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**Systems**

4700 Finance  
Communication System  
X.25 Custom Feature  
Description  
RPQ 8V0134



### **First Edition (June 1983)**

This manual provides programming and operating information for the 4700 Finance Communication System's X.25 special feature RPQ 8V0134. This feature is supported by release 2 of the 4700 system. This manual supports that release, and applies to all subsequent releases and modifications until otherwise changed in new editions or Technical Newsletters (TNLs).

Changes occur often to the information herein; before using this publication in connection with the installation or operation of IBM equipment, consult the latest *IBM System/370 Bibliography of Industry Systems and Application Programs*, GC20-0370, for the editions that are applicable and current.

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## What This Manual Contains

This manual describes the 4700 Finance Communication Subsystem's support for attaching to X.25-based packet-switched data networks. This support is called RPQ 8V0134.

## Who Should Use This Manual, and How

This manual is intended for those who install, test, program, operate, or maintain a 4700 system attached to a host over an X.25 network. It contains information primarily for configuring and programming such a system, and describes the following topics:

Physical, link, and packet support provided

X.25 facilities (call barring, closed user group support, and so on)

Configuration and programming additions and changes

Operator/4700 system monitor additions and changes

If you are programming the system, this manual contains the theory, configuration (CPGEN), and instruction descriptions you need to use *in addition to* those in the *4700 Controller Programming Library*. It also lists the statistical counters and error messages added by X.25.

If you are installing the 4700 system, you should understand the storage allocation, data transfer (MABR) rate, added configuration macro instructions, and optional module descriptions in this manual before beginning the configuration process.

If you are operating a 4700/X.25 system, changes to the 4700 system monitor installation and operating procedures may be needed. A new system log message is also added.

If you maintain a 4700/X.25 system, you need the information about added statistical counters and diagnostics in the chapter on maintenance and diagnostics.

This manual is a supplement to the information contained in the co-requisite publications listed on the following page.

## Other Information and Manuals You Will Need

The following manuals contain information with which you should be familiar when programming or operating a 4700/X.25 system:

### *Prerequisite Publications*

Before programming or operating a 4700/X.25 system, you should first understand the information in the IBM manual, *X.25 Interface for Attaching IBM SNA Nodes to Packet-Switched Data Networks, General Information Manual*, GA27-3345.

### *Co-Requisite Publications*

The following publications, which this manual supplements, should be available to you when you program or operate a 4700/X.25 system:

- *IBM 4700 Finance Communication System: System Summary*, GC31-2016
- *IBM 4700 Finance Communication System Configurator*, GC31-2017
- *IBM 4700 Finance Communication System, Controller Programming Library*, GBOF-1387. This manual refers to the six-volume library as the *4700 Controller Programming Library*, and at times to a specific volume, particularly *Volume 3, Communication Programming* (GC31-2068).
- *IBM 4700 Finance Communication System, Subsystem Operating Procedures*, GC31-2032, referred to by this manual as the *4700 Operating Procedures*.
- *IBM 4700 Finance Communication System, Subsystem Problem Determination Procedures*, GC31-2033. This manual is referred to as the *4700 Problem Determination Procedures*.
- *IBM Systems Network Architecture Format and Protocol Reference Manual: Architectural Logic*, SC30-3112.

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# Chapter 1. Application Programming Reference

This chapter briefly introduces X.25 for the 4700 system, and discusses changes or additions to the process of creating an application program when your system has an X.25 link.

## Introduction

The International Telegraph and Telephone Consultative Committee (CCITT) Recommendation X.25 defines an interface between customer data terminal equipment (DTE) and data circuit-terminating equipment (DCE) to attach DTEs to packet-switched data networks (PSDN). The definition includes:

- **Physical level:** The mechanical and electrical functions and procedures for starting, operating, and stopping DCE-DTE communication links. The 4700/X.25 feature supports:
  - X.21 BIS leased circuit
  - X.21 leased circuit
  - Line speed to 9.6 kilobits/second
  - Full duplex operation.
- **Link level:** Access procedures for exchanging data over DTE-DCE communication links. The 4700/X.25 feature provides support for:
  - Link access protocol balanced (LAPB).
  - Modulo 8 link-level sequence numbering.
- **Packet level:** Packet formats and control procedures for sending control information and data over DTE-DCE links.
  - Single virtual circuit, switched or permanent.
  - Modulo 8 or 128 packet level sequence numbering.
  - Data packet sizes of 64, 128, 256, and 512 bytes.
  - Packet window sizes 1 to 7 for modulo 8.
  - Packet window sizes 1 to 15 for modulo 128.

The 4700 X.25 implementation adheres to the specifications found in *The X.25 Interface for Attaching IBM SNA Nodes to Packet-Switched Data Networks, General Information Manual, GA27-3345*.

The 4700 X.25 interface simulates logical link control for adjacent SNA nodes with either of the following:

- Qualified Logical Link Control (QLLC)
- Physical Services Header (PSH)

You must define these and other X.25 operating characteristics with the link configuration macros or operating instructions described in Chapter 2.

## The X.25 Network

The network for a 4700 Finance Communication System when using X.25 protocols includes a 4700 application program, a 4700 controller, the X.25 network, a 3704/3705 communications controller or equivalent, a host system, an access method (such as VTAM), and a host application program.

The X.25 network provides a *virtual circuit*, identified by a logical channel, for data transfer. The IBM 4700 uses either Qualified Logical Link Control (QLLC) or Physical Services Header (PSH) protocols to control communications with a remote data terminal (DTE).

### *Virtual Circuits*

A Permanent Virtual Circuit (PVC) is a logical point-to-point SDLC leased line. A Switched Virtual Circuit (SVC) is a logical point-to-point switched line.

### *Logical Channels*

Each virtual circuit is assigned, by the PSDN, a logical channel group number (0 to 15) and a logical channel number (0 to 255). Current X.25 support limits the 4700 to only one active virtual circuit at a time. The logical channel identifier, the group number plus the channel number, is defined to the 4700 in the X25LCHN macro. You can define the following types of logical channels:

#### **Permanent channel**

Used for a PVC dedicated to data transfer between a 4700 and a specific DTE.

#### **Outgoing channel**

Used for an SVC where only the 4700 can initiate a call.

#### **Incoming channel**

Used for an SVC where only the remote DTE can initiate a call.

#### **Two-way channel**

Used for an SVC where either the remote DTE or the 4700 can initiate a call.

### *Logical Link Control*

QLLC protocols provide two levels of data transfer. Packets transmitted with the qualifier bit (Q-bit) off contain SNA/user data. Packets transmitted with the Q-bit on contain logical link control to perform adjacent node physical services such as XID, TEST, and DISC.

PSH protocols contain a minimum two byte header to indicate the format of the packet (data or adjacent node physical services).

## **Establishing Contact**

The X.25 network requires certain parameters to be passed to the X.25 DCE before communications can be established with a remote DTE. These parameters are defined to the 4700 through either the COMLINK, X25LCHN, X25CKT, and X25FAC configuration macros or in the start link (STRLNK) and start circuit (STRCKT) instruction parameters.

Certain X.25 circuit information, such as the facility field of a call packet, are passed during call setup. The X.25 circuit information will be presented to the station whose program issued the STRCKT, or to the station specified during CPGEN to receive the information. This station is called the X.25 Circuit Information Station (X25CIS).

**Note:** Contact during initial program load (IPL) considers the system monitor as the X25CIS. Any X.25 information passed at this time is written to the system log.

## **Automatic Contact**

Contact with the remote DTE will be established automatically by the 4700 when a STRLNK instruction is issued and the following conditions are met:

1. The circuit is a PVC.
2. The circuit is specified, via CPGEN or a prior STRCKT, to be automatically started.

The station's program must then issue a STRCKT instruction, using the parameters specified in the CPGEN macros or changed by a previous STRCKT. GMSILRM (X'40') is set in GMSIND when the connection is established.

An 11 006 message containing cause and diagnostic codes is written to the log if a failure occurs during contact.

## **Application Program Contact**

If your operation requires an incoming call or outgoing call SVC, if you must change a configured or previously changed STRCKT parameter, or if you require flow control or throughput class negotiations, you must follow a STRLNK instruction with a STRCKT instruction.

Successful completion of STRLNK (GMSILR set to 1) occurs when the link has been initialized and the restart procedure has been completed for the packet level. Failure of the STRLNK results in an 11 006 message, containing the cause and diagnostic codes, to be written to the log.

Final connection is made with the remote DTE by issuing the STRCKT instruction. Flow control parameters and/or throughput class parameters, if specified in the configuration or in the STRCKT instruction, are included in the call request packet for an outgoing call SVC or in the call accepted packet for an incoming call SVC. The controller sets SMSCST to X'04' (SMSCCRM) for all stations configured for the link when connection is established. Failure of the STRCKT results in an 11 006 message, containing the cause and diagnostic codes, to be written to the log.

## ***Connection With a PVC***

If you specify an automatic start circuit, the controller sets GMSILR to 1 to indicate successful connection with a PVC. Connection to a PVC when automatic start circuit is not specified is indicated by setting GMSILR to 1 when the STRLNK instruction completes successfully and setting SMSCCR to 1 when the STRCKT instruction completes successfully. Failure of STRCKT, in either case, causes the controller to write an 11 006 message containing the cause and diagnostic codes in the log.

### ***SVC — Calling Connection***

If you select an outgoing call or two-way channel, you must establish the remote DTE connection by issuing the STRCKT instruction after STRLNK completes; GMSILR is set to 1. The controller then transmits a 'Call Request' packet containing optional X.25 facilities passed in either the STRCKT instruction or specified during configuration. Successful completion of the STRCKT instruction (SMSCCR set to 1) occurs when the controller receives a 'call connected' packet. The facility field of the call connected packet is presented to the X25CIS. If the received facility field is unacceptable to the X25CIS, the program must issue STPCKT to disconnect the virtual circuit. Any connection failure writes an 11 006 message containing the cause and diagnostic codes in the system log.

### ***SVC — Called Connection***

The user can select an incoming call channel or a two-way channel, and may want the remote DTE to establish connection. In this case, the application program waits following successful completion of STRLNK (GMSILR set to 1) for an 'incoming call' packet. The X25CIS receives the 'incoming call' packet, analyzes the Facility field of the call packet and, if acceptable, issues the STRCKT instruction. The X25CIS rejects the call by issuing STPCKT if the packet is not acceptable. A 'call accepted' packet, containing X.25 Facility parameters specified in the STRCKT instruction and/or via the CPGEN, is transmitted. Successful connection is indicated by SMSCCR set to 1.

Any connection failure results in an 11 006 message, containing the cause and diagnostic codes, to be written to the log.

## **Compatibility of Existing Application Programs**

Existing application programs for TYPE = 4502 (SDLC/SNA) leased line operate unchanged only for an X.25 permanent virtual circuit (PVC) when you specify automatic start circuit. You must add a STRCKT instruction to other programs.

Application programs required to support PVC that currently support TYPE = 4850 or 5656, must have all STRLNK instructions changed.

Application programs required to support a switched virtual circuit (SVC) must be modified to provide the following functions:

1. Detect a link operational condition (GMSILR).
2. Issue a STRCKT instruction.
3. Analyze return codes from a STRCKT.
4. Detect a circuit operational condition (SMSCCR).
5. Analyze CALL ACCEPTED data (for Outgoing Calls).
6. Analyze INCOMING CALL data (for Incoming Calls).
7. Analyze flow control negotiations (if required).
8. Analyze facility fields (if required).
9. Provide restart capabilities on a loss-of-contact condition.
10. Issue STPCKT, if necessary.

## Timers

X.25 defines the following timers and actions taken when the defined times expire:

### **T20 thru T23**

These timers are started when a restart request, call request, reset request, or clear request is transmitted. The response to the request must arrive before the time expires or both the link and circuit stop. These timers expire at 200 seconds.

You must define the following timeout controls on the COMLINK configuration (CPGEN) macro before using X.25:

### **Response timeout (RSPT)**

This specifies the most time that can elapse between the transmission of a frame and the receipt of the corresponding response. The timeout starts after the controller transmits each frame. If the timeout expires before the DCE acknowledges receipt of the frame, the 4700 transmits an RR frame with the poll bit on, forcing a DCE response indicating whether or not it received the previous frame. If it was not received, the controller resends the frame. Specify increments of 0.1 seconds. The default is 30 (3.0 seconds).

### **Idle/non-productive line (INPT)**

This defines the number of seconds that the line can remain idle with no complete frames received before the controller requests a DCE response. If the request produces no response from the DCE, the controller stops the link and circuit and posts loss-of-contact status. Specify increments of 5 seconds. The default is 4 (20 seconds).

### **Retransmission value (REXM)**

This count defines how often the controller can resend a frame before disconnecting and reporting loss-of-contact. The default is 2 (two retransmission attempts).

### **Connection timeout (OPTM)**

This specifies the time that the 4700 will wait for a link connection to be established before ending the connection attempt. Specify 13-second increments. The default is 1 (13 seconds).

For more information on the X.25 configuration macro instructions and requirements, refer to "Configuration Macro Instructions."

## **Packet Types**

The following describes each of the X.25 packet types supported by the 4700.

### ***Call Request (SVC)***

The call request packet is transmitted by the 4700 when a STRCKT instruction is issued specifying an 'outgoing call'. This packet contains the called and, optionally, the calling numbers, network facilities subscribed to by the 4700 user, and the Connection Identifier (CID).

### ***Incoming Call (SVC)***

This packet is received by the 4700 as a result of a remote DTE transmitting a call request. The X25CIS is presented with the data contained in the packet when an LREAD is issued, the Read Type field (SMSCRT) is set to X'B1'. Acceptance of the call is indicated by issuing the STRCKT instruction. To reject the call, a STPCKT is issued.

### ***Call Accepted (SVC)***

This packet is sent from the 4700 as a result of a STRCKT instruction being issued after receipt of an incoming call. If so specified via the CPGEN or a prior STRCKT, the called and calling numbers and network facilities subscribed to by the user are contained in the packet.

### ***Call Connected (SVC)***

The call connected packet is received by the 4700 confirming that the remote DTE has accepted the 'call request'. The X25CIS is presented with the data contained in the packet when an LREAD instruction is issued. The Read Type field (SMSCRT) is set to X'B2'. The channel is now in the 'data transfer' state and SNA protocols may begin.

### ***Clear Request (SVC)***

This packet is sent when a STPCKT instruction is issued. The diagnostic code specified in the instruction, selected from those codes listed in the DTE generated diagnostic code section, will be included in the packet.

Certain X.25 errors such as sequence errors, invalid packets, etc., will cause a clear request to be sent from the 4700. The circuit is stopped, an 11 006 message, containing the cause and diagnostic codes, is written to the log, and loss-of-contact status is posted to all stations using the circuit. A STRCKT instruction is required to re-open the circuit.

### ***Clear Indication (SVC)***

This packet is received by the 4700 as a result of problems detected by the network or the remote DTE, or via a normal clearing sequence. The circuit is stopped, a clear confirmation is sent, and all stations using the circuit are posted with loss-of-contact status. An 11 006 message, containing the cause and diagnostic codes, is written to the log. A STRCKT instruction is required to re-open the circuit.

### ***Clear Confirmation (SVC)***

Clear confirmation is sent by the 4700 whenever a clear indication is received.

### ***Reset Request (PVC)***

This packet is sent when a STPCKT instruction is issued. The diagnostic code specified in the instruction, selected from those codes listed in the DTE generated diagnostic code section, will be included in the packet.

Certain X.25 errors such as sequence errors, invalid packets, etc., will cause a reset request to be sent from the 4700. The circuit is stopped, the reset request sent, and all stations using the circuit are posted with loss-of-contact. An 11 006 message containing the cause and diagnostic codes, is written to the log. A STRCKT is required to re-open the circuit.

### ***Reset Indication (PVC)***

This packet is received by the 4700 as a result of problems detected by the network or the remote DTE. The circuit is stopped, and loss-of-contact status posted to all stations using the circuit. An 11 006 message, containing the cause and diagnostic codes, is written to the log. A STRCKT is required to re-open the circuit.

### ***Reset Confirmation (PVC)***

Reset confirmation confirms that the circuit has been reset. Reset confirmation is sent by the 4700 whenever a reset indication is received.

### ***Restart Request***

This packet is sent when a STRLNK or STPLNK instruction is issued as part of the restart procedure.

Certain X.25 errors occurring at the packet level will also cause a restart request to be sent from the 4700. The circuit is stopped, an 11 006 message containing the cause and diagnostic codes is written to the log, and all stations using the circuit are posted with loss-of-contact status. A STRLNK is required to re-establish communications.

### ***Restart Indication***

This packet is received by the 4700 and indicates that the link has been restarted. Loss-of-contact status is posted to all stations using the circuit and an attempt is made to re-establish communications.

### ***Restart Confirmation***

Restart confirmation is received by the 4700 in response to a restart request and sent by the 4700 whenever a restart indication is received.

### ***Data***

This packet sent/received by the 4700 and contains user data.

### ***Receiver Not Ready (RNR)***

This packet will not be sent by the 4700. If an RNR is received, the 4700 will stop transmission of data packets until an RR is received.

### ***Receiver Ready (RR)***

This packet is sent by the 4700 in response to a data packet received unless an outgoing data packet is available for transmission. Receipt of an RR packet indicates that transmission from the 4700 may resume.

### ***Diagnostic***

This packet is received by the 4700 from the DCE and contains error indication data where the usual method of reporting, Reset, Clear or Restart packets, are not appropriate. This information is written to the log and no further action is taken.

## **X.25 Facilities**

Optional X.25 Facilities are requested from network administration by subscription or, for those facilities that can be specified in call packets, specified via CPGEN or by parameters passed in the STRLNK and STRCKT instructions.

The following facilities are subscribed to from the Network Administrator and require no support from the 4700.

1. Incoming calls barred
2. Outgoing calls barred
3. Closed user group (CUG) with outgoing access
4. CUG with incoming access
5. Incoming calls barred in CUG
6. Outgoing calls barred in CUG
7. Reverse charge acceptance.

The following facilities are subscribed to from the Network Administrator and require support from the 4700 via the CPGEN and/or the controller application program for inclusion in Call packets:

1. One-way logical channel-outgoing
2. One-way logical channel-incoming
3. Extended packet sequence numbering
4. Non-standard default window sizes
5. Default throughput classes assignment
6. Closed user group
7. Reverse charging
8. Recognized private operating agency (RPOA)
9. Flow control parameter negotiation
10. Throughput class negotiation.

### ***Extended Packet Sequence Numbering***

Selects modulo 128 sequence numbering of packets instead of the default, modulo 8.

### ***Incoming Calls Barred***

Prevents incoming calls from remote DTEs. A call request must be sent by the 4700 to establish communications.

### ***Outgoing Calls Barred***

Prevents 4700 call requests from entering the network. An incoming call is needed to establish communications.

### ***One-Way Logical Channel Out***

Restricts the logical channel use to originating call requests. Incoming calls are not allowed.

### ***One-Way Logical Channel In***

Restricts the logical channel use to receiving incoming calls. Call requests are not allowed.

### ***Closed User Group (CUG)***

Specifies that the 4700 is a member of a closed user group (CUG). Communications can occur only among members of the group.

### ***CUG with Outgoing Access***

Allows the 4700 to send a call request to DTEs outside of the CUG.

### ***CUG with Incoming Access***

Allows incoming calls from DTEs outside of the CUG.

### ***Incoming Calls Barred in CUG***

Prevents incoming calls from members of the CUG. The 4700 may make call requests to members of the CUG.

### ***Outgoing Calls Barred in CUG***

Prevents the 4700 from sending call requests. The remote DTE must transmit an incoming call before communication is established.

## ***Reverse Charging***

Request that the called DTE accept all charges for the call. The reverse charging information received in the call request is analyzed by the called DTE and if acceptable a call accepted is sent, otherwise a clear request is sent.

## ***Reverse Charging Acceptance***

This facility specifies that the network transmit to the 4700 incoming calls that request reverse charging.

## ***Recognized Private Operating Agency (RPOA)***

Allows you to select the intermediate network (RPOA) to be used between two public networks.

## ***Flow Control Parameter Negotiation***

Specified by the FCPN operand of the X25CKT macro or in the STRCKT instruction, permits negotiation of packet and window sizes. The values received in the call connected packet on an outgoing call SVC or sent in the call accepted packet on an incoming call SVC *used* for the remainder of the call. The application program can issue a STPCKT instruction if the parameters are not acceptable; the controller does not check the parameters.

## ***Packet-Size Negotiation***

The packet size specified in the STRCKT instruction or the X25CKT macro will be included in the facility field of a call request packet for an outgoing call SVC or in the call accepted packet for an incoming call SVC.

## ***Non-Standard Default Window Sizes***

The window size value will be included in the facility field of a call request packet for an outgoing call SVC or the call accepted packet for an incoming call SVC.

## ***Throughput Class Negotiation***

Specified in the THPTCL operand of the X25FAC macro or in the STRCKT instruction, permits negotiation of the throughput class. The values received in the call connected packet on an outgoing call SVC or sent in the call accepted packet on an incoming call SVC, will be used for the remainder of the call. The application program can issue a STPCKT instruction if the parameters are not acceptable.

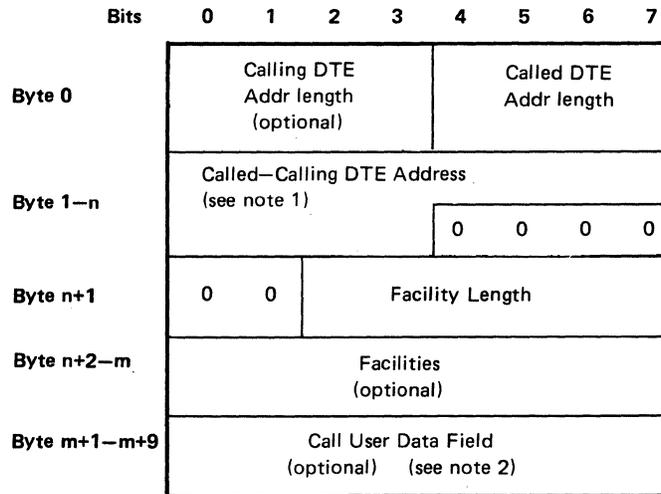
## ***Throughput Class Assignment***

Specifies a selection of throughput classes from a list supported by the network.

## Call Data Formats

### Incoming Call Data Format

The data contained in an incoming call packet and presented to the application program has the following format:

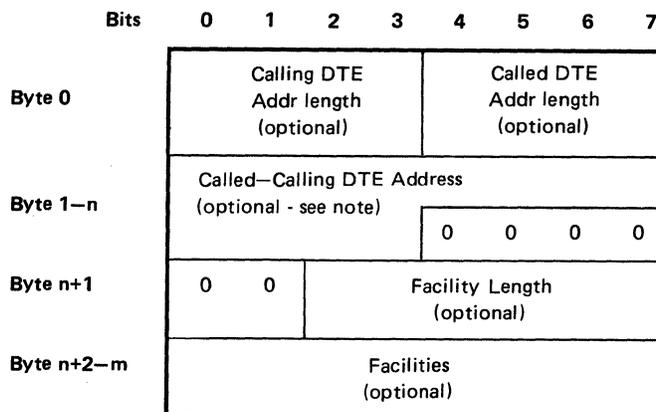


**Notes:**

- Each address contains from 1 to 15 numbers, 2 digits to a byte. The figure is drawn assuming a single address consisting of an odd number of digits, padded with zeros to provide byte alignment.
- The first byte of the call user data field is set to X'C3' for QLLC and X'C2' for PSH. The next 8 bytes contain the connection identifier.

### Call Connected Data Format

The data contained in a call connected packet and presented to the application program has the following format:



**Note:** Each address contains from 1 to 15 numbers, 2 digits to a byte. The figure assumes a single address consisting of an odd number of digits, and padded with zeros to provide byte alignment.

## Facility Formats

The facilities contained in the incoming call or call accepted data presented to the application program has the following format.

Facility:	Code:	Field:
CUG	X'03'	One byte containing the two-digit index.
Reverse Charging	X'0n'	One byte with the following bit meaning: X'00': Reverse charging not requested. X'01': Reverse charging requested.
RPOA	X'44'	Two bytes containing the four-digit Identification Code.

### Flow Control Parameter Negotiation:

Packet Size	X'42'	Two bytes coded in binary. The first byte contains the packet size of the called DTE. The second byte contains the packet size of the calling DTE.
Window Size	X'43'	Two bytes coded in binary. The first byte contains the window size of the called DTE. The second byte contains the window size of the calling DTE.

### Throughput Class Negotiation:

X'02'	One byte specifying the throughput class. Bits 0-3 contain the called DTE size. Bits 4-7 contain the calling DTE size.
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The hexadecimal codes listed above are fixed at the values shown by 4700 X.25 support.

An example of a facility field is:

X'0311442222'

This field specifies a CUG of 11 (X'03') and an RPOA of 2222 (X'44'). You can also specify the field as:

X'4422220311'

## Chapter 2. Instructions and Macros

This section contains descriptions of the X.25 instructions, configuration macro instructions, and the parameters required for X.25.

### 4700 Assembler Instructions

#### *LCHECK CP*

The operation of the LCHECK instruction is the same as described in current 4700 publications.

#### *LREAD CP*

The operation of the LREAD instruction is the same as described in current 4700 publications with two additional Read types set in SMSCRT:

- X'B1' — Incoming call packet.
- X'B2' — Call connected packet.

#### *LWRITE CP*

The operation of the LWRITE instruction is the same as described in current 4700 publications.

#### *Start Circuit (STRCKT)*

STRCKT activates an inactive virtual circuit. STRCKT can perform two functions: (1) return the current contents of parameters FLAG1, set to X'F0', through CID in the parameter list, or (2) control the automatic start circuit flag. STRCKT points to a 5 to 56 byte parameter list that describes the virtual circuit options and X.25 Facilities. The parameter list may be specified in 5 sections with section 1, the first 5 bytes, always required. The other sections are optional and the required CPGEN values will be used if not specified.

Name	Operation	Operand
label	STRCKT	$\left\{ \begin{array}{l} \text{defcon} \\ \text{defld} \\ \text{defrf} \\ \text{reg} \\ \text{seg,disp} \end{array} \right\}$

#### **defcon**

Is the label of a DEFCON instruction that defines the start of the parameter list.

#### **defld**

Is the label of a DEFLD instruction that defines the start of the parameter list.

**defrf**

Is the label of a DEFRR instruction that defines the start of the parameter list.

**reg**

Is the register number that contains the address of the parameter list.

**seg**

Is the number of the segment that contains the parameter list.

**disp**

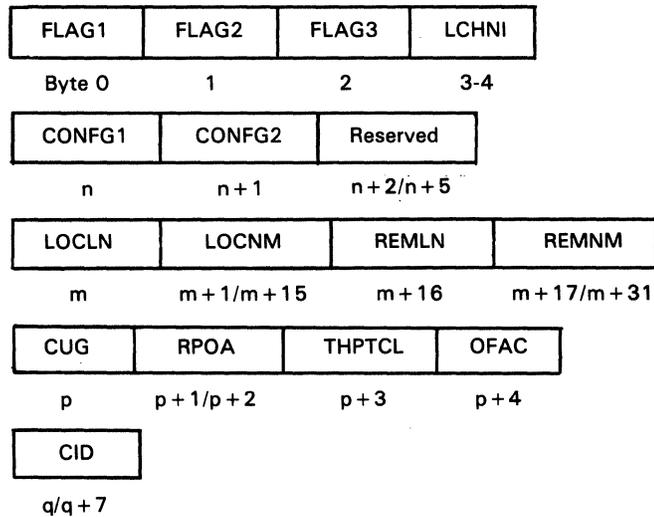
Is the location of the parameter list within the segment.

**Condition Codes:** X'01' The instruction executed successfully.

X'02' Status is returned; the status code is contained in SMSDST.

**Program Checks:** 1 or 2 may be set.

The parameter list formats are:

**FLAG1**

A one-byte binary number that describes the parameter list.

Bit:	Definition:
0	0 = bytes n through n + 5 are not present. 1 = bytes n through n + 5 are present.
1	0 = bytes m through m + 31 are not present. 1 = bytes m through m + 31 are present.
2	0 = bytes p through p + 4 are not present. 1 = bytes p through p + 4 are present.
3	0 = bytes q through q + 7 are not present. 1 = bytes q through q + 7 are present.
4 - 7	Reserved

## FLAG2

A one-byte binary number that describes the circuit parameters.

Bit:	Definition:
0	0 = start this circuit now without starting automatically in the future. 1 = start this circuit now, and automatically in the future (valid for PVC only).
1	0 = use default FLAG3 values (from GPGEN or previous STRCKT commands). 1 = use specified FLAG3 values.
2 - 5	Reserved
6	0 = start the Circuit. 1 = turn off the Automatic Start Circuit flag.
7	0 = start the Circuit. 1 = return current contents of all parameters.

If either bits 6 or 7 are on, the circuit does not start.

## FLAG3

A one-byte binary number that describes the inclusion of fields in call packets.

Bit:	Definition:
0	0 = do not include flow control negotiation parameters in the call packets. 1 = include flow control negotiation parameters in the call packets.
1	0 = do not include LOCNM in the call packets. 1 = include LOCNM.
2	0 = do not include REMNM in the call accepted packet. 1 = include REMNM. 4700 requires this bit for outgoing calls.
3	0 = do not include CUG in the call packet. 1 = include CUG.
4	0 = do not include RPOA in the call packets. 1 = include RPOA.
5	0 = do not include THPTCL in the call packet. 1 = include THPTCL.
6	0 = do not include OFAC in the call packet. 1 = include OFAC.
7	0 = do not include CID in the call packet. 1 = include CID.

## LCHNI

A 2-byte field containing a 12-bit, right-justified, binary number that specifies the logical channel group number (0 to 15) and the logical channel number (0 to 255). This parameter is ignored if an incoming call has been received.

### CONFIG1

A one-byte binary number that specifies the packet size, LLC, and type of circuit; switched or permanent. Absence of this parameter, or a value of zero, indicates that the current settings are to be used.

**Note:** The instruction will complete with X'0401' status if the packet size is greater than that specified in the X25CKT CPGEN instruction.

Bit:	Definition:
0 } 1 }	00 = 128 10 = 256 01 = 64 11 = 512
2	Reserved
3	1 = Permanent 0 = Switched
4 } 5 }	10 = PSH 11 = QLLC
6	Reserved
7	Reserved

### CONFIG2

A one-byte binary number that specifies the type of switched call and window size. Absence of this parameter, or a value of zero, indicates that the current settings are to be used.

**Note:** The instruction will complete with X'0402' status if the window size is specified greater than 7 and the modulo is specified as 8.

Bit:	Explanation:
0	0 = Outgoing call 1 = Incoming call
1	Reserved
2	Reserved
3	Reserved
4	Window size
5	X'1' to X'7' if modulo 8 specified
6	X'1' to X'F' if modulo 128 specified
7	Reserved

### LOCLN

A one-byte binary number, in the range of 0 to 15, that specifies the decimal number length of the calling DTE number (LOCNM). Absence of this parameter, or a value of zero, indicates that the current values are to be used in the call accepted and call request packets.

### LOCNM

A 15-byte field containing the calling DTE number, left justified.

### REMLN

A one-byte binary number, in the range of 0 to 15, that specifies the decimal number length of the called DTE number (REMNM). Absence of this parameter, or a value of zero, indicates that the current values are to be used in the call accepted packets.

### REMNM

A 15-byte field containing the called DTE number, left justified.

**CUG**

A one-byte hexadecimal number specifying the two-digit group code. Absence of this parameter, or a value of zero, indicates that the current value is to be used.

**RPOA**

A two-byte hexadecimal number specifying the four-digit number of the intermediate network. Absence of this parameter, or a value of zero, indicates that the current value is to be used.

**THPTCL**

A one-byte binary number specifying the throughput class. Absence of this parameter, or a value of zero, indicates that the current value is to be used.

Bits	DCE to 4700:				4700 to DCE:				HEX	
	0	1	2	3	4	5	6	7		
	0	0	1	1	75	0	0	1	1	3
	0	1	0	0	150	0	1	0	0	4
	0	1	0	1	300	0	1	0	1	5
	0	1	1	0	600	0	1	1	0	6
	0	1	1	1	1200	0	1	1	1	7
	1	0	0	0	2400	1	0	0	0	8
	1	0	0	1	4800	1	0	0	1	9
	1	0	1	0	9600	1	0	1	0	A

**OFAC**

A one-byte binary number specifying the optional facilities requested. Absence of this parameter indicates that the current value is to be used.

Bit:	Optional Facility:
0 - 6	Reserved
7	Reverse Charging

**CID**

An eight-byte field that contains the eight-character connection ID. This ID will be placed in the user data field of a call packet. Absence of this parameter indicates that the current value is to be used.

## Stop Circuit (STPCKT)

STPCKT deactivates an active virtual circuit. STPCKT points to a one-byte parameter list that provides a diagnostic code to be included in the clear request packet for an SVC, in the reset request packet for PVC, and in the restart request packet.

Name	Operation	Operand
label	STPCKT	{ defcon defld defrf reg seg,disp }

### defcon

Is the label of a DEFCON instruction that defines the start of the parameter list.

### defld

Is the label of a DEFLD instruction that defines the start of the parameter list.

### defrf

Is the label of a DEFRLF instruction that defines the start of the parameter list.

### reg

Is the register number that contains the address of the parameter list.

### seg

Is the number of the segment that contains the parameter list.

### disp

Is the location of the parameter list within the segment.

**Condition Codes:** The code is not changed.

**Program Checks:** 1 or 2 may be set.

The parameter list format is:

DIAG

Byte 0

### DIAG

A one-byte hexadecimal number specifying the DTE diagnostic code to be included in the call packet. See Chapter 3 for specific diagnostic codes.

## Start Link (STRLNK)

STRLNK activates an inactive communications link or returns the current contents of parameters FLAG1 through ICLCI in the parameter list. STRLNK points to a 7 or 19-byte parameter list that describes the link options and logical channel specifications.

Name	Operation	Operand
label	STRLNK	$\left. \begin{array}{l} \text{defcon} \\ \text{defld} \\ \text{defrf} \\ \text{reg} \\ \text{seg,disp} \end{array} \right\}$

### defcon

Is the label of a DEFCON instruction that defines the start of the parameter list.

### defld

Is the label of a DEFILD instruction that defines the start of the parameter list.

### defrf

Is the label of a DEFRLF instruction that defines the start of the parameter list.

### reg

Is the register number that contains the address of the parameter list.

### seg

Is the number of the segment that contains the parameter list.

### disp

Is the location of the parameter list within the segment.

**Condition Codes:** The code is not changed.

**Program Checks:** 1 or 2 may be set.

Parameter list format.

FLAG1	FLAG2	CUA	FLAG3	XID
Byte 0	1	2	3	4-6
INPT	RSPT	REXM	OPTM	PVCLCI
7	8	9	10	11-12
OCLCI	TWLCI	ICLCI		
13-14	15-16	17-18		

Bytes 0, 1, 2, and 4-6 are the same for all communication links and are described in current publications.

### **FLAG3**

A one-byte binary number that describes the X.25 link parameters.

<b>Bit:</b>	<b>Definition:</b>
0	Set to 1 if XID is present.
1	Set to 1 if X.25 parameters follow.
2	Set to 1 if UKPSS or TELENET network.
3	Set to 1 for modulo 128 packet level sequence numbering.
4	Set to 1 for a DDXP network.
5 - 6	Reserved.
7	Return current parameter list contents.

### **INPT**

A one-byte binary number, in the range of 0 to 20, that specifies the idle/non-productive timeout value in five-second increments. Absence of this parameter, or a value of zero, causes the current value to be used.

### **RSPT**

A one-byte binary number, in the range of 0 to 99, that specifies the response timeout value in increments of 0.1 seconds. Absence of this parameter, or a value of zero, causes the current value to be used.

### **REXM**

A one-byte binary number, in the range of 0 to 99, that specifies the re-transmission retry count. Absence of this parameter, or a value of zero, causes the current value to be used.

### **OPTM**

A one-byte binary number, in the range of 0 to 7, that specifies the connection establishment timeout value in 13-second increments. Absence of this parameter, or a value of zero, causes the current value to be used.

### **PVCLCI**

A two-byte field that contains a 12-bit, right-justified, binary number that specifies the logical channel group number (0 to 15) and the logical channel number (0 to 255), of the channel reserved by the network for the PVC. Absence of this parameter causes the current value from either CPGEN or a previous STRLNK command to be used.

### **OCLCI**

A two-byte field that contains a 12-bit, right-justified, binary number that specifies the logical channel group number (0 to 15) and the logical channel number (0 to 255), of the channel reserved by the network for outgoing calls. Absence of this parameter causes the current value from either CPGEN or a previous STRLNK command to be used.

### **TWLCI**

A two-byte field that contains a 12-bit, right-justified, binary number that specifies the logical channel group number (0 to 15) and the logical channel number (0 to 255), of the channel reserved by the network for two-way calls. Absence of this parameter causes the current value from either CPGEN or a previous STRLNK command to be used.

### **ICLCI**

A two-byte field that contains a 12-bit, right-justified, binary number that specifies the logical channel group number (0 to 15) and the logical channel number (0 to 255), of the channel reserved by the network for incoming calls. Absence of this parameter causes the current value from either CPGEN or a previous STRLNK command to be used.

## *Stop Link (STPLNK)*

STPLNK immediately deactivates the communication link. STPLNK points to a parameter list; however, the parameters are neither used nor changed by STPLNK.

Name	Operation	Operand
label	STPLNK	$\left\{ \begin{array}{l} \text{defcon} \\ \text{defld} \\ \text{defrf} \\ \text{reg} \\ \text{seg,disp} \end{array} \right\}$

### **defcon**

Is the label of a DEFCON instruction that defines the start of the parameter list.

### **defld**

Is the label of a DEFLD instruction that defines the start of the parameter list.

### **defrf**

Is the label of a DEFRF instruction that defines the start of the parameter list.

### **reg**

Is the register number that contains the address of the parameter list.

### **seg**

Is the number of the segment that contains the parameter list.

### **disp**

Is the location of the parameter list within the segment.

**Condition Codes:** The code is not changed.

**Program Checks:** 1 or 2 may be set.

## Configuration Macro Instructions

The configuration macros required during the CPGEN process, when X.25 is included in the 4700 system controller, are described in detail in this section.

The syntax notation format used in describing the macros is, with the following exceptions, identical to the format used in the *IBM 4700 Finance Communications System Controller Programming Library, GB0F-1387*. Operands which require specification of EBCDIC data may be coded directly without any data type identification, or in the form C'operand'. Data to be expressed as hexadecimal must be specified in the form X'operand'.

The macros used by X.25 are:

- COMLINK used to specify the characteristics of the network
- X25LCHN used to specify the characteristics of logical channels
- X25CKT used to specify the characteristics of the circuit
- X25FAC used to specify optional user facilities.

## COMLINK

This macro is used to specify the X.25 network characteristics and must be coded for X.25 operations. The operands discussed here are in addition to or modifications to existing operands. Network parameters specified in this macro may be altered with the STRLNK instruction.

Name	Operation	Operand
label	COMLINK	$\left[ \text{TYPE} = 8\text{V}0134 \right] \left[ ,\text{CNL} = \left\{ \begin{array}{c} \text{nnn} \\ \underline{128} \end{array} \right\} \right] \left[ ,\text{CNB} = \left\{ \begin{array}{c} \text{nn} \\ \underline{3} \end{array} \right\} \right]$ $\left[ ,\text{NETWORK} = \left\{ \begin{array}{c} \text{DDXP} \\ \text{TELENET} \\ \text{UKPSS} \\ \underline{\text{NORM}} \end{array} \right\} \right] \left[ ,\text{MODULO} = \left\{ \begin{array}{c} 128 \\ \underline{8} \end{array} \right\} \right]$ $\left[ ,\text{RSPT} = \left\{ \begin{array}{c} \text{nn} \\ \underline{30} \end{array} \right\} \right] \left[ ,\text{INPT} = \left\{ \begin{array}{c} \text{nn} \\ \underline{4} \end{array} \right\} \right]$ $\left[ ,\text{REXM} = \left\{ \begin{array}{c} \text{nn} \\ \underline{2} \end{array} \right\} \right] \left[ ,\text{OPTM} = \left\{ \begin{array}{c} \text{n} \\ \underline{1} \end{array} \right\} \right]$

### TYPE

Specify 8V0134 when operating with an X.25 link.

### CNL

Is a decimal number, in the range 128 to 4084, that specifies the size of the controller read buffers in bytes. The read buffers must be as large as the largest message read from the communication link, and must be at least 128 bytes. If unspecified, 128 is assumed.

**Note:** A clear or reset packet is sent if a message is received that exceeds this value.

### CNB

A decimal number, in the range 3 to 99, that specifies the number of controller read buffers. The minimum value is 3, also the default.

### NETWORK

The name of the specific network that will be used. Currently, the network-specific processing required is for the DDXP, TELENET, and UKPSS networks. The default is NORM.

### MODULO

A decimal number, 8 or 128, specifying the modulo to be used for packet level sequence numbering. The default is modulo 8.

### RSPT

Response timeout value, a decimal number in the range of 1 to 99, represents the maximum allowable period of time that can elapse between the transmission of a frame and the receipt of the corresponding response. This time value is agreed upon with the Network Administration. RSPT is specified in 0.1-second intervals with a default of 30 (3 seconds).

**INPT**

Idle/non-productive timeout value, a decimal number in the range 1 to 20, represents the period of time, in 5-second increments, that the line can remain idle, no complete frames received, before the 4700 will transmit an RR frame soliciting a response from the DCE. If no response is received from the DCE, the link and circuit will be stopped and loss-of-contact status will be posted. The default is 4 or 20 seconds of idle state.

**REXM**

Retransmissions value, a decimal number in the range 1 to 99, specifies the number of times the 4700 will retransmit a frame, based on RSPT value, before terminating the connection and posting loss-of-contact. The default value is 2.

**OPTM**

Connection establishment timeout value, a decimal number in the range 1 to 7, specifies the time, in 13-second increments, that the 4700 will wait for the link connection to be established before aborting the connection attempt. The default is 1 or 13 seconds.

## X25LCHN

This macro specifies the ID of all logical channels reserved by the network subscription, and must be coded for X.25 operations. Parameters specified in this macro can be changed with the STRLNK program instruction.

Name	Operation	Operand
label	X25LCHN	[ PVCLCI = (nn,mmm) ] [ ,OCLCI = (nn,mmm,pp) ] [ ,TWLCI = (nn,mmm,pp) ] [ ,ICLCI = (nn,mmm,pp) ]

### PVCLCI

The logical channel group number (nn) and the logical channel number (mmm) of the channel reserved by the network for the permanent virtual circuit. nn is a decimal number in the range of 0 to 15; mmm is a decimal number in the range of 0 to 255.

### OCLCI

The logical channel group number (nn) and the logical channel numbers (mmm) of the channels reserved by the network for outgoing call circuits. nn is a decimal number in the range of 0 to 15; mmm is a decimal number in the range of 0 to 255 that specifies the first logical channel number. pp is the decimal number in the range of 1 to 64 that specifies the number of logical channels to be defined (the LCNs must be sequential).

### TWLCI

The logical channel group number (nn) and the logical channel numbers (mmm) of the channels reserved by the network for two-way call circuits. nn is a decimal number in the range of 0 to 15. mmm is a decimal number in the range of 0 to 255 that specifies the first logical channel number. pp is a decimal number in the range 1 to 64 that specifies the number of logical channels to be defined (the LCNs must be sequential).

### ICLCI

The logical channel group number (nn) and the logical channel numbers (mmm) of the channels reserved by the network for incoming-call circuits. nn is a decimal number in the range of 0 to 15. mmm is a decimal number in the range of 0 to 255 that specifies the first logical channel number. pp is a decimal number in the range 1 to 64 that specifies the number of logical channels to be defined (the LCNs must be sequential).

## X25CKT

This macro is used to specify the characteristics of an X.25 circuit and must be coded for X.25 operations. Parameters specified in this macro are included in the call packet and may be altered with the STRCKT instruction.

Name	Operation	Operand
label	X25CKT	[VIRT = {S P}] [ ,AUTO = {N Y}] [ ,LLC = {PSH QLLC}]
		[ ,CALL = {O I}] [ ,FCPN = {Y N}]
		[ ,PKTSIZ = {nnn 128}] [ ,WINDOW = {nn 2}]
		[ ,LOCNM = nn . . n] [ ,REMNM = nn . . n]
		[ ,CONID = nn . . n] [ ,X25CIS = nn]

### VIRT

Describes the type of virtual circuit subscribed, S for a switched virtual circuit and P for a permanent virtual circuit. If 'S' is specified, the CALL operand must be specified. The default is 'P', or a permanent virtual circuit.

### AUTO

N requires a STRLNK followed by a STRCKT instruction to activate the circuit. Y, the default, specifies that this circuit is to be started automatically with existing parameters, when a STRLNK instruction is issued. This parameter applies to PVC only. SVC must be started via a STRCKT instruction.

### LLC

Specifies the type of logical link control used. QLLC is the default.

### CALL

Describes the type of call required for a switched circuit. O indicates an outgoing call (REMNM required) and I indicates an incoming call. This parameter must be specified if VIRT is specified as switched.

### FCPN

Y specifies that flow control parameter negotiation has been subscribed and that the PKTSIZ and WINDOW values will be included in the facility field of the call packet. N, the default, specifies that the PKTSIZ and WINDOW values will not be included in the call packet.

### PKTSIZ

A decimal number specifying the subscribed packet size for the virtual circuit. Values that may be specified are 64, 128, 256, and 512 bytes, and must be equal to or less than the size of the controller read buffer specification (COMLINK macro CNL =). The default size is 128-byte packets.

**WINDOW**

A decimal number in the range 1 to 7 if modulo 8 is specified in the COMLINK macro, or 1 to 15 if modulo 128 is specified in the COMLINK macro that specifies the subscribed window size.

**LOCNM**

1 to 15 characters (range 0 to 9) specifying the calling DTE address, the network address of the 4700. This number will be included in the call request and call accepted packets if specified. This parameter is not required for PVC.

**REMNM**

1 to 15 characters (range 0 to 9) specifying the called DTE network address. This number is included in the call request packet and must be specified when outgoing call is specified. This parameter is not required for PVC.

**CONID**

8 characters that specify the optional user connection ID or password. This ID is included in the user data field of the call packet.

**X25CIS**

A decimal number in the range of 2 to 60 that specifies the station to receive all data contained in incoming call and call connected packets. If this parameter is not specified, X25CIS defaults to the station that issues the first STRCKT instruction. If the default station is station 1, the system monitor, the data is written to the log and ignored.

## X25FAC

This macro specifies the subscribed facility fields. Parameters specified in this macro are included in the call packet, and can be changed with the STRCKT instruction.

Name	Operation	Operand
label	X25FAC	[THPTCL = (nnnn, mmmm)] [,CUG = nn]  [ ,REVCHG = { Y } ] [ ,RPOA = nnnn ] [ ,REVCHG = { N } ]

### THPTCL

nnnn is a decimal number specifying the throughput class from the DCE to the 4700. mmmm is a decimal number specifying the throughput class from the 4700 to the DCE. The valid numbers are 75, 150, 300, 600, 1200, 2400, 4800, and 9600.

### CUG

A decimal number, in the range of 1 to 99, that specifies the closed user group (CUG) code.

### REVCHG

Y specifies that the reverse charging facility applies to the logical channel.  
N specifies that the facility does not apply to the logical channel.

### RPOA

Specifies that the recognized private operating agency facility applies to the logical channel. nnnn is a decimal number, in the range of 1 to 9999, that identifies the intermediate network.

## CPGEN Assembly Error Messages

CPGEN error messages are located in the *IBM 4700 Finance Communication System Controller Programming Library*. No additional error messages are required for X.25.

### X.25 Additional Status

The error conditions described below are in addition to existing status found in the *IBM 4700 Controller Programming Library, Volume 3*.

Status Bits	Condition	Instruction
.....x.....x X'0401'	Command reject: The packet size specified in STRCKT is larger than specified in CPGEN.  <i>Action:</i> Change CPGEN to provide a larger packet size.	STRCKT
.....x.....x. X'0402'	Command reject: The Window size specified in STRCKT is too large for modulo 8.  <i>Action:</i> Change CPGEN or STRLNK parameter to provide modulo 128.	STRCKT
.....x.....x.. X'0404'	Command reject: An incoming call is specified in STRCKT and no incoming call has been received.  <i>Action:</i> Correct CPGEN or STRCKT.	STRCKT
.....x.....x... X'0408'	Command reject: An outgoing call or PVC is specified and an incoming call has been received.  <i>Action:</i> Correct CPGEN or STRCKT.	STRCKT
.....x.....x... X'0410'	Command reject: LOCNM-REMNM are requested to be included in the call packet and none are given or are specified incorrectly.  <i>Action:</i> Correct CPGEN or STRCKT.	STRCKT
.....x.....x... X'0420'	Command reject: The link is not active.  <i>Action:</i> Issue a STRLNK.	STRCKT



## Chapter 3. Operating Information

This chapter contains information for using the X.25 system's monitor, log message descriptions and the X.25 status they contain, and the meanings of the controller's operator panel indicator for the X.25 link.

### Log Message 11 006 (Format 5)

Format 5: 11 006 a b vvvvwwwxxyyzz

a=8. The log entry pertains to the X.25 link and circuit.

b=0. Status pertains to an operational link.

b=1. Status pertains to a STRLNK operation.

b=2. Status pertains to a STPLNK operation.

b=3. Status pertains to an operational circuit.

b=4. Status pertains to a STRCKT operation.

b=5. Status pertains to a STPCKT operation.

The values of vvvv, wwww, xx, yy, and zz are described in the following status charts.

## Operational Link Status (B = 0)

vvvv	Status and User Procedures
0290	<p><i>Reason:</i> A diagnostic packet was received.</p> <p><i>4700 :</i> None.</p> <p><i>User :</i> Analyze the diagnostic code (yy) and explanation field (wwwvwx) to determine the cause. See "Diagnostic Codes" later in this chapter. wwwvwx contain the first three bytes of the packet in error sent from the 4700.</p>
0295	<p><i>Reason:</i> A packet has been discarded.</p> <p><i>4700 :</i> None.</p> <p><i>User :</i> Analyze the diagnostic code (yy) to determine why the packet was discarded. See "DTE—Generated Diagnostic Codes."</p>
02C1	<p><i>Reason:</i> A Frame Reject (FRMR) has been received.</p> <p><i>4700 :</i> A DISC has been sent, the link and circuit have been stopped and the link was restarted.</p> <p><i>User :</i> Report the condition for servicing. The SVC circuit may be restarted.</p>
02C2	<p><i>Reason:</i> A Frame Reject (FRMR) has been sent due to an error in a received I-Frame.</p> <p><i>4700 :</i> A DISC has been sent, the link and circuit have been stopped. The link and circuit (if a PVC) is restarted.</p> <p><i>Action :</i> Report the condition for servicing. The SVC circuit may be restarted.</p>
02D2	<p><i>Reason:</i> A packet level RESTART has been received.</p> <p><i>4700 :</i> The link and circuit have been stopped and the link was restarted. A PVC circuit may also be restarted.</p> <p><i>User :</i> The Diagnostic code (yy) indicates the cause of the restart. See "DCE — Generated Diagnostic Codes." An SVC circuit may be restarted.</p>
02D3	<p><i>Reason:</i> A packet level RESTART has been sent due to an error.</p> <p><i>4700 :</i> The link and circuit have been stopped and the link was restarted. A PVC circuit may also be restarted.</p> <p><i>User :</i> The Diagnostic code (yy) indicates the cause of the restart. See "DTE — Generated Diagnostic Codes." An SVC circuit may be restarted.</p>
Fvvv	<p><i>Reason:</i> An unexpected or out of sequence event occurred.</p> <p><i>4700 :</i> The circuit and link have been stopped.</p> <p><i>User :</i> Report the condition for servicing. The link and circuit can be restarted.</p>

*STRLNK Status (B = 1)*

vvvv	Status and User Procedures
0000	<p><i>Reason:</i> The STRLNK has completed successfully.</p> <p><i>4700 :</i> None.</p> <p><i>User :</i> None.</p>
02C5	<p><i>Reason:</i> A DM has been received in response to an SABM, indicating that the DCE is not ready to communicate.</p> <p><i>4700 :</i> The link is restarted.</p> <p><i>User :</i> If this status persists, determine why the DCE is not ready for communications.</p>
0438	<p><i>Reason:</i> A link-level error condition exists that has not been cleared by retries.</p> <p><i>4700 :</i> The link is stopped and restart was tried.</p> <p><i>User :</i> Previous log messages indicate the nature of the problem, follow the specified action procedure.</p>
Fvvv	<p><i>Reason:</i> An unexpected or out of sequence event occurred.</p> <p><i>4700 :</i> The link has been stopped.</p> <p><i>User :</i> Report the condition for servicing. The link can be restarted.</p>

**STPLNK Status (B = 2)**

vvvv	Status and User Procedures
0000	<p><i>Reason:</i> The STPLNK has completed successfully.</p> <p><i>4700 :</i> None.</p> <p><i>User :</i> None.</p>
0429	<p><i>Reason:</i> DSR from the DCE has been interrupted.</p> <p><i>4700 :</i> The link is stopped.</p> <p><i>User :</i> Remove the external cable and install the wrap plug. Issue the Wrap-One-Time command. A wrap failure indicates a problem internal to the 4700; begin service procedures.</p> <p>Reinstall the external cable and place 'Test/Operate' switch in the 'Test' position. Issue the Wrap-One-Time command. A wrap failure indicates a cable problem; replace the cable. If the wrap is successful, the problem is with the cable connector or the DCE.</p>
042A	<p><i>Reason:</i> The clocking from the DCE has been interrupted.</p> <p><i>4700 :</i> The link is stopped.</p> <p><i>User :</i> Remove the external cable and install the wrap plug. Issue the Wrap-One-Time command. A wrap failure indicates a problem internal to the 4700; begin service procedures.</p> <p>Reinstall the external cable and place 'Test/Operate' switch in the 'Test' position. Issue the Wrap-One-Time command. A wrap failure indicates a cable problem; replace the cable. If the wrap is successful, the problem is with the cable connector or the DCE.</p>
042B	<p><i>Reason:</i> A 4700 communications adapter problem has occurred.</p> <p><i>4700 :</i> The link is stopped.</p> <p><i>User :</i> Remove the external cable and install the wrap plug. Issue the Wrap-One-Time command. A wrap failure indicates a problem internal to the 4700; begin service procedures.</p> <p>Reinstall the external cable and place 'Test/Operate' switch in the 'Test' position. Issue the Wrap-One-Time command. A wrap failure indicates a cable problem; replace the cable. If the wrap is successful, restart the link.</p>
0438	<p><i>Reason:</i> A link-level error condition exists that has not been cleared by retries.</p> <p><i>4700 :</i> The link is stopped.</p> <p><i>User :</i> Previous log messages indicate the nature of the problem; follow the specified service procedure.</p>

vvv	Status and User Procedures
04F6	<p><i>Reason:</i> A 4700 communications adapter problem has been encountered.</p> <p><i>4700 :</i> The link is stopped.</p> <p><i>User :</i> Remove the external cable and install the wrap plug. Issue the Wrap-One-Time command. A wrap failure indicates a problem internal to the 4700; begin service procedures.</p> <p>Reinstall the external cable and place 'Test/Operate' switch in the 'Test' position. Issue the Wrap-One-Time command. A wrap failure indicates a cable problem; replace the cable. If the wrap is successful, restart the link.</p> <p>If the problem persists, begin service procedures.</p>
Fvvv	<p><i>Reason:</i> An unexpected or out of sequence event occurred.</p> <p><i>4700 :</i> The circuit and link have been stopped.</p> <p><i>User :</i> Report the condition for servicing. The link and circuit can be restarted.</p>

### Operational Circuit Status (B=3)

vvvv	Status and User Procedures
0288	<p><i>Reason:</i> An XID without data was received.</p> <p><i>4700 :</i> The circuit is stopped.</p> <p><i>User :</i> Determine why no XID data was included.</p>
02D0	<p><i>Reason:</i> A reset packet has been received.</p> <p><i>4700 :</i> The circuit is stopped and restarted.</p> <p><i>User :</i> Analyze the cause (xx) code and diagnostic (yy) code to determine the cause of the reset.</p>
02D1	<p><i>Reason:</i> A clear packet has been received.</p> <p><i>4700 :</i> The circuit is stopped.</p> <p><i>User :</i> Analyze the cause (xx) code and diagnostic (yy) code to determine the cause of the reset.</p>
02D3	<p><i>Reason:</i> A clear/reset packet has been sent.</p> <p><i>4700 :</i> The circuit is stopped.</p> <p><i>User :</i> Analyze the diagnostic code (yy) for cause of clear/reset. If cause is an LLC error, wwwww contains the LLC header. If the cause was a QFRMR, wwwwwwxx contains the QFRMR information field.</p>
02D4	<p><i>Reason:</i> 200 seconds have elapsed without receiving a response to a clear/reset packet.</p> <p><i>4700 :</i> The circuit is stopped.</p> <p><i>User :</i> Stop and restart the link before restarting the circuit.</p>
Fvvv	<p><i>Reason:</i> An unexpected or out of sequence event occurred.</p> <p><i>4700 :</i> The circuit and link have been stopped.</p> <p><i>User :</i> Report the condition for servicing. The link and circuit may be restarted.</p>

**STRCKT Status (B=4)**

vvvv	Status and User Procedures
0000	<p><i>Reason:</i> The STRCKT completed successfully.</p> <p><i>4700 :</i> None.</p> <p><i>User :</i> None.</p>
0292	<p><i>Reason:</i> A call request packet has been received that is larger than the buffer reserved for the packet.</p> <p><i>4700 :</i> Complete STRCKT and present the data to the user.</p> <p><i>User :</i> Define a larger buffer.</p>
02D1	<p><i>Reason:</i> A clear packet has been received.</p> <p><i>4700 :</i> The circuit is stopped.</p> <p><i>User :</i> Analyze the cause (yy) code and diagnostic (zz) code to determine the cause of the clear.</p>
02D3	<p><i>Reason:</i> A clear/reset packet has been sent.</p> <p><i>4700 :</i> The circuit is stopped. A PVC circuit may be restarted.</p> <p><i>User :</i> Analyze the cause (yy) code and diagnostic (zz) code to determine the cause of the clear/reset.</p>
02D4	<p><i>Reason:</i> 200 seconds have elapsed without receiving a response to a clear packet.</p> <p><i>4700 :</i> The circuit is stopped.</p> <p><i>User :</i> The link must be stopped and started before the circuit can be started.</p>
02D5	<p><i>Reason:</i> A reset packet has been received within the time specified in OPTM.</p> <p><i>4700 :</i> The circuit is stopped.</p> <p><i>User :</i> Restart the circuit.</p>
040F	<p><i>Reason:</i> The circuit is in an invalid state. This condition occurs if an incoming call packet is received and a STRCKT is not issued before the DCE times out.</p> <p><i>4700 :</i> The circuit is stopped.</p> <p><i>User :</i> Investigate why the AP is not issuing, or delaying, a STRCKT when an incoming call is received.</p>
041C	<p><i>Reason:</i> No channel is available for a STRCKT specifying an outgoing call. This occurs if a STRCKT has already been issued, there was a timeout on a previous STRCKT, or the channel is currently being cleared.</p> <p><i>4700 :</i> The circuit is stopped.</p> <p><i>User :</i> Previous log messages may indicate which of the above are causing the problem. If a previous STRCKT has been issued, then correct the program. For the other problems, issue a STPCKT, wait one minute and issue a STRCKT.</p>

vvvv	Status and User Procedures
041E	<p><i>Reason:</i> The Logical Channel Number (LCHNI) specified in the STRCKT was not specified during CPGEN.</p> <p><i>4700 :</i> The circuit is stopped.</p> <p><i>User :</i> Correct the LCHNI.</p>
041F	<p><i>Reason:</i> The PVC channel is inoperative due to a timeout.</p> <p><i>4700 :</i> The circuit is stopped.</p> <p><i>User :</i> Stop and restart the link, followed by the STRCKT.</p>
0439	<p><i>Reason:</i> The link has been stopped due to a previous error.</p> <p><i>4700 :</i> The circuit is stopped.</p> <p><i>User :</i> Stop and restart the link, followed by the STRCKT.</p>
Fvvv	<p><i>Reason:</i> An unexpected or out of sequence event occurred.</p> <p><i>4700 :</i> The circuit and link have been stopped.</p> <p><i>User :</i> Report the condition for servicing. The link and circuit may be restarted.</p>

## STPCKT Status (B = 5)

vvvv	Status and User Procedures
0000	<p><i>Reason:</i> The STPCKT completed successfully.</p> <p><i>4700 :</i> None.</p> <p><i>User :</i> None.</p>
Fvvv	<p><i>Reason:</i> An unexpected or out of sequence event occurred.</p> <p><i>4700 :</i> The circuit and link have been stopped.</p> <p><i>User :</i> Report the condition for servicing. The link and circuit may be restarted.</p>

## Controller Log — 11 006 Log Message, Format 6

Format 6: 11 006 A B XXX...XXX

A=9. Data has arrived for the X25CIS, but the X25CIS is unavailable (the system monitor is currently the X25CIS or the X25CIS was not generated for the link).

B=0. XXX...XXX contains data from an incoming call packet.

B=1. XXX...XXX contains data from a call connected packet.

## OP Panel Indicator

The operator panel indicator for the X.25 communication link will contain one of the following:

Character	Meaning
=	There is a configuration mismatch, and no link module has been loaded.
-	A link module has been loaded.
*	A wrap failure has occurred.
%	The Communication Link has failed.
''	A STPLNK has been issued.
)	A STPCKT has been issued.
<	A STRLNK has been issued.
(	A STRCKT has been issued.
>	Contact has been established with the DTE.
+	The SNA System Services Control Point session has been established.

## X.25 Cause and Diagnostic Codes

The following charts describe the one-byte cause and one-byte diagnostic code fields that are included in the clear, reset, and restart packets.

### *DCE-Generated Cause Codes*

Clear Indication Packet	Code
Remote DTE passed diagnostic code	X'00'
Number busy	X'01'
Invalid facility request	X'03'
Network congestion	X'05'
Number out of order	X'09'
Access barred	X'0B'
Not obtainable	X'0D'
Remote procedure error	X'11'
Local procedure error	X'13'
RPOA out of order	X'15'
Reverse charging acceptance error	X'19'
Incompatible destination	X'21'
Fast Select acceptance error	X'29'

Reset Indication Packet	Code
Remote DTE passed diagnostic code	X'00'
Out of order (PVC only)	X'01'
Remote procedure error	X'03'
Local procedure error	X'05'
Network congestion	X'07'
Remote DTE operational (PVC only)	X'09'
Network operational (PVC only)	X'0F'
Incompatible destination	X'11'

Restart Indication Packet	Code
Local procedure error	X'01'
Network congestion	X'03'
Network operational	X'07'

## DCE-Generated Diagnostic Codes

No additional information	X'00'
Invalid Packet Send Sequence Number	X'01'
Invalid Packet Receive Sequence Number	X'02'
Packet type invalid - general for state R1 for state R2 for state R3 for state P1 for state P2 for state P3 for state P4 for state P5 for state P6 for state P7 for state D1 for state D2 for state D3	X'10' X'11' X'12' X'13' X'14' X'15' X'16' X'17' X'18' X'19' X'1A' X'1B' X'1C' X'1D'
Packet not allowed - general unidentifiable call on one-way logical channel invalid packet type on PVC packet on unassigned channel REJECT not subscribed to packet too short packet too long invalid General Format Identifier (GFI) RESTART with non-zero GFI packet type incompatible unauthorized INTERRUPT confirmation unauthorized INTERRUPT	X'20' X'21' X'22' X'23' X'24' X'25' X'26' X'27' X'28' X'29' X'2A' X'2B' X'2C'
Timer expired – general INCOMING CALL CLEAR INDICATION RESET INDICATION RESTART INDICATION	X'30' X'31' X'32' X'33' X'34'
Call setup problem – general facility code not allowed facility parameter not allowed invalid call address invalid calling address	X'40' X'41' X'42' X'43' X'44'

## DTE-Generated Diagnostic Codes

Normal or termination	X'00'
Invalid packet type – general	X'10'
for state R1	X'11'
for state R2	X'12'
for state R3	X'13'
for state P1	X'14'
for state P2	X'15'
for state P3	X'16'
for state P4	X'17'
for state P5	X'18'
for state P6	X'19'
for state P7	X'1A'
for state D1	X'1B'
for state D2	X'1C'
for state D3	X'1D'
DCE timer expired – general	X'20'
INCOMING CALL	X'21'
CLEAR INDICATION	X'22'
RESET INDICATION	X'23'
RESTART INDICATION	X'24'
DTE timer expired – general	X'30'
CALL REQUEST	X'31'
CLEAR REQUEST	X'32'
RESET REQUEST	X'33'
RESTART REQUEST	X'34'
QLLC error – general	X'50'
undefined C-field	X'51'
unexpected C-field	X'52'
missing I-field	X'53'
undefined I-field	X'54'
I-field too long	X'55'
QFRMR received	X'56'
Invalid QLLC header	X'57'
QLLC data received in non-data state	X'58'
PSH error – general	X'60'
sequence error	X'61'
invalid PS header	X'62'
invalid PSH format	X'63'
invalid PS command	X'64'
invalid PSH protocol	X'65'
PSH data received in non-data state	X'66'
Packet not allowed	X'A01'
invalid M-bit packet sequence	X'A1
invalid packet type received	X'A2'
invalid packet on PVC	X'A3'
unassigned logical channel number	X'A4'
diagnostic packet received	X'A5'
packet too short	X'A6'
packet too long	X'A7'
invalid GFI	X'A8'
not identifiable	X'A9'
not supported	X'AA'
invalid P (S)	X'AB'
invalid P (R)	X'AC'
invalid D-bit received	X'AD'
invalid Q-bit received	X'AE'

***DTE-Generated Diagnostic Codes (continued)***

termination pending channel inoperative unauthorized interrupt confirmation unauthorized interrupt request PVC resource not available	X'C1' X'C2' X'C3' X'C4' X'C5'
Resources - general buffers depleted PIU too long	X'D0' X'D1' X'D2'
Local procedure error – general packet received with LC $\neq$ 0 RESTART or DIAG received LC $\neq$ 0 incoming call received on wrong LC facility not subscribed invalid packet for LC = 0 facility parameters not supported facility not supported unexpected calling DTE invalid D-bit request reset indication on virtual call invalid protocol identifier connection identifier mismatch	X'E0' X'E1' X'E2' X'E3' X'E4' X'E5' X'E6' X'E7' X'E8' X'E9' X'EA' X'EB' X'EC'
Remote procedure error – general	X'F0'

## X.25 Statistical Counters

X.25 provides statistical data in two groups of counters that a key operator can read using the system monitor. This section describes the meaning of those counters.

### *Link Counters*

The first group of counters are the link counters. These counters replace the normal SDLC host link counters on an X.25 system. Remote operators can read some of the X.25 link counters through the IBM Communications Network Monitor/Controller Support (CNM/CS) function. CNM/CS does not read all X.25 link counters, however, and the counter numbers of those read are different from the normal numbers. The following list of X.25 link counters shows the link counter number followed by, where applicable, the CNM/CS number in parentheses. The second part of the list contains the counter description.

<b>Counter:</b>	<b>Description:</b>
1	Set Asynchronous Balance Mode (SABM) received. The controller received SABM from the DCE after completing the normal start sequence, and returned a DISC to stop the link operation.
2	Test message received. The controller received a link test message.
3	Reserved
4 (1)	Receive has timed out. The controller did not receive a valid frame within the time specified by INPT. The controller stops the link and circuit, then tries a restart.
5	Reserved
6	Reserved
7 (11)	Write Timeout. DCE clocking was interrupted. The controller stops the link and circuit and attempts a restart.
8 (12)	Invalid hardware status. The controller detected a communications adapter problem. The controller stops the link and circuit and attempts a restart.
9	Reserved
10	Reserved
11 (10)	DCE hardware error. The Data Set Ready signal from the DCE was interrupted. The controller stops the link and circuit and attempts a restart.
12	Reserved
13 (9)	Sequence number error. The controller received more than one I-frame with the same send sequence number. The controller stops the link and circuit and attempts a restart.
14 (13)	Adapter machine check. The controller detected a communications adapter problem, stopped the link and circuit, and tried to restart.
15	The controller sent Frame Reject (FRMR) to indicate an I-frame error was received. The controller follows FRMR with DISC, stops the link and circuit, and attempts a restart.
16	Packet discarded. Analyze the diagnostic code in the 11 006 a b 0290 log message to find the reason.

- 17 Exchange ID (XID) was received.
- 18 The controller received a diagnostic packet. Analyze the diagnostic code in the 11 006 a b 0290 log message to find the reason.
- 19 Frame Reject (FRMR) was received. The controller sends a DISC, stops the link and circuit, and attempts a restart.
- 20 DCE unavailable. The controller received a DM response to SABM, indicating that the DCE cannot communicate. The controller attempts a restart.
- 21 Unexpected unsequenced acknowledgement (UA) was received. The controller sends DISC, stops the link and circuit, and attempts a restart.
- 22 The controller received a packet-level restart, and responds by stopping the link and circuit and attempting restart. Analyze the 11 006 a b 02D3 log message to find the cause.
- 23 The controller sent either a reset, clear, or restart packet in response to an error. The controller stops and then restarts the link and circuit. Analyze the diagnostic code in the 11 006 a b 02D3 log message to find the cause.
- 24 200 seconds passed without the controller receiving a response to a restart. The controller stops and restarts the link and circuit.
- 25 The controller deferred an adapter-level function because a previous function was incomplete. The controller recovers without errors being logged or counted.
- 26 The controller attempted a link operation, but the link was not open.
- 27 A previously reported hardware error prevented a later function from completing.
- 28 The controller tried to open a link that was already open.
- 29 A condition requiring STPLNK or STPCKT to be executed cannot be completed.
- 30 (6) The controller detected a link-level error condition that was not corrected by retrying. The controller stops the link and circuit and attempts a restart.
- 31 The controller received a DISC and responded by sending an unsequenced acknowledgement (UA), stopping the link and circuit, and attempting a restart.
- 32 The controller detected an unexpected or out-of-sequence event and stopped the link and circuit. No restart was attempted.

### *Circuit Counters*

The following one-byte counters define X.25 circuit conditions. The application program should reset these counters before issuing STRCKT. These counters cannot be read directly by CNM/CS.

<b>Counter:</b>	<b>Description:</b>
1	Exchange ID (XID) received.
2	Test message received. The controller received a link test message for this circuit.
3	Set Normal Response Mode (SNRM) was received.
4	Set Disconnect Response Mode (SDRM) was received.

- 5 The controller received a call request packet that was too large for the packet buffer.
- 6 A count indicates the remote DTE answered a STRCKT with operational status, and is ready to receive data.
- 7 (SVC Open Circuit only) The flow control negotiation parameters received in the call connected packet do not match those sent in the STRCKT parameter list.
- 8 The stop failed. No error occurs, and the controller restarts the operation.
- 9 The controller received a reset packet and stopped the circuit. Analyze the 11 006 a b 02D0 log message for the cause.
- 10 The controller received a clear packet and stopped the circuit. Analyze the 11 006 a b 02D1 log message for the cause.
- 11 The controller sent either a reset, clear, or restart packet in response to an error. The controller stops the link. Analyze the diagnostic code in the 11 006 a b 02D3 log message to find the cause.
- 12 200 seconds passed without the controller receiving a response to a clear or reset packet.
- 13 The controller deferred an adapter-level function because a previous function was incomplete. The controller recovers without errors being logged or counted.
- 14 The controller attempted a circuit operation but the circuit was not open.
- 15 A previously reported hardware error prevented a later function from completing.
- 16 The controller tried to open a circuit that was already open.
- 17 The controller deferred an adapter-level function because a previous function was incomplete, requiring the link and circuit to stop.
- 18 The circuit received an incoming call packet, but no STRCKT was issued before the DCE timer ran out. The circuit is stopped.
- 19 There is no channel available for the outgoing call packet. The circuit attempts to restart.
- 20 The STRCKT logical channel number was not defined during configuration.
- 21 The PVC channel cannot operate because of a timeout condition. The circuit stops.
- 22 A previous error or other condition stopped the link.
- 23 The circuit received no response to a call request within the time specified in OPTM. The circuit tries to restart.
- 24 Reserved

## System Monitor Functions

### *Display Statistical Counters (CMD 010)*

This command will display the statistical counters for the circuit, the link, or the hardware registers. The format of the command is:

```
010 90x1
```

where:

x = 0 to display link counters  
1 to display circuit counters

The formats of the counters are:

If the circuit counters are requested, 24 counters are displayed in decimal. See "Circuit Counters" for the definition of each counter.

If the link counters are requested, 32 counters are displayed in decimal. See "Link Counters" for the definition of each counter.

### *Print Statistical Counters (CMD 012)*

This command will print all counters and registers for X.25. See the 010 command for format of the output.

### *Start/Stop the Circuit (CMD 141)*

This new command allows the user to start or stop the Circuit. The format of the command is as follows:

```
141 x flag2 flag3 lchni config1 config2 locnm remnm  
cug rpoa thptcl ofac cid
```

**Note:** It is possible to obtain the existing circuit parameters by setting flag3 to 01 (141 0 01); no other parameters are required.

The following parameters are *required* to start a circuit:

```
x flag2 flag3 lchni.
```

where:

X = 0 Start the circuit.  
1 Stop the circuit.

All other parameters are optional and may be specified in groups. If the first parameter of a group is specified, the others of that group must be specified. There are four groups of parameters:

```
(config1 config2)  
(locnm remnm)  
(cug rpoa thptcl ofac)  
(cid)
```

If a particular group is specified, then all previous groups are required. For example: if the third group is specified, then all the previous parameters in groups 1 and 2 *must* be specified.

**flag2**

Two hexadecimal characters that describe circuit parameters.

Bit	Explanation
0	0=do not start this circuit automatically in the future. 1=start the circuit automatically in the future.
1	0=default the flag3 values. 1=use flag3 as specified.
6	0=start the Circuit. 1=turn off the automatic start circuit flag.
7	0=start circuit. 1=do not start circuit but return existing parameters.

### flag3

Two hexadecimal characters that describe the inclusion of fields in call packets.

Bit	Explanation
0	0 = do not include Flow Control Negotiation parameters in the call packets. 1 = include Flow Control Negotiation parameters.
1	0 = do not include LOCNM in the call packets. 1 = include LOCNM.
2	0 = do not include REMNM in the call accepted packet. 1 = include REMNM (required for outgoing calls).
3	0 = do not include CUG in the call packet. 1 = include CUG.
4	0 = do not include RPOA in the call packets. 1 = include RPOA.
5	0 = do not include THPTCL in the call packet. 1 = include THPTCL.
6	0 = do not include OFAC in the call packet. 1 = include OFAC.
7	0 = do not include CID in the call packet. 1 = include CID.

**Example:** To include flow control negotiation parameters and CID in the call packet:

ENTER — 81

### lchni

A 3-digit number that specifies the logical channel group number (0 to F) and the logical channel number (00 to FF).

In the following format:

xyy

x — Logical channel group number

yy — Logical channel number

**Example:** To enter group channel number 13, channel number 128:

ENTER — D80

### confg1

Two hexadecimal characters that specify the packet size, LLC, and type of circuit; switched or permanent.

**Note:** The command will complete with status X'0401' if the packet size is greater than that specified in the X25CKT configuration macro.

Bit	Explanation
0 } 1 }	00=128    10=256    01=64    11=512
2	Reserved
3	1=Permanent    0=Switched
4 } 5 }	10=PSH    11=QLLC
6	Reserved
7	Reserved

**config2**

Two hexadecimal characters that specify the type of switched call and window size.

**Note:** The command will complete with status X'0402' if the window size is specified greater than 7 and the modulo is specified as 8.

Bit	Explanation
0	{ 0=Outgoing call 1=Incoming call
1	Reserved
2	Reserved
3	Reserved
4	Window size
5	X'1' to X'7' if modulo 8 specified
6	X'1' to X'F' if modulo 128 specified
7	Reserved

**locnm**

One to 15 characters that contain the calling DTE number.

**remnm**

One to 15 characters that contain the called DTE number.

**cug**

A number specifying the two-digit group code (specified as two hexadecimal digits).

**rpoa**

The four-digit number of the intermediate network.

**thptcl**

A two-character hexadecimal number specifying the throughput class.

Bits	DCE to 4700				4700 to DCE				Hex	
	0	1	2	3	4	5	6	7		
	0	0	1	1	75	0	0	1	1	3
	0	1	0	0	150	0	1	0	0	4
	0	1	0	1	300	0	1	0	1	5
	0	1	1	0	600	0	1	1	0	6
	0	1	1	1	1200	0	1	1	1	7
	1	0	0	0	2400	1	0	0	0	8
	1	0	0	1	4800	1	0	0	1	9
	1	0	1	0	9600	1	0	1	0	A

**Example:** To specify DCE to 4700 of 9600 and 4700 to DCE of 4800:

ENTER — A9 (10101001)

**ofac**

Specifies the optional facilities requested.

00 — No reverse charging

01 — Reverse charging

**cid**

Eight characters that specify the connection ID. This ID is placed in the user data field of a call packet.

## ***Start/Stop the Link (CMD 041)***

The format of the command for an X.25 communications link is as follows:

041 x yy zz cc xff aaaaa x25flg tmr1 inpt rspt rexm optm

pvclci oclci twlci iclci

where:

x yy zz cc xff aaaaa

is the same for all link types.

### **X25flg**

A 1-byte field that indicates if modulo 128 packet level sequence numbering is to be used.

bit 2 = 1 for UKPSS or TELENET network.

bit 3 = 1 for modulo 128 packet level sequence numbering.

bit 4 = 1 for DDXP

bit 7 = 1 to return existing link parameters.

### **inpt**

A decimal number that specifies the idle/non-productive timeout value.  
(Values 0 - 99)

### **rspt**

A decimal number that specifies the regional timeout value (0 - 20).

### **rexm**

A decimal number that specifies the retransmission timeout value  
(Values 0 - 99).

### **optm**

A decimal number that specifies the connection establishment timeout value  
(Values 0 - 7).

### **pvclci**

A 3-digit number that specifies the logical channel group number (0 to 15) and the logical channel number (0 to 255) of the channel reserved by the network for the PVC.

In the following format:

xyy

x — Logical channel group number

yy — Logical channel number

**Example:** To enter group channel number 13, channel number 128:

ENTER — D80

**oclc**

A 3-digit number that specifies the logical channel group number (0 to 15) and the logical channel number (0 to 255) of the channel reserved by the network for outgoing calls.

In the following format:

xyy

x — Logical channel group number

yy — Logical channel number

**Example:** To enter group channel number 13, channel number 128:

ENTER — D80

**twlc**

A 3-digit number that specifies the logical channel group number (0 to 15) and the logical channel number (0 to 255) of the channel reserved by the network for two-way calls.

In the following format:

xyy

x — Logical channel group number

yy — Logical channel number

**Example:** To enter group channel number 13, channel number 128:

ENTER — D80

**iclc**

A 3-digit number that specifies the logical channel group number (0 to 15) and the logical channel number (0 to 255) of the channel reserved by the network for incoming calls.

In the following format:

xyy

x — Logical channel group number

yy — Logical channel number

**Example:** To enter group channel number 13, channel number 128:

ENTER — D80

**Startup**

The monitor will support a new code defined in the GMSLID field to indicate the X.25 link. The value will be X'09'.

## Chapter 4. Storage Requirements

The values listed for the storage requirements are in addition to the factors calculated for the basic 4700 controller. Consult the *IBM 4700 Finance Communication System Configurator*, GC31-2017, to determine the storage requirements.

### Controller Data Requirements

The additional controller data storage required when the X.25 link is included is 25K.

### CPGEN Requirements

The additional CPGEN storage required for the X.25 link is as follows:

- For the X.25 link ..... 2064 bytes  
    plus 4 X (packet size + 16) (default) ..... 576 bytes
- For each logical channel specified ..... 32 bytes
- For each controller read buffer specified ..... 8 bytes

#### Example:

X.25 link .....	2064
Packet size 128 .....	576
1 logical channel .....	32
3 read buffers .....	24
	<hr/>
Total storage required .....	2696



# Glossary

This glossary defines System Network Architecture (SNA) terms as they apply to SNA-Primary. This glossary elaborates on or qualifies those basic definitions. For other definitions, the reader should refer first to the appropriate section of this manual, then to either the *IBM Vocabulary for Data Processing, Telecommunications, and Office Systems*, GC20-1699, or to the prerequisite publications listed at the beginning of this manual.

**application program (AP).** The 4700 program that resides in Segment 14 of a work station and performs work on behalf of that station.

**application program interface (API).** The boundary between the application program and the 4700 controller that comprises instruction parameters, status fields, and global flags.

**circuit information station.** The station which has been selected to receive all data contained in incoming call and call connected packets.

**closed user group (CUG).** A restricted access subset of an X.25 network. Identified by a two-digit group code.

**connection ID (CID).** The eight character identification name which is included in the user data field of a call packet.

**(CPU).** The host processing system.

**data terminal equipment (DTE).** A host controller or terminal.

**(DCE).** Data circuit-terminating equipment.

**flow control parameter negotiation (FCPN).** The network subscription option that allows packet size and window size values to be included in call packets.

**frame reject (FRMR).** A response used to report error conditions that are not recoverable by retransmission.

**incoming call logical channel identifier (ICLCI).** The logical channel group number and logical channel number of the channel reserved by the network for an incoming call circuit.

**international telegraph and telephone consultative committee (CCITT).**

**link access protocol balanced (LAPB).** The link access procedure used in IBM's implementation of X.25.

**logical channel identifier (LCI).** The logical channel group number and the logical channel number of a channel reserved by the network for a virtual circuit.

**logical channel number (LCN).** A decimal number in the range of 0 to 255 that identifies a particular channel within a group.

**logical link control (LLC).** Either QLLC or PSH.

**logical unit (LU).** One of three network addressable units (the others are physical unit and system services control point), and the port through which an end user accesses function management in order to communicate with another end user. A logical unit must support two sessions — one with the system services control point, the other with the other end user's logical unit.

**network identification field (NID).** The identifier, also known as the network address or network name, by which end users refer to a network addressable unit (NAU). You must define NIDs for each SNA-Primary line, control unit, and terminal with the NETID parameters of the ALACU, ALATERM, and ALALINE configuration macros during the configuration (CPGEN) process.

**outgoing call logical channel identifier (OCLCI).** The logical channel group number and logical channel number of the channel reserved by the network for an outgoing call circuit.

**permanent virtual circuit logical channel identifier (PVCLCI).** The logical channel group number and logical channel number of the channel reserved by the network for a permanent virtual circuit.

**physical services header (PSH).** A link control procedure used by some initial IBM DTE's to perform adjacent node services and segmentation/concatenation.

**physical unit (PU).** One of three types of network addressable units (the others are the logical unit and system services control point). The physical unit (PU-T1, PU-T2, or PU-T5) at each node controls the resources for that node.

**primary logical unit (PLU).** An SNA access port containing the primary half of an LU-LU session. A controller or controller-level device may contain program support that allows it to act as both a PLU when working with one or more secondary logical unit (SLU) devices, and as an SLU when working with another PLU device higher in the chain.

**(PSDN).** Packet-switched data network.

**(PVC).** Permanent virtual circuit.

**qualified logical link control (QLLC).** The logical link control level used in IBM's implementation of X.25.

**receive not ready (RNR).** A packet sent by either a primary or secondary station to indicate a temporarily busy condition.

**receive ready (RR).** A packet that indicates the originating station is ready to receive.

**(RPOA).** Recognized private operating agency.

**(SDLC).** Synchronous data link control.

**(SDRM).** Set disconnect response mode.

**secondary logical unit (SLU).** An SNA access port containing the secondary half of an LU-LU session. Contrast with *primary logical unit (PLU)*.

**set asynchronous balanced mode (SABM).** An unnumbered command used by transmitting stations to place the remote station in information transfer phase.

**(SNA).** System network architecture.

**(SNRM).** Set normal response mode.

**(SVC).** Switched virtual circuit.

**system services control point (SSCP).** A network addressable unit (NAU) that provides configuration, maintenance, management, and session services between physical units, logical units, and other SSCPs. The 4700 controller contains some of the physical unit-type 5 (PU-T5) functions necessary to support an SSCP. The application program must provide the remaining SSCP support.

**two-way logical channel identifier (TWLCI).** The logical channel group number and logical channel number of the channel reserved by the network for two-way call circuits.

**(UA).** Unnumbered acknowledgement.

**(VTAM).** Virtual telecommunications access method.

**(XID).** Exchange station ID.

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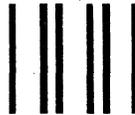
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