

Flow Control

Range:	OFF, ON
Default:	OFF
Description:	Specifies whether the Flow Control is on or off. This should be enabled on the adjacent TPA. **Note** TPA uses the “Send Window Size” in the TPDU Router configuration to do the flow control. When the number of packets that have not received any acknowledgment from the adjacent TPA exceeds a particular threshold (75% of “Send Window Size”), the TPA blocks the device with which it is connected.

Note

When you are configuring your nodes, you must enable the XID and RNR parameters (QLLC) for the SDLC station configuration.

BSC3270 DSP/TPDU Access Protocol Adaptor

Introduction

The BSC3270 TPA provides termination of the BSC3270 DSP protocol. This allows data, from the BSC3270 access devices (for example, BSC3270 POS devices) to be transported and routed in the TPDU packets.

Figure 38 illustrates a typical application involving a number of BSC3270 POS devices attached to host, which is providing a transaction processing service.

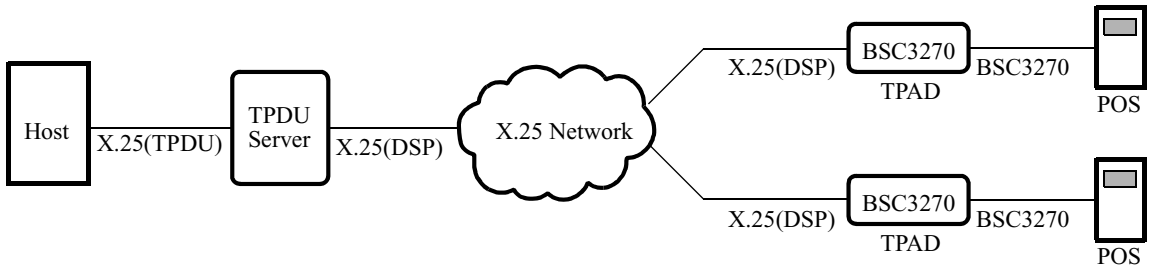


Figure 38. TPDU Application Example

BSC3270 DSP TPA Originator

The BSC3270 DSP TPA supports only the Autocall and the Connection Request Modes (CRM) 1, 2, or 3.

This TPA sends a call request packet to the remote BSC3270 TPAD when either the TPDU server or the TPAD for BSC3270 DSP are enabled and booted.

Call Clearing

The BSC3270 DSP TPA disconnects the session when error conditions occur. After being disconnected, the session is reestablished according to the TPA configuration.

DSP Command Message Processing

The BSC3270 DSP TPA converts TPDU messages into BSC3270 DSP messages (Figure 39), and sends them to the BSC3270 device as shown in Figure 40.

The XPAR bit is set according to the TPA configuration.

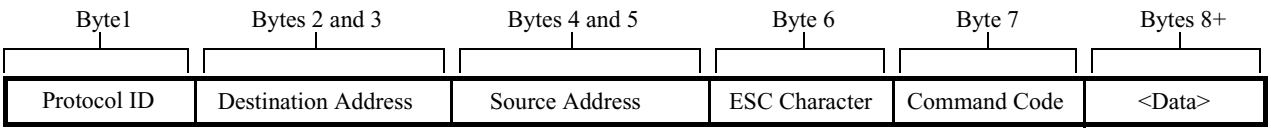


Figure 39. BSC3270 DSP Command Message Format

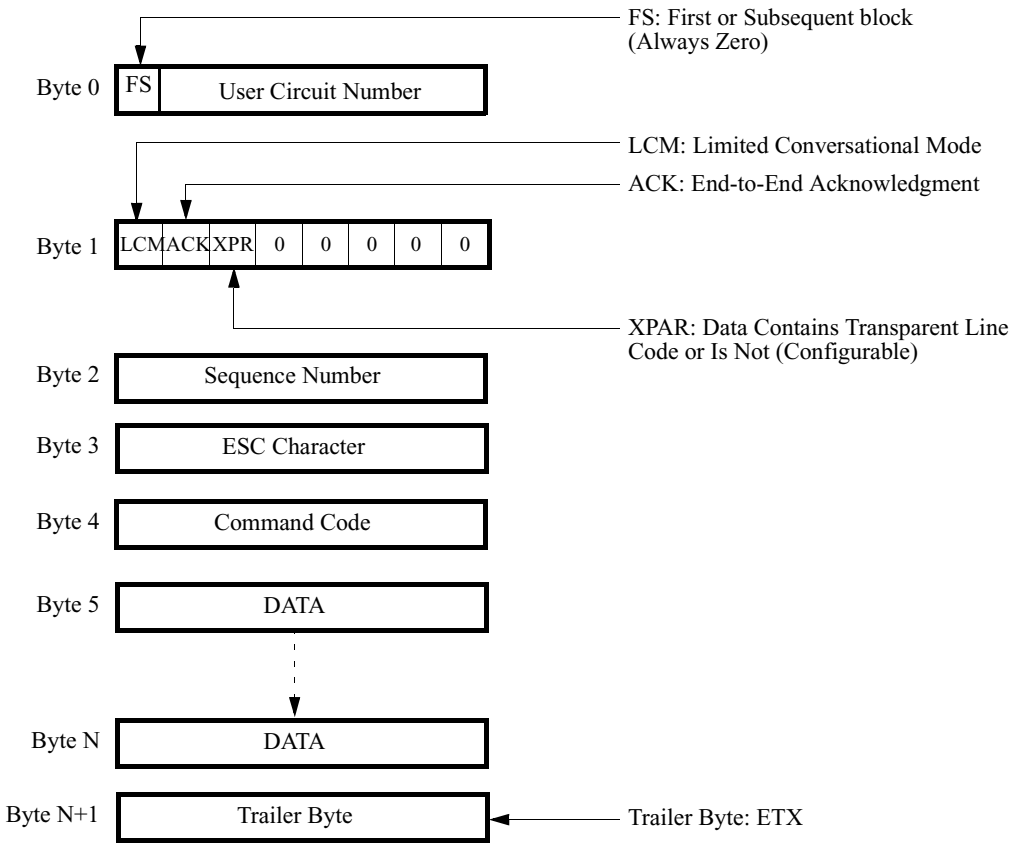


Figure 40. BSC3270 DSP Command Message Structure

DSP Response Message Handling

The BSC3270 DSP TPA converts the BSC3270 DSP response message to a TPDU message for the BSC3270 response (Figure 41) and sends it to the host, as shown in Figure 42.

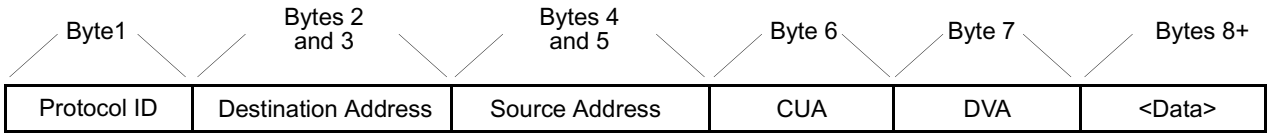


Figure 41. BSC3270 DSP Response Message Format

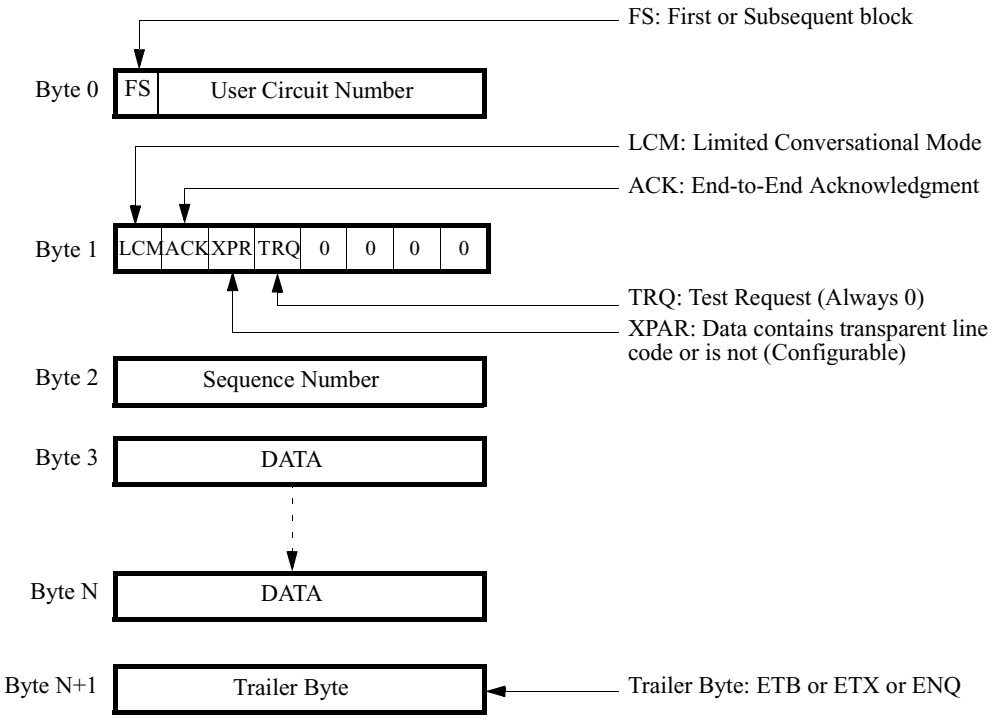


Figure 42. BSC3270 DSP Response Message Structure

BSC3270 TPA Configuration

Introduction

Each BSC3270 TPA has its own configuration and control parameters, as shown in Figure 43.

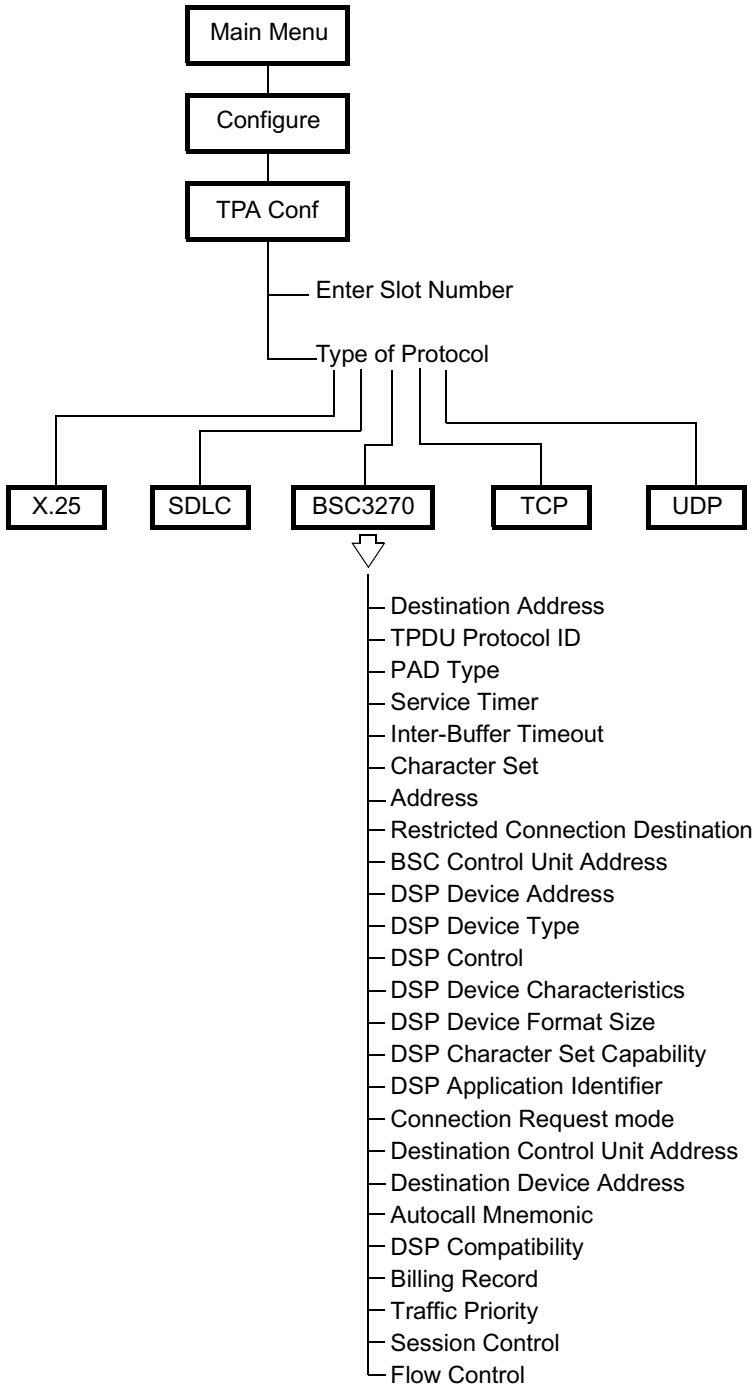


Figure 43. BSC3270 TPA Configuration Parameters

Parameters

The following tables identify generic slot parameters for the BSC3270 TPA.

Note

You must perform a Slot boot after changing the following parameters for the changes to take effect.

Destination Address

Range	0000 to FFFF (Hex)
Default	0000
Description:	Specifies the TPR destination address of this slot.

TPDU Protocol ID

Range	0000 to FFFF (Hex)
Default	60
Description:	Specifies the TPDU protocol ID for this slot.

PAD Type

Range	HPAD, TPAD
Default	HPAD
Description:	Indicates whether the slot is functioning as a Terminal PAD (TPAD) or a Host PAD (HPAD).

Service Timer

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

Inter-Buffer Timeout

Range	1 to 255
Default	30
Description:	Specifies the maximum time (in seconds) the PAD waits for the end of a multi-packet message from the network. If this time limit is exceeded, the PAD aborts the entire message and requests retransmission.

Character Set

Range	EBCDIC, ASCII
Default	EBCDIC
Description:	Indicates whether Terminal/Printer devices on this port support an ASCII or EBCDIC character set. **Note** The character set parameter must mach the value configured in the host or BSC3270 Controller/Device as applicable to the TPA for BSC3270 DSP or BSC3270 TPAD, respectively.

Address

Range	0 to 15 Decimal digits
Default	(Blank)
Description:	Calls addressed to this node and with this address are routed to this slot. When this slot makes a call, this address is inserted into the calling address field.

Restricted Connection Destination

Range	0 to 32 Alphanumeric characters
Default	(Blank)
Description:	All calls originating from this port are routed to the destination specified in this parameter, 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. Blank this field to disable this function.

BSC Control Unit Address

Range	20 to D9 (hex)
Default	40
Description:	The Poll address of the Control Unit that supports this device. It consists of two hexadecimal digits. Valid ranges depend on device. The character set is 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

DSC Device Address

Range	20 to D9 (hex)
Default	40
Description:	The Poll/Select address of this device. It consists of two hexadecimal digits. Valid ranges depend on device Character Set as follows: • EBCDIC: 40, C1, C2, C3, C4, C5, C6, C7, C8, C9, 4A, 4B, 4C, 4D, 4E, 4F, 50, D1, D2, D3, D4, D5, D6, D7, D8, D9, 5A, 5B, 5C, 5D, 5E, 5F • ASCII: 0, 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

DSP Device Type

Range	TERM, PRIN
Default	TERM
Description:	• TERM: Device is a terminal. • PRIN: Device is a printer.

DSP Control

Range	NONE, AUTO, ACK
Default	NONE
Description:	Specifies device call control. • NONE: Device is not a call originator and is enabled. • AUTO: Device is a call originator and automatically connects to pre-configured host. • ACK: Device requires DSP acknowledgment for all messages. You can specify any combination of these options by entering a plus sign between them, for example, AUTO+ACK.

Device Control

Range	NONE, NCMD, XPAR
Default	NONE
Description:	Specifies device control parameters: • NONE: No device control parameter is set. • NCMD: Prevents the HPAD from checking for ESC and CMD code messages from the host; the LCM flag is not sent in the BSP message to the TPAD. • XPAR: Handles the received message as the transparent message format. TPR is always sent in the DSP message. **Note** You can specify any combination of these options by entering a plus sign between them (for example, NCMD+XPAR).

DSP Device Characteristics

Range	NONE, XPAR, COLOR, PRINa
Default	NONE
Description:	Determines the characteristics of the device as follows: • NONE: no option. • XPAR: device supports transparency. • COLOR: device supports color. • PRINa: printer is attached to a terminal device. Any combination of above can be specified by summing (for example, COLOR+PRINa).

DSP Device Format Size

Range	480, 960, 1920, 2560, 3440, 3564
Default	480
Description:	Specifies maximum size of the terminal or printer message. For a CRM3 call, the TPA for BSC3270 DSP 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 host or BSC3270 Controller/Device as applicable to the TPA for BSC3270 DSP or BSC3270 TPAD, respectively.

DSP Character Set Capability

Range	NONE, APL, TEXT
Default	NONE
Description:	Indicates device capability: • NONE: No indication of capability. • APL: APL capability. • TEXT: Text capability. Any combination of above can be specified by summing (for example, APL+TEXT). **Note** The DSP Character Set Capability must match the value configured in the host or BSC3270 Controller/Device as applicable to the TPA for BSC3270 DSP or BSC3270 TPAD, respectively.

DSP Application Identifier

Range	0 to 255
Default	0
Description:	Specifies the target application to which this device is connected. This should match with 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. There are three modes of connection as follows: • 1: Fixed Class CRM: Connects a call to the device on a control unit with addresses that match the addresses of the call originator. • 2: Specific Class CRM: Connects to a specific device as indicated in the destination control unit and device address. • 3: Non-specific Class CRM: Connects to any device as indicated in the destination control unit address.

Destination Control Unit Address

Range	20 to D9 (hex)
Default	40
Description:	Specifies the control unit address on remote PAD. This is used with Connection Request Mode configured as 2 or 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	20 to D9 (hex)
Default	40
Description:	Specifies the device address on the remote PAD. This is used with Connection Request Mode configured as 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 if this device is configured for AUTO.

DSP Compatibility

Range	YES, NO
Default	NO
Description:	Specifies whether the device connects to a DSP host or a 6507/6525 node. • YES: if the device connects to a DSP host or if it connects to a 6507/6525 node with 2.13 or higher software revision. • NO: if the device connects to 6507/6525 with a software release prior to 2.13.

Billing Record

Range	OFF, ON
Default	OFF
Description:	Determines if billing (accounting) records are created for calls.

Traffic Priority

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

Session Control

Range:	OFF, ON
Default:	OFF
Description:	Specifies whether or not to use the Session Control messages.

Flow Control

Range:	OFF, ON
Default:	OFF
Description:	Specifies whether the Flow Control is on or off. This should be enabled on the adjacent TPA. **Note** TPA uses the "Send Window Size" in the TPDU Router configuration to do the flow control. When the number of packets that have not received any acknowledgment from the adjacent TPA exceeds a particular threshold (75% of "Send Window Size"), the TPA blocks the device with which it is connected.

Copying Configurations

Copying of BSC3270 DSP TPA device configuration records is supported.

TCP Protocol Adaptor

Introduction

This TPA connects the TPDU router to a TCP stack, and sends data from the TCP protocol to TPDU datagrams (and vice versa). A TCP TPA extends the connection-oriented service provided by TCP.

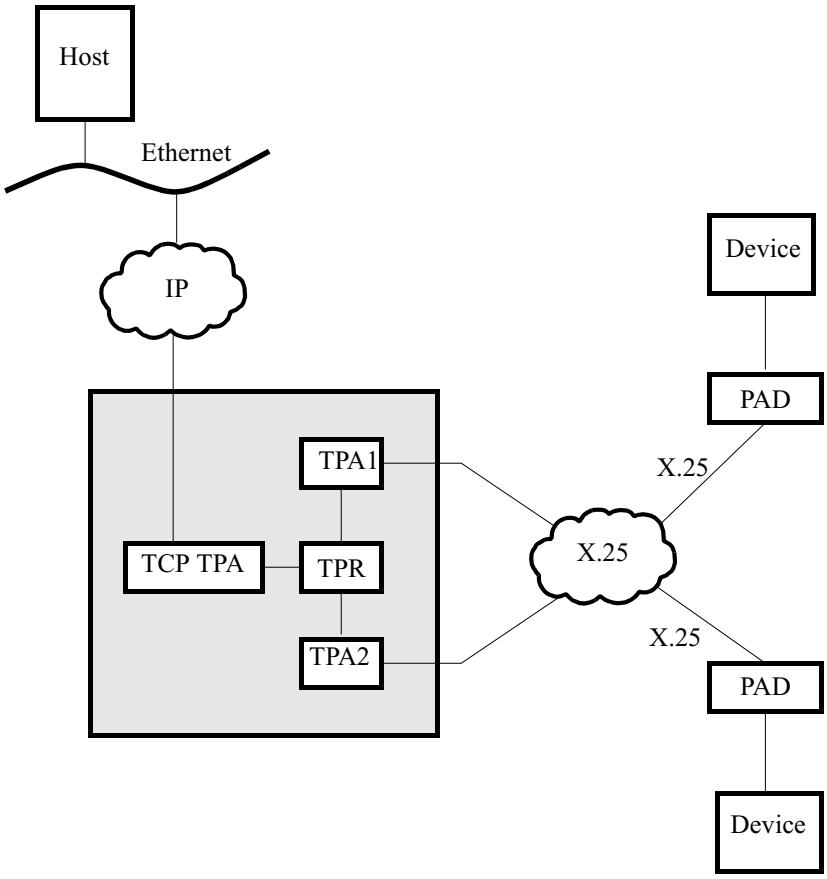


Figure 44. TCP TPA

Call Establishment

Connection can be established from either TPDU host or TPA. When the node is established, the TPA registers its port with TCP. Whenever a connection request is received from the Host, TCP forwards the request to the TPA. The TPA then verifies the remote node address. If the node address is a match, the TPA makes the connection. However, no other action is taken to establish the connection to the device. If the connection is not established within a configured time, the TPA attempts to open the connection again. The number of retries is configurable.

The TPA itself can initiate a connection to the Host. When the TPA receives a data packet, it checks whether the TPA is in the connected state or not. If the TPA is not connected it sends a TCP Open Request to establish the connection. Once the connection is made, data packets are sent on the connection.

The TCP TPA can also initiate a connection to the Host if the AutoCall parameter is enabled.

Call Clearing

Calls can be cleared from either end. When the TPA receives a Close Request from the Host, it clears the call and moves to the disconnected state. No data can be passed in the disconnected state.

The Idle Timeout parameter closes the TCP connection if there is no data traffic during a configurable period of time. If the configured value is zero, the TPA cannot close the connection.

Data Passing

If the connection is made, data received from the TPR is passed to TCP and vice versa. Since TCP is a stream-oriented protocol, we need to know the length of the packet being sent. Hence TPDU datagram format is enhanced to include the length of the packet (45). The new format is shown Figure 45.

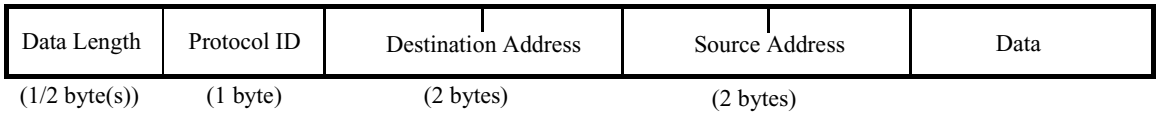


Figure 45. TCP TPA Datagram Format

Note

The length of data includes the length of the TPDU payload (data only) but does not include the TPDU header and the Data Length field.

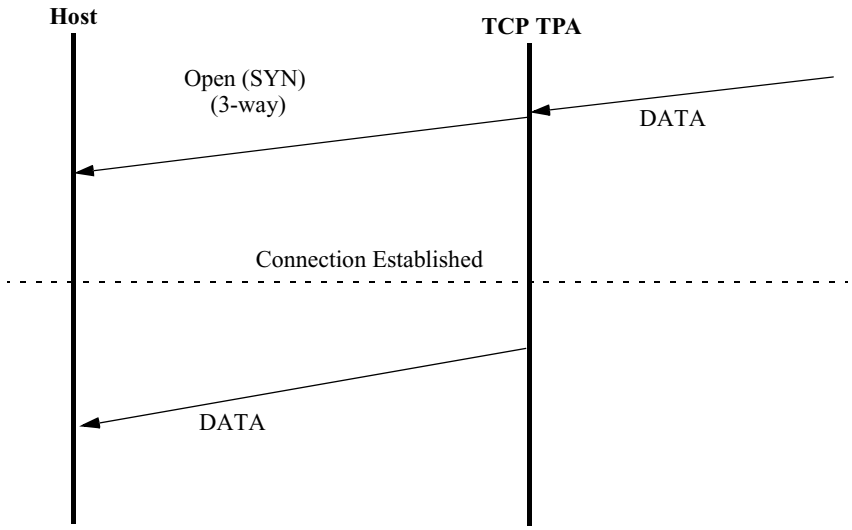


Figure 46. TCP TPA Timing Diagram

TCP TPA Configuration

Introduction

Each TCP TPA has its own configuration and control parameters, as shown in Figure 47.

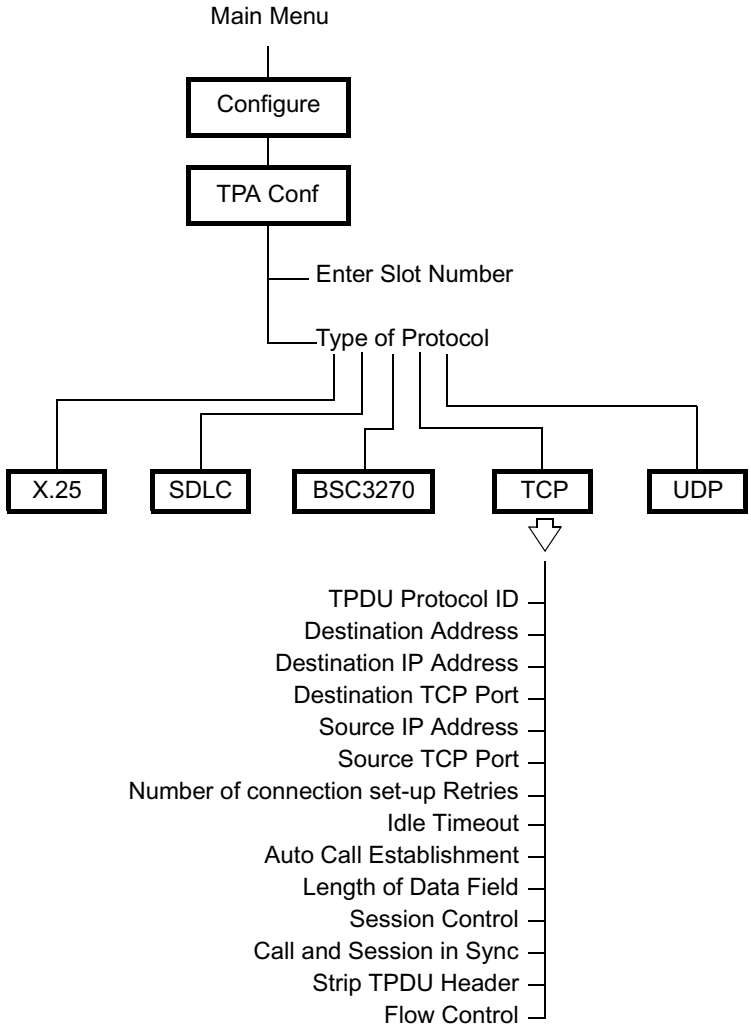


Figure 47. TCP TPA Configuration Parameters

Parameters

The following parameters are used to specify the TCP TPA.

Note

You must perform a Slot boot after changing the following parameters for the changes to take effect.

TPDU Protocol ID

Range:	00 to FF (hex)
Default:	FF
Description:	Specifies the Protocol Identifier. This is the first byte in the TPDU packet header. The TPDU host uses this field to identify the protocol carried in this TPDU packet. The host might be supporting multiple protocols.

Destination Address

Range:	0000 to FFFF (hex)
Default:	0000
Description:	Specifies the Destination TPDU address in hex, which is to be inserted before routing the packets received from the TCP host. **Note** Refer to the discussion about “Strip TPDU Header” in the “Session and Flow Control Configuration” section on page 28.

Destination IP Address

Range:	X.X.X.X, where X is less than 255. (This can be any valid IP Address.)
Default:	0.0.0.0
Description:	The remote node’s IP address to which the TPA makes a connection. **Note** When the TPA receives a call from a remote TCP host, it validates the IP address of the remote node and if it is different from what configured is, the call gets cleared.

Destination TCP Port

Range:	256 to 65535 (decimal)
Default:	256
Description:	Specifies the TCP port number to which the TPA makes a connection. The remote end must have the same value configured as the "Source TCP Port" for this feature to work. **Note** When the TPA receives a call from a remote TCP host, it validates the IP address of the remote node and if it is different from what configured is, the call is cleared.

Source IP Address

Range:	X.X.X.X, where X is less than 255. (This can be any valid IP Address.)
Default:	0.0.0.0
Description:	IP address of this node. **Note** Change the default value 0.0.0.0 to the IP address of the node.

Source TCP Port

Range:	256 to 65535 (decimal)
Default:	256
Description:	This is the TCP port number at which the TPA listens for a connection. The remote-end must have the same value configured as "Destination TCP Port" for this feature to work.

Number of connection set-up Retries

Range:	0 to 10
Default:	10
Description:	Specifies the number of times that the TPA attempts to establish the connection to the remote destination. A value of zero allows unlimited attempts.

Idle Timeout

Range:	0 to 60
Default:	5
Description:	Selects the idle timer that clears the connection when no data transfer takes place for this timeout period. • 0: Timer disabled • 1 to 60: Value of idle timer in 1 minute increments.

Auto Call-establishment

Range:	OFF, ON
Default:	OFF
Description:	Specifies whether call should be established before receiving any transaction. If ON, each time when the call gets cleared, the TPA tries to bring the connection up. **Note** If "Session" is enabled and "Call in Sync with Session" is ON, Auto Call Establishment does not work because once the connection comes up, the TPA clears the call immediately because the Call should be synchronized with Session.

Length of Data Length Field

Range	0 to 2
Default:	1
Description:	This specifies the number of bytes needed to specify the data length field in the TPDU header, which is used to access data from TCP. A value of zero means no data length is given in the packet. **Note** If the data length is configured as 0, TPA uses a timeout value of 100ms to wait for data from TCP and when the Timeout happens, the data is passed to the TPDU router. A data length of '0' means that the maximum data size that can be sent or read is 256 bytes while a length 2 means the maximum size is 8192(8k) **Note** Using a 2 bytes length doesn't mean that the maximum size of the data packet is 64KB. The TCP TPA imposes the limit of 8KB.

Session Control

Range:	OFF, ON
Default:	OFF
Description:	Specifies whether the Session Control is disabled or enabled in the TPA.

Call and Session in Sync

Range:	OFF, ON
Default:	ON
Description:	This parameter is used to control the call to the access protocol. If this parameter is configured ON, then call is terminated when session is closed from the adjacent TPA. Otherwise, the connection remains in place (Call in Place) so that when a Session request comes from the adjacent TPA next time, the session is established immediately. There is no delay in call processing towards the native protocol connection. Also whenever a data packet is received through the existing connection, the session is established again. **Note** This parameter appears only if Session Control = On.

Strip TPDU Header

Range:	OFF, ON
Default:	ON
Description:	Strips (or adds) the TPDU header containing the Protocol ID, Source and Destination Address of a message that goes to, or comes from, the host device. • OFF: The TPDU header is stripped from the packets going to, or coming from the host device. This TPA is able to talk with a TPDU host. • ON: The TPDU Header may (or may not) be stripped from the packets going to (or coming from) the host device.

Flow Control

Range:	OFF, ON
Default:	OFF
Description:	Specifies whether the Flow Control is enabled or disabled in the TPA. This should be enabled on the adjacent TPA also for the proper working. **Note** TPA uses the "Send Window Size" in the TPDU Router configuration to do the flow control. When the number of packets that have not received any acknowledgment from the adjacent TPA exceeds a particular threshold (75% of "Send Window Size"), the TPA blocks the device with which it is connected.

UDP Protocol Adaptor

Introduction

The UDP TPA provides a UDP connection from the TPDU router to a UDP stack. It forwards the data from the UDP to TPDU datagrams and vice versa.

Note

UDP TPA does not support session and flow control.

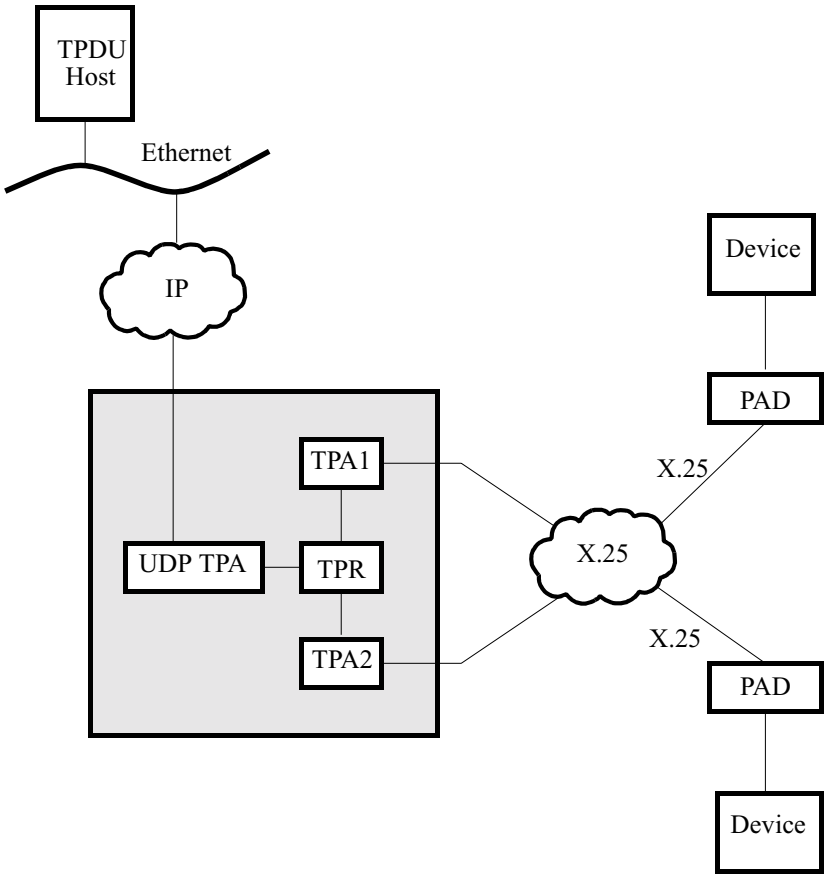


Figure 48. UDP TPA

Call Establishment

Since UDP is connectionless, each UDP TPA registers its configured port with UDP. Whenever UDP receives a datagram destined for a particular port, it is handed over to the respective TPA. Therefore, all UDP TPAs must be configured with unique port numbers.

Data Passing

When a packet is delivered to the UDP TPA by the TPR, the TPA forms a datagram, with the configured IP address and port number, and sends it to the UDP. When a packet is received from the Host, through UDP, the source IP address of the host is validated against the configured IP address. If the validation fails, the packet is dropped. After successful validation, the packet is forwarded to the TPR.

UDP TPA Configuration

Introduction

Each UDP TPA has its own configuration and control parameters, as shown in Figure 49.

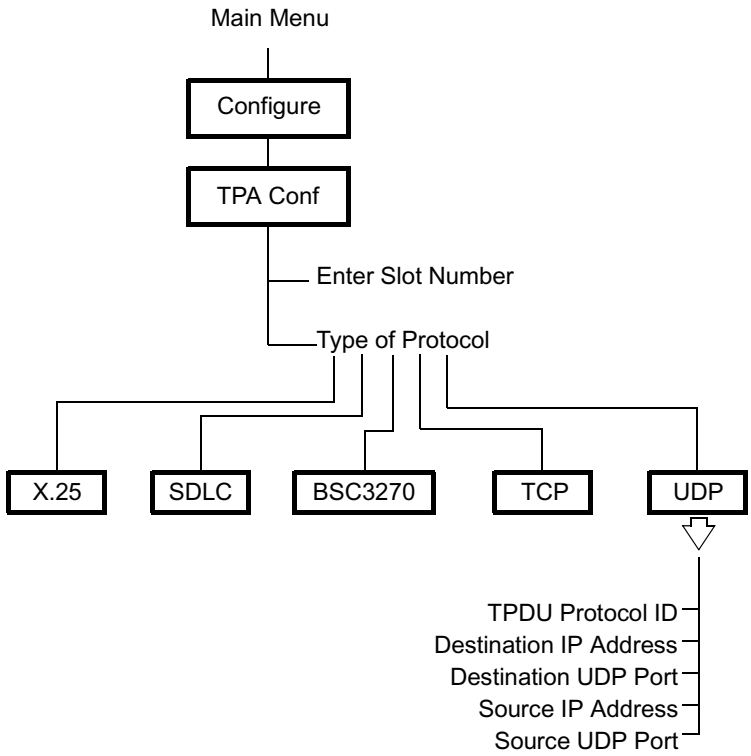


Figure 49. UDP TPA Configuration Parameters

Parameters

These are the parameters specific to the UDP TPA.

Note

You must perform a Slot boot after changing the following parameters for the changes to take effect.

TPDU Protocol ID

Range:	00 to FF (hex)
Default:	FF
Description:	Specifies the Protocol Identifier. This is the first byte in the TPDU packet header. The TPDU host uses this field to identify the protocol carried in this TPDU packet. The host might be supporting multiple protocols.

Destination IP Address

Range:	X.X.X.X, where X is less than 255. (This can be any valid IP address.)
Default:	1.1.1.1
Description:	The remote node's IP address to which the TPA makes a connection. **Note** When the TPA receives a datagram from a remote UDP client, it validates the IP address of the remote node and if it is different from what is configured, the datagram is discarded.

Destination UDP Port

Range:	256 to 65535 (decimal)
Default:	256
Description:	The UDP port number to which the TPA sends the datagrams. The remote-end must have the same value configured as "Source UDP Port" for this feature to work. **Note** When the TPA receives a datagram from a remote UDP client, it validates the UDP Port of the remote node and if it is different from what is configured, the datagram is discarded.

Source IP Address

Range:	X.X.X.X, where X is less than 255. (This can be any valid IP address.)
Default:	1.1.1.1
Description:	The IP address of this node. **Note** The default value 0.0.0.0 should be changed to the IP address of the node, otherwise the UDP TPA does not work.

Source UDP Port

Range:	256 to 65535 (decimal)
Default:	256
Description:	Specifies the UDP port number at which the TPA listens for new datagrams. The remote-end must have the same value configured as the Destination UDP Port for this feature to work.

BSC2780 TPDU Access Protocol Adaptor

Introduction

The BSC2780 TPA provides termination of the BSC2780 session layer protocol (SES) used between BSC2780 PAD ports over X.25 networks. This allows data from BSC2780 access devices to be transported and routed in TPDU packets.

Figure 50 illustrates a typical application involving a number of BSC2780 devices attached to host, that is providing a transaction processing service.

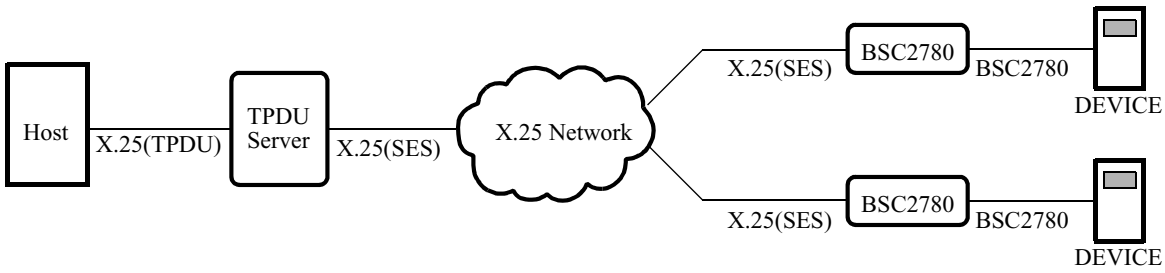


Figure 50. TPDU Application Example

Call Establishment

A BSC2780 TPA can make of accept a call. Refer to the “Connection Management” section on page 9 for additional information.

Call Clearing

Refer to “Call Clearing” section on page 10 for additional information.

TPDU TO SES Message Processing

The BSC2780 TPA converts the TPDU message format (see Figure 51) to the BSC2780 SES message format (Figure 52) according to these rules:

- The TPDU header is removed and replaced by STX (DLE STX).
- ETX is added as the trailer byte.

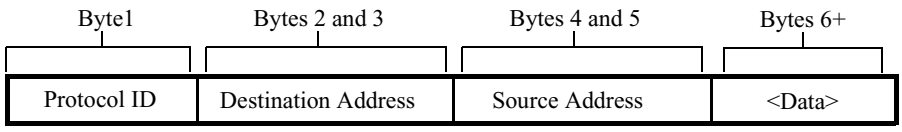


Figure 51. BSC2780 TPDU Message Format

The BSC2780 TPA converts the BSC2780 SES message format (Figure 52) to the TPDU message format (Figure 51) by following these rules:

- TPDU header is added.
- Header processing based on configured option.
- Trailer byte ETX/ETB/ENQ is stripped.

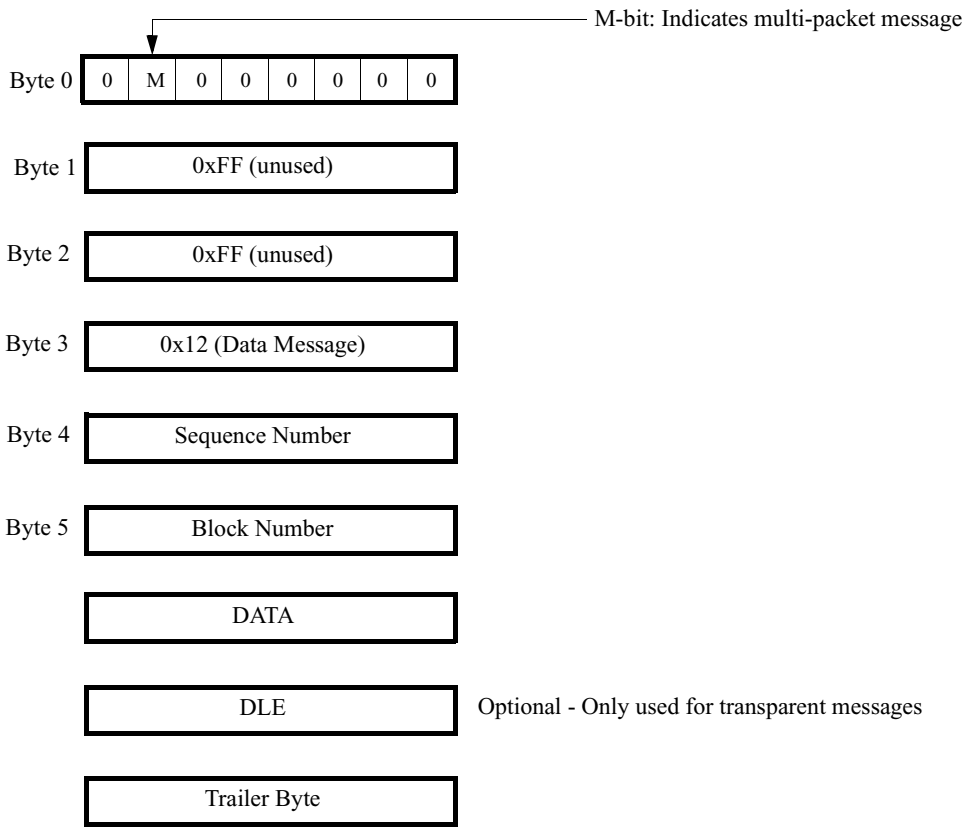


Figure 52. BSC32708 SES Message Format

BSC2780 TPA Configuration

Introduction

Each BSC2780 TPA has its own configuration and control parameters, as shown in Figure 53.

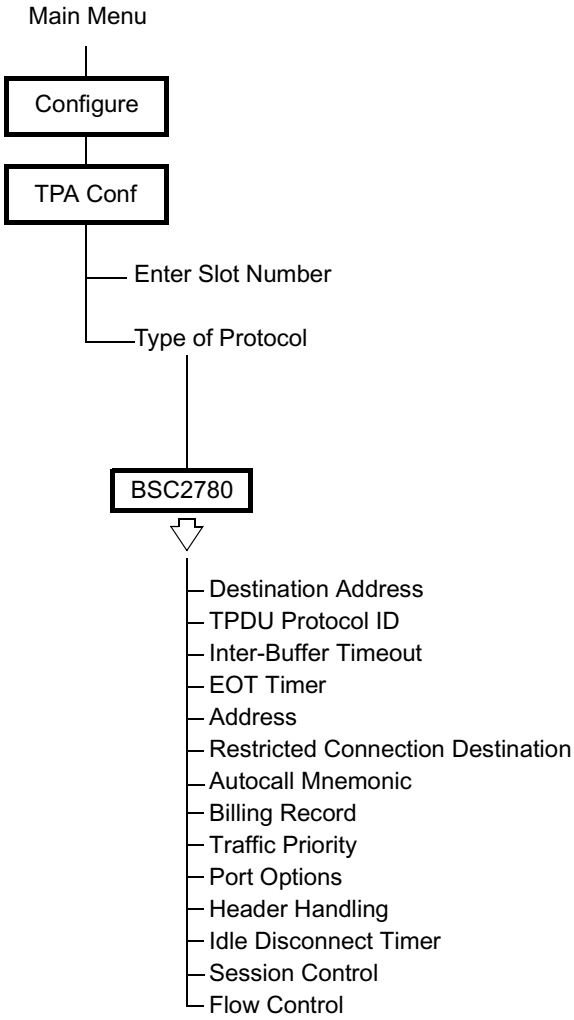


Figure 53. BSC2780 TPA Configuration Parameters

Parameters

These tables identify generic slot parameters for the BSC2780 TPA.

Note

You must perform a Slot boot after changing the following parameters for the changes to take effect.

Destination Address

Range	0000 to FFFF (Hex)
Default	0000
Description:	Specifies the TPR destination address of this slot.

TPDU Protocol ID

Range	00 to FF (Hex)
Default	60
Description:	Specifies the TPDU protocol ID for this slot.

Inter-Buffer Timeout

Range	1 to 255
Default	30
Description:	Specifies the maximum time (in seconds) the PAD waits for the end of a multi-packet message from the network. If this time limit is exceeded, the PAD aborts the entire message and requests retransmission.

EOT Timer

Range	0 to 60
Default	5
Description:	Specifies the maximum time (in seconds) that the PAD waits for the next message from the TPDU Router. The PAD sends an EOT to the remote PAD.

Address

Range	0 to 15 Decimal digits
Default	(Blank)
Description:	Specifies that calls addressed to this node and with this address be routed to this slot. When this slot makes a call, this address is inserted into the calling address field.

Restricted Connection Destination

Range	0 to 32 Alphanumeric characters
Default	(Blank)
Description:	Specifies the destination to which all calls originating from this port are routed, 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. Blank this field to disable this function.

Autocall Mnemonic

Range	0 to 8 Alphanumeric characters
Default	(Blank)
Description:	Specifies the use of this mnemonic name if this device is configured for AUTO.

Billing Records

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

Traffic Priority

Range	LOW, MED, HIGH, EXP
Default	MED
Description:	Specifies the traffic priority of the 2780 device.

Port Options

Range	NONE, ACK, XPAR
Default	NONE
Description:	Specifies the port control options. • NONE: No options are specified • ACK: End-to-End acknowledgments are used. • XPAR: TPDU data is always sent as a transparent message. Any combination of these options can be specified by summing. For example, ACK+XPAR.

Header Handling

Range	NONE, RMVHDR, RMVSTX
Default	NONE
Description:	Specifies header information: • NONE: removes only the first SOH or STX. • RMVHDR: removes SOH, Header, and STX. • RMVSTX: removes SOH and STX.

Idle Disconnect Timer

Range	0 to 60
Default	0
Description:	Specifies the time (in seconds) that the port waits before clearing a call. A value of 0 disables this timer.

Session Control

Range:	OFF, ON
Default:	OFF
Description:	Specifies whether or not the Session Control messages should be used.

Flow Control

Range:	OFF, ON
Default:	OFF
Description:	Specifies whether the Flow Control is on or off. This should be enabled on the adjacent TPA. **Note** TPA uses the "Send Window Size" in the TPDU Router configuration to do the flow control. When the number of packets which have not received any acknowledgment from the adjacent TPA exceeds a particular threshold (75% of "Send Window Size"), the TPA blocks the device with which it is connected.

Copying Configurations

Copying of BSC3270 TPA device configuration records is supported.

Index

X