ANSI X3.100-1989

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American National Standard

for Information Systems –

Interface between Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE) for Operation with Packet-Switched Data Networks (PSDN), or between Two DTEs, by Dedicated Circuit

ANSI X3.100-1989

ANSI American National Standards Institute
1430 Broadway
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Details concerning its use within the Federal Government are contained in Federal Information Processing Standards Publication 100-1, Interface Between Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE) for Operation with Packet-Switched Data Networks (PSDN), or Between Two DTEs, by Dedicated Circuit. For a complete list of the publications available in the Federal Information Processing Standards Series, write to the Standards Processing Coordinator (ADP), National Institute of Standards and Technology, Gaithersburg, MD 20899.

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X3.100-1989
Revision of
ANSI X3.100-1983

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Secretariat
Computer and Business Equipment Manufacturers Association

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Foreword (This Foreword is not part of American National Standard X3.100-1989.)

This standard was developed by Task Group X3S3.7, Public Digital Network Access, in close cooperation with the International Telegraph and Telephone Consultative Committee (CCITT) and the International Organization for Standardization (ISO). Task Group X3S3.7 started its work on public data network access protocols in 1973 and contributed to the international work of CCITT and ISO in this area. Work in CCITT on packet-switching technology also advanced at this time and was highlighted by the adoption, in 1976, of Recommendation X.25. Work has continued to refine Recommendation X.25 over the last twelve years, culminating with the approval of the 1988 version of Recommendation X.25 by CCITT at its Plenary Assembly in October 1988. In 1981, ISO, seeing the need for a terminal-oriented counterpart to Recommendation X.25, started work on standards that became known as ISO 7776 (corresponding to the data link layer of Recommendation X.25) and ISO 8208 (corresponding to the packet layer). Task Group X3S3.7 was responsible for significant input to both efforts.

To meet the unique requirements of the US environment for signaling speeds and optional user facilities, for example, the task group determined that Recommendation X.25 should serve as the basis for an American National Standard. Such a standard was adopted in 1983 as ANSI X3.100-1983. With the continuing work in both CCITT and ISO, work was started in 1985 to revise ANSI X3.100-1983. The draft revised American National Standard was submitted to Technical Committee X3S3 to start the approval process according to ANSI procedures. The process was successfully completed, resulting in revised ANSI X3.100-1989.

Suggestions for improvement of this standard will be welcome. They should be sent to the Computer and Business Equipment Manufacturers Association, 311 First Street, NW, Suite 500, Washington, DC 20001.

This standard was processed and approved for submittal to ANSI by the Accredited Standards Committee on Information Processing Systems, X3. Committee approval of this standard does not necessarily imply that all committe members voted for its approval. At the time it approved this standard, the X3 Committee had the following members:

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Contents

American National Standard
for Information Systems –

Interface between Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE) for Operation with Packet-Switched Data Networks (PSDN), or between Two DTEs, by Dedicated Circuit

1. Scope

The following standards specify the interface between data terminating equipment (DTE) and data circuit-terminating equipment (DCE) for terminals operating in the packet mode on packet-switched data networks (PSDN), or between two DTEs, by dedicated circuit:

(1) CCITT Recommendation X.25,[1] Interface between Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE) for Terminals Operating in the Packet Mode and Connected to Public Data Networks by Dedicated Circuit

(2) ISO 7776:1986, Information Processing Systems — Data Communications — High-Level Data Link Control Procedures — Description of the X.25 LAPB-Compatible DTE Data Link Procedures

(3) ISO 8208:1987, Information Processing Systems — Data Communications — X.25 Packet Level Protocol for Data Terminal Equipment

NOTE: In this standard, CCITT Recommendation X.25 will also be referred to as "X.25".

CCITT Recommendation X.25 specifies the DCE side of the DTE/DCE interface. ISO 7776:1986 and ISO 8208:1987 specify the DTE/DTE interface and the DTE side of the DTE/DCE interface.

This standard conforms to the requirements of the three standards listed in this section and covers both the DTE/DCE and DTE/DTE interfaces.

NOTE: A companion American National Standard will be provided for terminals operating in the packet-mode and accessing a Packet-Switched Public Data Network (PSPDN) through a Public Switched Telephone Network (PSTN), a Circuit-Switched Public Data Network (CSPDN), or an Integrated Services Digital Network (ISDN).

2. Referenced and Related Standards and Publications

2.1 Referenced American National Standards. This standard is intended to be used in conjunction with the following American National Standards. When these referenced standards are superseded by a revision approved by the American National Standards Institute, Inc, the revision shall apply:

ANSI X3.1-1987, Information Systems — Data Transmission — Synchronous Signaling Rates

ANSI/EIA 232-C-1969, Interface between Data Terminal Equipment and Data Communication Equipment Employing Serial Binary Data Interchange[2]

[1] All designation numbers for CCITT Recommendations provided in this standard, except where noted, refer to the 1988 CCITT Blue Book.

[2] During the preparation of this standard, ANSI/EIA 232-C-1969 was superceded by ANSI/EIA 232-D-1986. To secure copies of ANSI/EIA 232-C-1969, write: Electronic Industries Association, Standard Sales, 2001 Eye Street, NW, Washington, DC 20006. Telephone: (202) 457-4966.

ANSI/EIA 232-D-1986, Interface between Data Terminal Equipment and Data Communication Equipment Employing Serial Binary Data Interchange

2.2 Other Referenced Standards. This standard is also intended to be used in conjunction with the following standards:

CCITT Recommendation V.24, List of Definitions for Interchange Circuits between Data Terminal Equipment and Data Circuit-Terminating Equipment[1,3]

CCITT Recommendation V.28, Electrical Characteristics for Unbalanced Double-Current Interchange Circuits[1,3]

CCITT Recommendation V.35 (1984), Data Transmission at 48 Kilobits per Second Using 60-108 kHz Group Band Circuits[1,3]

CCITT Recommendation X.1, International User Classes of Service in Public Data Networks and Integrated Services Digital Networks (ISDN)[1,3]

CCITT Recommendation X.2, International Data Transmission Services and Optional User Facilities in Public Data Networks and ISDNs[1,3]

CCITT Recommendation X.10, Categories of Access for Data Terminal Equipment (DTE) to Public Data Transmission Services[1,3]

CCITT Recommendation X.21, Interface between Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE) for Synchronous Operation or Public Data Networks[1,3]

CCITT Recommendation X.21 *bis*, Use on Public Data Networks of Data Terminal Equipment (DTE) which Is Designed for Interfacing to Synchronous V-Series Modems[1,3]

CCITT Recommendation X.25, Interface between Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE) for Terminals Operating in the Packet Mode and Connected to Public Data Networks by Dedicated Circuit[1,3]

CCITT Recommendation X.29, Procedures for the Exchange of Control Information and User Data between a Packet Assembly/Disassembly (PAD) Facility and a Packet Mode DTE or Another PAD[1,3]

CCITT Recommendation X.31, Support of Packet Mode Terminal Equipment by an ISDN[1,3]

CCITT Recommendation X.32, Interface between Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE) for Terminals Operating in the Packet Mode and Accessing a Packet Switched Public Data Network through a Public Switched Telephone Network or a Circuit Switched Public Data Network.

CCITT Recommendation X.92, Hypothetical Reference Connections for Public Synchronous Data Networks[1,3]

CCITT Recommendation X.96, Call Progress Signals in Public Data Networks[1,3]

EIA 422-A-1978, Electrical Characteristics of Balanced Voltage Digital Interface Circuits[4]

EIA 423-A-1978, Electrical Characteristics of Unbalanced Voltage Digital Interface Circuits[4]

EIA 449-1977, General Purpose 37-Position and 9-Position Interface for Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange[4]

EIA 530-1987, High-Speed 25-Position Interface for Data Terminal Equipment and Data Circuit-Terminating Equipment.[4]

ISO 2110:1980, Data Communication — 25-Pin DTE/DCE Interface Connector and Pin Assignments[3]

ISO 2593:1984, Data Communication — 34-Pin DTE/DCE Interface Connector and Pin Assignments[3]

ISO 7776:1986, Information Processing Systems — Data Communication — High-Level Data

[3] Available from the American National Standards Institute, 1430 Broadway, New York, NY 10018. Telephone: (212) 642-4900.

[4] Available from the Electronic Industries Association, Standard Sales, 2001 Eye Street, NW, Washington, DC 20006. Telephone: (202) 457-4966.

Link Control Procedures — Description of the X.25 LAPB-Compatible DTE Data Link Procedures[3]

ISO 8208:1987, Information Processing Systems — Data Communications — X.25 Packet Level Protocol for Data Terminal Equipment[3]

2.3 **Related Publication.** The publication listed here is for information only and is not essential for completion of the requirement of this standard:

Application Notes on Interconnection between Interface Circuits Using EIA 449 and EIA 232-C, EIA Industrial Electronics Bulletin No. 12 (1977)[4]

3. Requirements

This standard conforms to the requirements of CCITT Recommendation X.25, ISO 7776:1986, and ISO 8208:1987 with the exceptions listed here and in 3.1 through 3.3. A minimum subset of the requirements of CCITT Recommendation X.25, ISO 7776:1986, and ISO 8208:1987 that is to be supported is defined in 3.1 through 3.3. Requirements apply to both the DTE and DCE unless otherwise specified. These requirements neither prohibit nor discourage the support of additional capabilities.

Aspects of the other CCITT X-Series Recommendations (e.g., X.1, X.2, X.10, X.21, X.21 *bis*, X.29, X.92, and X.96) referenced in CCITT Recommendation X.25 that are relevant to this standard are contained in the material that follows.

The general elements of this standard include:

(1) A family of physical layer interfaces, from which a particular interface may be selected

(2) A single data link layer control procedure

(3) Packet layer procedures for virtual calls and permanent virtual circuits

3.1 Physical Layer. At the physical layer, the provisions of Section 1 of CCITT Recommendation X.25 shall be used.

3.1.1 Data Signaling Rates. CCITT Recommendation X.1 standardizes user classes of service, which are data signaling rates of 2.4, 4.8, 9.6, 48, and 64 kbit/s for packet mode operation. Additional signaling rates shall be as defined by ANSI X3.1-1987.

It is required that PSDNs support the data signaling rates of 4.8 and 9.6 kbit/s duplex. Other signaling speeds as defined by CCITT Recommendation X.1 and ANSI X3.1-1987 may also be provided. Note that 56 kbit/s is a standard rate specified in North America in ANSI X3.1-1987; 56 kbit/s is recommended in place of the 48 kbit/s rate specified in CCITT Recommendation X.1.

3.1.2 Physical Interface. In accordance with CCITT Recommendation X.25, either ANSI/EIA 232-D-1986 or ANSI/EIA 232-C-1969[2] shall be provided as the physical interface for dedicated access.

NOTE: DTE purchasers and designers should determine if the associated DCEs support packet sequence numbering modulo-128.

One of the following physical interfaces shall be provided:

(1) Electrical characteristics according to Appendix II of CCITT Recommendation V.35 (for data and timing circuits) and CCITT Recommendation V.28 (for control circuits); interchange circuits according to CCITT Recommendation V.24; connection and pin assignments according to ISO 2593:1984.

(2) EIA 449-1977, with electrical characteristics as provided in either EIA 422-A-1978 or EIA 423-A-1978.

(3) EIA 530-1987.

NOTE: DTE purchasers and designers should determine which physical interface(s) is provided by the associated DCE(s).

3.2 Data Link Layer. The provisions in Section 2 of CCITT Recommendation X.25 applying only to LAPB and those of ISO 7776:1986 shall be used. The use of LAP provisions of CCITT Recommendation X.25 are not applicable to this standard.

3.2.1 Two combined stations on a point-to-point single link configuration shall be supported. Optionally, multilink configurations may also be supported.

3.2.2 Two-way simultaneous operation shall be supported.

3.2.3 The FCS shall be a 16-bit sequence in accordance with 2.2.7 of X.25.

3.2.4 The address of the DCE shall be 10000000 for single data link operation and

11100000 for multilink operation. The address of the DTE shall be 11000000 for single data link operation and 11110000 for multilink operation in accordance with 2.4.2 of X.25. For direct DTE/DTE operations, one of the DTEs uses the address of the DCE.

3.2.5 The smallest N1 (the maximum number of bits in an information frame excluding flags and zero-bit insertion for transparency) to be supported by a DCE shall be 2104 bits (263 octets). An N1 as small as 1080 bits (135 octets) may be supported by the DTE. These values are based on modulo-8 operation at both the data link and packet layer.

3.2.6 It is required that all implementations be capable of operating with $k=7$; optionally, values of 1 to 6 are permissible with modulo-8 operation and values 1 to 127 are permissible with modulo-128 operation. Modulo-128 operation is optional.

NOTE: DTE purchasers and designers should determine what values of k other than 7 are supported by the associated DCE(s).

3.3 Packet Layer. The provisions of CCITT Recommendation X.25 and ISO 8208:1987 dealing with packet-layer procedures shall be used subject to the following:

(1) The services for packet-switched data networks are from CCITT Recommendation X.2. Networks shall provide virtual call service and permanent virtual circuit service, both of which are designated as essential (E).

(2) It is required that all implementations be capable of operating with packet-sequence-numbering modulo-8; optionally, implementations of packet-sequence-numbering modulo-128 are also permitted.

NOTE: DTE purchasers and designers should determine if the associated DCEs support packet sequence numbering modulo-128.

(3) Any additional field appended after the first three octets shall contain an integral number of octets. When the packet layer detects nonoctet alignment, the DTE/DCE shall follow the packet-layer procedures for processing a packet type that is not octet aligned (diagnostic #82), as described in Annex C of X.25 and 11.3 of ISO 8208:1987.

(4) All DCE Restart Confirmation, DCE Reset Confirmation, and DCE Clear Confirmation packets shall be interpreted by the DTE as having local significance only.

(5) Networks may optionally support the Diagnostic packet. In the operational situations listed in Table C-1/X.25 in Annex C of CCITT Recommendation X.25, the following shall apply:

(a) If the network supports the Diagnostic packet, it shall transmit a Diagnostic packet with an appropriate diagnostic code

(b) If the network does not support the Diagnostic packet, it shall discard the packet, and take no subsequent action as a direct result of receiving the packet.

No DTE shall reject Diagnostic packets as errors.

(6) A diagnostic code shall be provided in all Clear Request, Reset Request, and Restart Request packets. All DTEs shall support the diagnostic codes listed in Table 25 of ISO 8208:1987. In addition, under bilateral or multilateral agreements, DTEs may support nonstandard diagnostic codes as provided for in Table 25 of ISO 8208:1987.

(7) The network diagnostic codes shall be used in accordance with the codes listed in Annex E of CCITT Recommendation X.25 whenever they apply; nonassigned codings, which are in the range of 128–255 in X.25, may be used for events not listed in X.25.

(8) A generic diagnostic code shall not be used when a more specific diagnostic code is known to be applicable.

(9) In the DTE/DCE environment, the selection of a logical channel number for new virtual calls shall follow the procedures suggested in 4.1.2, Note 2; Annex A, Note 5; and Annex A, Note 6, of CCITT Recommendation X.25. In the DTE/DTE environment, logical channel number selection shall follow the procedure specified in 5.2.1, Note 3; 5.2.5; and Figure 1, in ISO 8208:1987.

(10) In ISO 8208:1987, Subsection 6.1, the second paragraph, the second sentence, which pertains to Data, Interrupt, Flow Control, Reset, and Reject packets, reads "While in a state other than d1, the above-mentioned packets may be discarded." This shall be interpreted that the receiving DTE/DCE shall follow the packet-layer procedures for processing these packet types in accordance with Tables C-2/X.25, C-3/X.25, and C-4/X.25 of CCITT Recommendation X.25.

(11) The following option in Table C-3/X.25 of CCITT Recommendation X.25 shall not be used. "Some networks may invoke the ERROR

#74 procedure if the address length fields are not equal to 0 in the Call Accepted packet, except when the called line address modified notification facility is present in the facility field."

(12) A DTE may transmit a Reject packet, but it shall be able to suppress the generation of that packet if there is no agreement to use the packet retransmission facility. Processing a retransmission request by a DTE shall follow procedures given in 13.4.2 of ISO 8208:1987.

(13) Receipt of a Data packet with a nonconsecutive P(S) value, with a user data field length greater than the allowed maximum or a user data field that is not octet-aligned, is an error condition. For these conditions, a DTE shall ignore the erroneous Data packet and reset the logical channel with cause indicating "DTE originated", and one of the following diagnostics as appropriate: invalid P(S) (#1), packet too long (#39), or non-octet aligned data field (#82). This procedure is in accordance with Table C-4/X.25 of CCITT Recommendation X.25. For the case of a nonconsecutive P(S) value, alternative b of 11.3 in ISO 8208:1987 may be used. Alternative c as defined in 11.3 of ISO 8208:1987 shall not be used.

(14) A DTE shall invoke ERROR #39 procedure as defined in Table 25 of ISO 8208:1987 when the DTE receives an RR or RNR packet having one or more octets beyond the third octet when modulo-8 numbering is used (or the fourth octet when modulo-128 numbering is used). The alternative action (the packet may be ignored) as defined in Note 2 of Table 25 of ISO 8208:1987 shall not be used.

(15) Timeouts and time limits specified in Annex D of X.25 shall be employed for DTE/DCE operation. T21 shall not be less than the value given in Table D-2/X.25 of CCITT Recommendation X.25. The actions listed in Tables D-1/X.25 and D-2/X.25 of CCITT Recommendation X.25 shall be followed. Timeouts and time limits for DTE/DTE operation shall be in accordance with Table 26 of ISO 8208:1987. In addition, the window rotation timer, T25, may be optionally supported, as described in 11.2.1 of ISO 8208:1987.

(16) If the optional procedure at the transmitting DTE to effect recovery from nonreceipt of window-rotation information is used, and if a P(R) that rotates the window is not received before expiration of T25, then the transmitting DTE shall reset the logical channel, indicating the cause DTE-originated with the diagnostic #146, as described in 11.2.1 of ISO 8208:1987.

(17) The D-bit procedure shall be implemented by all networks. DTEs need not employ the D-bit procedures when transmitting to the network, but no DTE shall reject incoming packets with the D-bit set to 1 or 0 as having this bit in error unless the receiving DTE knows the remote DTE has not implemented this value of the D-bit; in this case, the receiving DTE may treat such an occurence as an error condition. Specifically, if this error condition applies and the packet received is acceptable to the state of the logical channel (see note 5 to Table 33 of ISO 8208:1987), then the DTE invokes the ERROR procedure with diagnostic #166, D-Bit Procedure Not Supported.

(18) DTEs shall implement the address length fields and the facility length field in the Call Accepted packet, even if they are set to zero, as described in 5.2.3.1.2 and 5.2.3.1.3 of X.25 and 12.2.2 of ISO 8208:1987.

(19) User facilities for packet-switched data networks are given in CCITT Recommendation X.2, and optional user facilities are given in ISO 8208:1987 for DTE/DTE operation. Table A1 is adapted from these standards. These facilities are described in Sections 2 and 6 of CCITT Recommendation X.25. The following further constraints apply:

(a) Networks shall provide the facilities designated as essential (E).

(b) Networks shall implement basic RPOA selection. Networks shall also provide extended RPOA selection to DTEs that require it.

(c) All DTEs that employ any of the facilities classified as additional (A) shall also be capable of operating without employing any A facilities. However, this requirement is not intended to preclude from the scope of this standard specialized intermediary equipment designed principally to operate upon one or more A facility (e.g., equipment to collect and record billing information using the charging information facility).

(d) The throughput class value of 48 kbit/s may be interpreted as 56 kbit/s in those locations where 56 kbit/s access is used.

(20) The list of the applicable call progress signals adapted from CCITT Recommendation X.96 is given in Table B1 in Appendix B of this standard. Coding of call progress signals in packet cause fields is given in Tables 20/X.25,

21/X.25, 22/X.25, and 23/X.25 of CCITT Recommendation X.25.

(21) DTEs shall not use a facility marker with a facility parameter field set to all ones in case of intranetwork calls in accordance with 7.1 of X.25.

(22) DCEs shall support the facility marker for CCITT-specified DTE facilities.

Appendixes

(These Appendixes are not part of American National Standard X3.100-1989, but are included for information only.)

Appendix A

Facilities for CCITT Recommendation X.25 from CCITT Recommendation X.2 and ISO 8208:1985

Table A1 is adapted from CCITT Recommendation X.2, International Data Transmission Services and Optional User Facilities in Public Data Networks and ISDNs, 1988 CCITT Blue Book, (reprinted with permission of the International Telecommunications Union). Additional information from ISO 8208:1987, Information Processing Systems — X.25 Packet Level Protocol for Data Terminal Equipment is included. For DTE/DTE operation, reference should be made to ISO 8208:1987 to determine specific conditions that apply to particular user facilities.

Table A1
User Facilities for Packet-Switched Data Networks

Optional User Facility	VC	PVC	DTE/DTE Operation (ISO 8208:1987)	Reference Paragraph in X.25
Optional user facilities assigned for an agreed contractual period				
1 Extended frame sequence numbering	A	A	††	2.1.5
2 Multilink procedure	A	A	††	2.5
3 On-line facility registration	A	—	—	6.1
4 Extended packet sequence numbering (modulo-128)	A	A	Yes	6.2
5 D-bit modification	A	A	No	6.3
6 Packet retransmission	A	A	Yes	6.4
7 Incoming calls barred	E	—	No	6.5
8 Outgoing calls barred	E	—	No	6.6
9 One-way logical channel outgoing	E	—	Yes	6.7
10 One-way logical channel incoming	A	—	Yes	6.8
11 Nonstandard default packet sizes 16, 32, 64, 256, 512, 1024, 2048, 4096	A	A	Yes	6.9
12 Nonstandard default window sizes	A	A	Yes	6.10
13 Default throughput classes assignment	A	A	Yes	6.11
14 Flow control parameter negotiation	E	—	Yes	6.12
15 Throughput class negotiation	E	—	Yes	6.13
16 Closed user group	E	—	No	6.14.1
17 Closed user group with outgoing access	A	—	No	6.14.2
18 Closed user group with incoming access	A	—	No	6.14.3
19 Incoming calls barred within a closed user group	A	—	No	6.14.4
20 Outgoing calls barred within a closed user group	A	—	No	6.14.5
21 Bilateral closed user group	A	—	No	6.15.1
22 Bilateral closed user group with outgoing access	A	—	No	6.15.2
23 Fast select acceptance	E	—	No	6.17
24 Reverse charging acceptance	A	—	No	6.19
25 Local charging prevention	A	—	No	6.20
26 NUI subscription	A	—	No	6.21.1
27 Permission to override via NUI	A	—	—	6.21.2
28 Charging information	A	—	No	6.22
29 RPOA subscription	A	—	No	6.23.1
30 Hunt group	A	—	No	6.24
31 Call redirection	A	—	No	6.25.1
32 Call deflection subscription	A	—	—	6.25.2
33 Direct call	FS	—	—	—
Optional user facilities on a per-call basis				
1 Flow control parameter negotiation	E	—	Yes	6.12
2 Throughput class negotiation	E	—	Yes	6.13
3 Closed user group selection	E	—	No	6.14.6
4 Closed user group with outgoing access selection	A	—	No	6.14.7
5 Bilateral closed user group selection	A	—	No	6.15.3
6 Fast select	E	—	Yes	6.16
7 Reverse charging	A	—	No	6.18
8 NUI subscription	A	—	No	6.21.1
9 Charging information	A	—	No	6.22
10a Basic RPOA selection	E*	—	No	6.23.2
10b Extended RPOA selection	A†	—	No	6.23.2
11 Call deflection selection.	A	—	—	6.25.2
12 Called line address modified notification	A	—	No	6.26
13 Call redirection or deflection notification	A	—	No	6.25.3
14 Transit delay selection and indication	E	—	No	6.27
15 Abbreviated address calling	FS	—	—	—

Key. E: An essential user facility; A: An additional user facility that may be available in certain data networks; FS: For further study; —: Not applicable; VC: Applicable when the virtual call service is being used; PVC: Applicable when the permanent virtual circuit service is being used; *: Although designated A in CCITT Recommendation X.2, this facility is designated E by this standard; †: This facility is designated E when a DTE requires it; ††: This facility is allowed in ISO 7776:1986.

Appendix B

Call Progress Signals (Cause Codes) for CCITT Recommendation X.25 from CCITT Recommendation X.96

This information is adapted from CCITT Recommendation X.96, Call Progress Signals in Public Data Networks, 1988 CCITT Blue Book, and reprinted with permission of the International Telecommunications Union.

The call progress signals and the related circumstances giving rise to them are defined in Table B1. The categories listed in Table B1 are defined in notes at the end of the table.

The sequence of call progress signals in Table B1 implies, for Categories C and D, the order of call set-up processing by the network. In general, the DTE can assume, on receiving a call progress signal, that no condition higher up the table is present. Network congestion is an exception to this general rule. The actual coding of call progress signals (see Tables 20/X.25, 21/X.25, 22/X.25, and 23/X.25 of CCITT Recommendation X.25) does not necessarily reflect this sequence.

Users and DTE manufacturers are warned to make due allowance for possible later extensions to this table by providing appropriate fall-back routines for unexpected signals.

Table B1
Categories and Definitions of Call Progress Signals

Call Progress Signal	Definitions	Category	Packet Switching		See Note	Reference Table X.25
			VC	PVC		
Registration/ cancellation confirmed	The facility registration or cancellation requested by the DTE has been confirmed by the network.	B	(M)	(M)	11	22 23
Local procedure error	A procedure error caused by the DTE is detected by the DCE at the local DTE/DCE interface. Possible reasons include: • incorrect format; • expiration of a time-out.	D1	M	M	—	20 21 22 23
Network congestion	A condition exists in the network such as: • temporary network congestion, • temporary fault condition within the network, including procedure error within a network or an international data link.	C2	M	M	—	20 21 22 23
Network out of order	Temporary inability in the network to handle data traffic.	C2	—	M	—	21

Table B1
Categories and Definitions of Call Progress Signals *(Continued)*

Call Progress Signal	Definitions	Category	Packet Switching VC	Packet Switching PVC	See Note	Reference Table X.25
Invalid facility request	A facility requested by the DTE is detected as invalid by the DCE at the local DTE/DCE interface. Possible reasons include: • request for a facility that has not been subscribed to by the DTE; • request for a facility that is not available in the local network; • request for a facility that has not been recognized as valid by the local DCE.	D1	M	—	—	20 23
RPOA out of order	The RPOA nominated by the calling DTE is unaable to forward the call.	D2	(M)	—	4	20
Not obtainable	The called DTE address is out of the numbering plan or not assigned to any DTE.	D1	M	—	—	20
Access barred	The calling DTE is not permitted the connection to the called DTE. Possible reasons include: • unauthorized access between the calling DTE and the called DTE; • incompatible closed user group.	D1	M	—	—	20
Reverse charging acceptance not subscribed	The called DTE has not subscribed to the reverse charging acceptance facility.	D1	(M)	—	—	20
Fast select acceptance not subscribed	The called DTE has not subscribed to the fast select acceptance facility.	D1	(M)	—	—	20
Incompatible destination	The remote DTE/DCE interface or the transit network does not support a function or facility requested.	D1	M	M	—	20 21
Ship absent	The called ship is absent.	D1	M	—	13	20
Out of order	The remote number is out of order. Possible reasons include: • DTE is uncontrolled not ready; • DCE power off; • network fault in the local loop; • X.25 layer 1 not functioning; • X.25 layer 2 not in operation.	D1 or D2	M	M	7 8	20 21
Number busy	The called DTE is detected by the DCE as engaged on other call(s), and therefore as not being able to accept the incoming call.	C1	M	—	—	20
Remote procedure error	A procedure error caused by the remote DTE or an invalid facility request by the remote DTE is detected by the DCE at the remote DTE/DCE interface.	D1	M	M	—	20 21
Network operational	Network is ready to resume normal operation after a temporary failure or congestion.	C2	—	M	—	21 22

(continued on next page)

Table B1
Categories and Definitions of Call Progress Signals *(Continued)*

Call Progress Signal	Definitions	Category	Packet Switching VC	Packet Switching PVC	See Note	Reference Table X.25
Remote DTE operational	Remote DTE/DCE interface is ready to resume normal operation after a temporary failure or out of order condition (e.g., restart at the remote DTE/DCE interface). Loss of data may have occurred.	C1	—	M	—	21
DTE originated	The remote DTE has initiated a clear, reset or restart procedure.	B or D1	M	M	12	20 21

Key. —: Not applicable; M: Mandatory in all networks; (M) Mandatory where the relevant optional user facility is provided.

Significance of Categories in Table B1:

A	Call not cleared. The calling DTE is expected to wait.
B	Call cleared because the procedure is complete.
C1 and C2	*Call cleared.* The call has failed due to conditions of a temporary nature. The DTE may try again after a suitable delay as the next attempt may be successful. However, after a number of unsuccessful call attempts with the same response, the action taken by the DTE should be defined in category D1 or D2. *Reset.* The DTE may continue to transmit data recognizing that data loss may have occurred.
D1 and D2	*Call cleared.* The calling DTE should take other action to clarify when the call attempt might be successful. *Reset* (for permanent virtual circuit only). The DTE should cease data transmission and take other action as appropriate.
C1 and D1	Due to subscriber condition.
C2 and D2	Due to network condition.

Notes concerning Table B1:

The following notes are numbered according to Table 1/X.96 of CCITT Recommendation X.96.

Note 4. The *RPOA out-of-order* call progress signal shall not be returned to a DTE that does not subscribe to the *RPOA selection* facility.

Note 7. Although the basic *out-of-order* call progress signal is transmitted for these conditions, the diagnostic field in the *Clearing* or *Resetting* packet may give more precision.

Note 8. The fact that a DTE is also out of order when the data link access procedure layer is not operating correctly is a subject for further study.

Note 11. Applicable only to the local DTE/DCE interface.

Note 12. Possible reasons for this include *reverse charging not accepted.*

Note 13. Used only in conjunction with mobile maritime service.