Appendix I

Definition of causes values

(This appendix does not form an integral part of this Specification)

Table I.2/B indicates the usage of cause values within this Specification. Other usage may be provided within other Recommendations, e.g. Q.700-Series and Q.699. Other causes may also be used by Q.931 entities where this is not precluded by the procedures defined elsewhere in this Specification.
Table I.1/B defines the key for the location of generation in Table I.2/B. For more precise usage of the location codes in the cause information element, see Recommendation Q.850.

TABLE I.1/B

Key to the location in Table I.2/B

LU	Local user
LN	Local network
TN	Transit network
RN	Remote network
RU	Remote user
LPE	Local peer entity (for symmetrical operation, see Annex D)
The following abbreviations to message types are used in Table I.2/B	
CON CON	CONGESTION CONTROL
DISC	DISCONNECT
REL	RELEASE
REL COM	RELEASE COMPLETE
RES REJ	RESUME REJECT
STAT	STATUS
SUSP REJ	SUSPEND REJECT

TABLE I.2/B **U**

Usage of cause values

Cause No.	Class	Value	Cause name	Diagnostics	Reference	Typical location of generation	Typical carrying message as identified by receiving side	
							At remote interface	At local interface
1	000	0001	Unassigned (unallocated) number	Condition	5.1.4	LN		REL COM DISC
					5.2.4	RU	REL COM DISC	
2	000	0010	No route to specified transit network	Transit network identity/network specific facilities info. elements	C.2	TN		DISC
					E.3	LN		REL COM
3	000	0011	No route to destination	Condition	5.1.4	LN		DISC REL COM
					5.2.4	RU	REL COM DISC	DISC
6	000	0110	Channel unacceptable	–	5.2.3.1 c) 5.3.2 d) 6.2.2.3.1	LN		REL
7	000	0111	Call awarded and being delivered in an established channel	–	6.2.2.3.1	LN		REL
16	001	0000	Normal call clearing	Condition		RU	DISC	DISC
17	001	0001	User busy	–	5.2.5.1 5.2.5.4 b)	RU	REL COM	DISC
					No procedure	RN		DISC

TABLE I.2/B *(cont.)*

Cause No.	Class	Value	Cause name	Diagnostics	Reference	Typical location of generation	Typical carrying message as identified by receiving side	
							At remote interface	At local interface
18	001	0010	No user responding	–	5.2.5.3	RN		DISC
19	001	0011	User alerting, no answer	–	5.2.5.3	RN		DISC
21	001	0101	Call rejected	Condition: user supplied diagnostic	5.2.5.1 5.2.5.4 b)	RU	REL COM	DISC
22	001	0110	Number changed	New destination number	5.1.4	LN		DISC REL COM
					5.2.4	RU	REL COM DISC	DISC
26	001	1010	Non-selected user clearing	–	5.3.2 b) 6.2.2.3.1	LN		REL
27	001	1011	Destination out of order	–	5.8.9	RN		DISC
28	001	1100	Invalid number format (incomplete number)	–		LN		DISC REL COM
					5.2.4	RU	DISC REL COM	DISC
					5.1.5.2	LN		DISC
					5.2.4	RN		DISC
					5.1.4	LN		DISC REL COM

Cause No.	Class	Value	Cause name	Diagnostics	Reference	Typical location of generation	Typical carrying message as identified by receiving side	
							At remote interface	At local interface
29	011	1101	Facility rejected	Facility identification	No procedure in Q.931	LN		REL COM DISC
						RN		DISC
						RU	REL COM DISC	
30	001	1110	Response to STATUS ENQUIRY	–	5.8.10	LU, LN		STAT
31	001	1111	Normal, unspecified	–	5.8.4	RN		REL COM DISC
34	010	0010	No circuit/Bhannel available	–	5.1.1 5.1.2 5.1.5.1 5.1.5.2	LN		REL COM
					5.2.3.1 b) 5.2.3.1 e) 5.2.3.2 6.2.2.3.1	RU	REL COM	DISC
					C.2	LN	REL COM DISC	REL COM DISC
					C.2	TN		DISC
					D.1.1 e) D.3 b)	LPE		REL COM
38	010	0110	Network out of order	–	No procedure			

TABLE I.2/B *(cont.)*

Cause No.	Class	Value	Cause name	Diagnostics	Reference	Typical location of generation	Typical carrying message as identified by receiving side	
							At remote interface	At local interface
41	010	1001	Temporary failure	–	5.8.8	LU, LN		DISC
					5.8.10	LN, RU, RN	DISC	DISC
42	010	1010	Switching equipment congestion	–	No procedure			REL REL COM
43	010	1011	Access information discarded	Discarded into element identifier(s)	7.1.5.7	RU, LN, RU		CON CON
					7.1.6.1	LN		STAT
					5.8.7.2	LN, LU		STAT
44	010	1100	Requested circuit/Bhannel not available	–	5.1.2 5.1.5.1 5.1.5.2	LN		REL COM
					5.2.3.1 e) 5.2.3.2 6.2.3.3.1	RU	REL COM	DISC
					D.1.1 e)			REL COM
47	010	1111	Resource unavailable, unspecified	–	No procedure			

Cause No.	Class	Value	Cause name	Diagnostics	Reference	Typical location of generation	Typical carrying message as identified by receiving side	
							At remote interface	At local interface
57	011	1001	Bearer capability not authorized	Attributes of bearer capability	5.1.5.2	LN		DISC REL COM
					7.2.2	LN		REL REL COM
58	011	1010	Bearer capability not presently available	Attributes of bearer capability	5.1.5.2	LN		DISC REL COM
					7.2.2	LN		REL REL COM
63	011	1111	Service or option not available, unspecified	–	5.1.5.2	LN		DISC REL COM
65	100	0001	Bearer capability not implemented	Attributes of bearer capability	5.1.5.2	LN		DISC REL COM
					6.1	LN		REL COM
66	100	0010	Channel type not implemented	Channel type	No procedure			
69	100	0101	Requested facility not implemented	Facility identification	7.1.3.6	RU	DISC REL COM	DISC
					7.1.4.3 7.1.5.3	RN		REL DISC
					7.1.7.4	LN		REL REL COM

TABLE I.2/B *(cont.)*

Cause No.	Class	Value	Cause name	Diagnostics	Reference	Typical location of generation	Typical carrying message as identified by receiving side	
							At remote interface	At local interface
70	100	0110	Only restricted digital information bearer capability is available	–	No procedure (network dependent option)			
79	100	1111	Service or option not implemented, unspecified					
81	101	0001	Invalid call reference value	–	5.8.3.2 a)	LU, LN		REL REL COM
					5.8.3.2 b)	LU, LN		REL COM
					5.8.3.2 f)	LU, LN		STAT
82	101	0010	Identified channel does not exist	Channel identity	5.1.4	LN		DISC REL COM
83	101	0011	A suspended call exists, but this call identity does not	–	5.6.5	LN		RES REJ
84	101	0100	Call identity in use	–	5.6.3	LN		SUSP REJ
85	101	0101	No call suspended	–	5.6.5	LN		RES REJ
86	101	0110	Call having the requested call identity has been cleared		5.6.5	LN		RES REJ

TABLE I.2/B *(cont.)*

Cause No.	Class	Value	Cause name	Diagnostics	Reference	Typical location of generation	Typical carrying message as identified by receiving side	
							At remote interface	At local interface
88	101	1000	Incompatible destination	Incompatible parameter	5.2.2 5.2.5.1 5.2.5.3 a) B.3.2 B.3.3	RU	REL COM	DISC
91	101	1011	Invalid transit network selection	–	C.2	TN		DISC
						LN		DISC REL REL COM
95	101	1111	Invalid message, unspecified	Message type	5.8	LN		REL COM STAT
96	110	0000	Mandatory information element is missing	Information element identifier(s)	5.8.6.1	LN, LU		REL REL COM STAT
					5.8.11	LN, LU		STAT
97	110	0001	Message type non-existent or not implemented	Message type	5.8.4 5.8.10 5.8.11	LU, LN		STAT
98	110	0010	Message not compatible with call state or message type non-existent or not implemented	Message type	5.8.4	LU, LN		STAT
99	110	0011	Information element non-existent or not implemented	Information element identifier(s)	5.8.7.1 5.8.11	LU, LN		STAT
					5.8.7.1	LN		REL REL COM

TABLE I.2/B *(end)*

Cause No.	Class	Value	Cause name	Diagnostics	Reference	Typical location of generation	Typical carrying message as identified by receiving side	
							At remote interface	At local interface
100	110	0100	Invalid information element contents	Information element identifier(s)	5.8.6.2	LU, LN		STAT REL REL COM
					5.8.7.2 5.8.11	LU, LN		STAT
101	110	0101	Message not compatible with call state	Message type	5.8.4	LN, LU		STAT
					5.8.11	LN, LU		DISC REL REL COM
102	110	0110	Recovery on time expiry	Timer number	5.2.4 5.2.5.3 5.6.5 5.4.1	LN		DISC
					5.3.3 5.3.4	LN		REL
					5.3.2 f) 5.3.3 5.6.5	LU		REL
111	110	1111	Protocol error, unspecified		5.8.4	RN		DISC
127	111	1111	Interworking, unspecified		No explicit procedure			

Appendix II
Example message flow diagrams and example conditions for cause mapping

(This appendix does not form an integral part of this Specification)

II.1 Example message flow diagrams

Examples of the procedures for the use of the B- and D-channel network connection types and the selection of the appropriate channel types are summarized in Figures II.1 to II.7. These figures are intended to complement the description in the preceding text and do not illustrate all possible situations.

NOTE – Not all frames that may be sent across the TA interface may be represented in the following figures.

II.1.1 Key to the figures

Q.931 messages

[ ] Layer 3

C CONNECT

CA CONNECT ACKNOWLEDGE

CP CALL PROCEEDING

D DISCONNECT

R RELEASE

RC RELEASE COMPLETE

S SETUP

X.25 layer 3 messages

Any layer 3 message preceded by X.25 indicates an X.25layer 3 packet (e.g. X.25 CR means X.25 *call request*).

CA Call accepted

CC Call connected

CLC Clear confirmation

CLI Clear indication

CLR Clear request CR Call request

IC Incoming call

SQ Restart request

SF Restart confirmation

SI Restart indication

Layer 2 frames

( ) Layer 2

GTEI Group TEI (127)

A.B X.25 layer 2 addresses (includes command and response)

SABM Set asynchronous balance mode

SABME Set asynchronous balance mode extended

UA Unnumbered acknowledgement frame

UI Unnumbered information frame (i.e. using unacknowledged information transfer at layer 2)

I Information frame

DISC Disconnect frame

Layer 2 addresses marked (x, p) indicates that the SAPI element of the frame address is coded for packet type (SAPI = 16) information as described in Recommendation Q.921. Layer 2 addresses marked (x, s) refer to signalling type (SAPI = 0) information.

II.2 Example conditions for cause mapping

Figures II.8 through II.16 show example conditions when cause mappings would be utilized between Q.931 and X.25 messages and utilize the specific mappings of Table **Error! Reference source not found.** and Table **Error! Reference source not found.** as shown below.

Figure *Reference Table*

Q.931 failures during call establishment

II.8 Table **Error! Reference source not found.**

II.9 Table **Error! Reference source not found.**

II.10 Table **Error! Reference source not found.**

II.11 Table **Error! Reference source not found.**

II.12 Table **Error! Reference source not found.**

User side failures during X.25 data transfer phase

II.13 Table **Error! Reference source not found.** (Note 1)

II.14 Table **Error! Reference source not found.** (Note 2)

Network side premature clearing

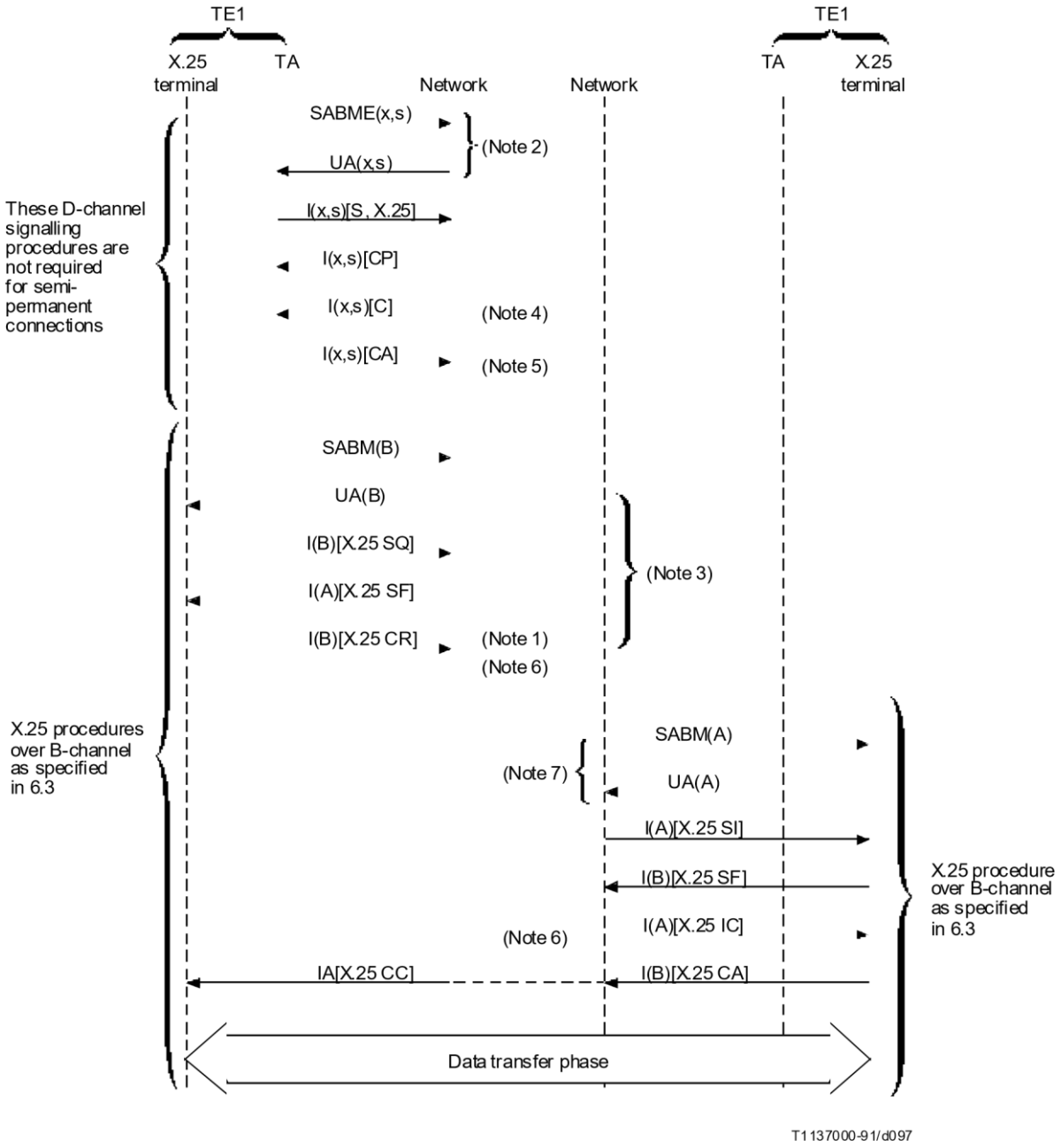
II.15 Table **Error! Reference source not found.**

II.16 Table **Error! Reference source not found.**

NOTES

1 This mapping is only needed in the case of the Q.931 message arriving prior to the clearing of the last virtual call.

2 This situation always results in either an X.25 *clear indication* packet with cause No. 9, *out of order* for switched virtual calls, or an X.25 *reset* packet with cause No. 9, *out of order* for permanent virtual circuits.



NOTES

1 When the called side establishes the call using D-channel access, the message sequence will continue as from point <3> in Figure II.3.

2 If signalling link is not already established.

3 For packet call offering, the incoming call may be offered to the TA and a B-channel established using the procedure shown in Figures II.5 and II.7.

4 The network starts timer T320, if implemented.

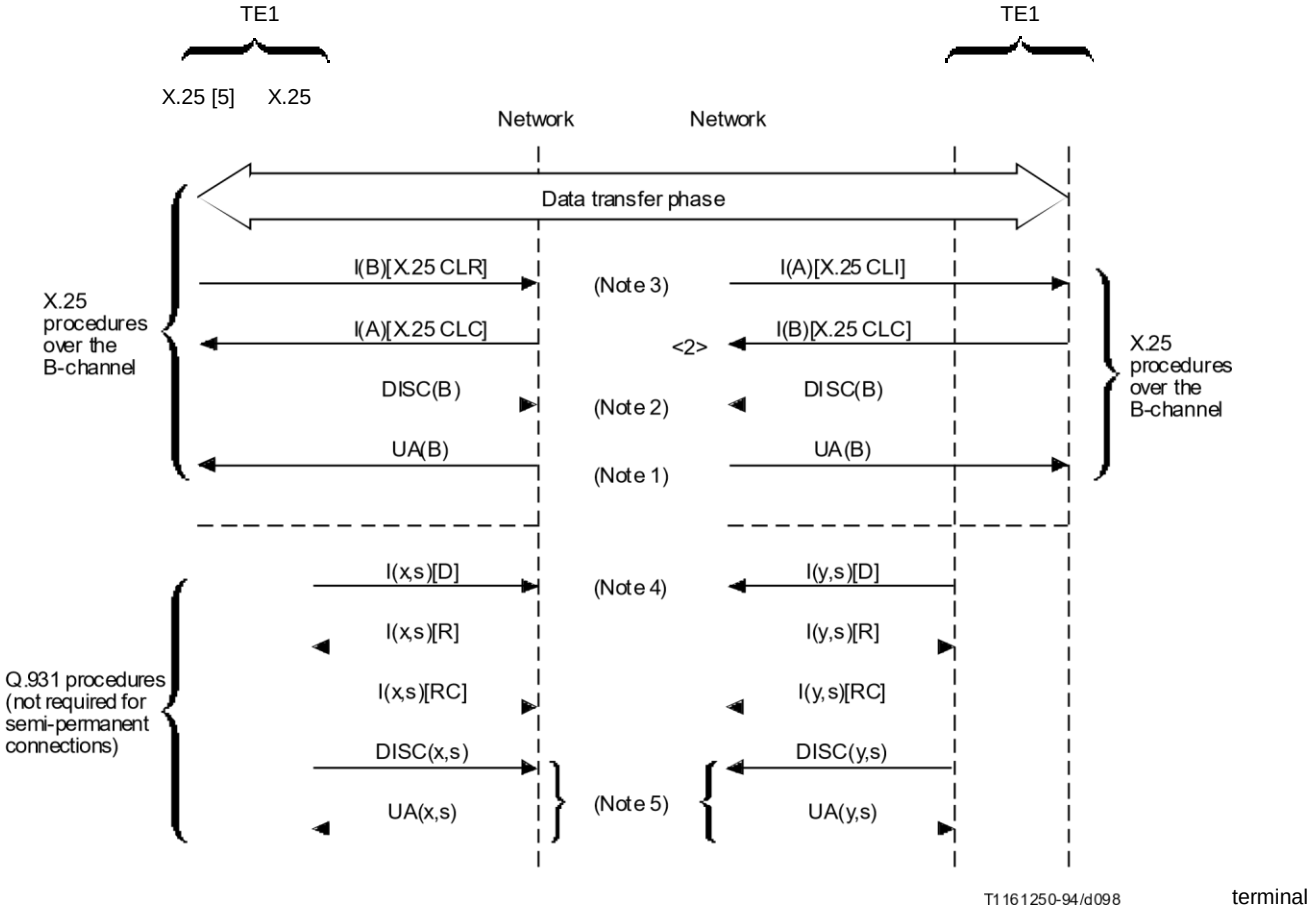
5 This message is optional.

6 The network cancels timer T320, if implemented and running.

7 The network establishes the Link Layer on the B-channel, if it is not already established as specified in 6.3.

FIGURE II.1/Q.931

Example message sequence for the ISDN virtual circuit service
B-channel access – First virtual call set-up in this channel



NOTES

1 When the cleared side has set up the call using D-channel access, the message sequence at the cleared side willbe as from point <4> in Figure II.4.

2 Clearing of the B-channel may be initiated by the network upon expiry of Timer T320, if implemented (see 6.4).

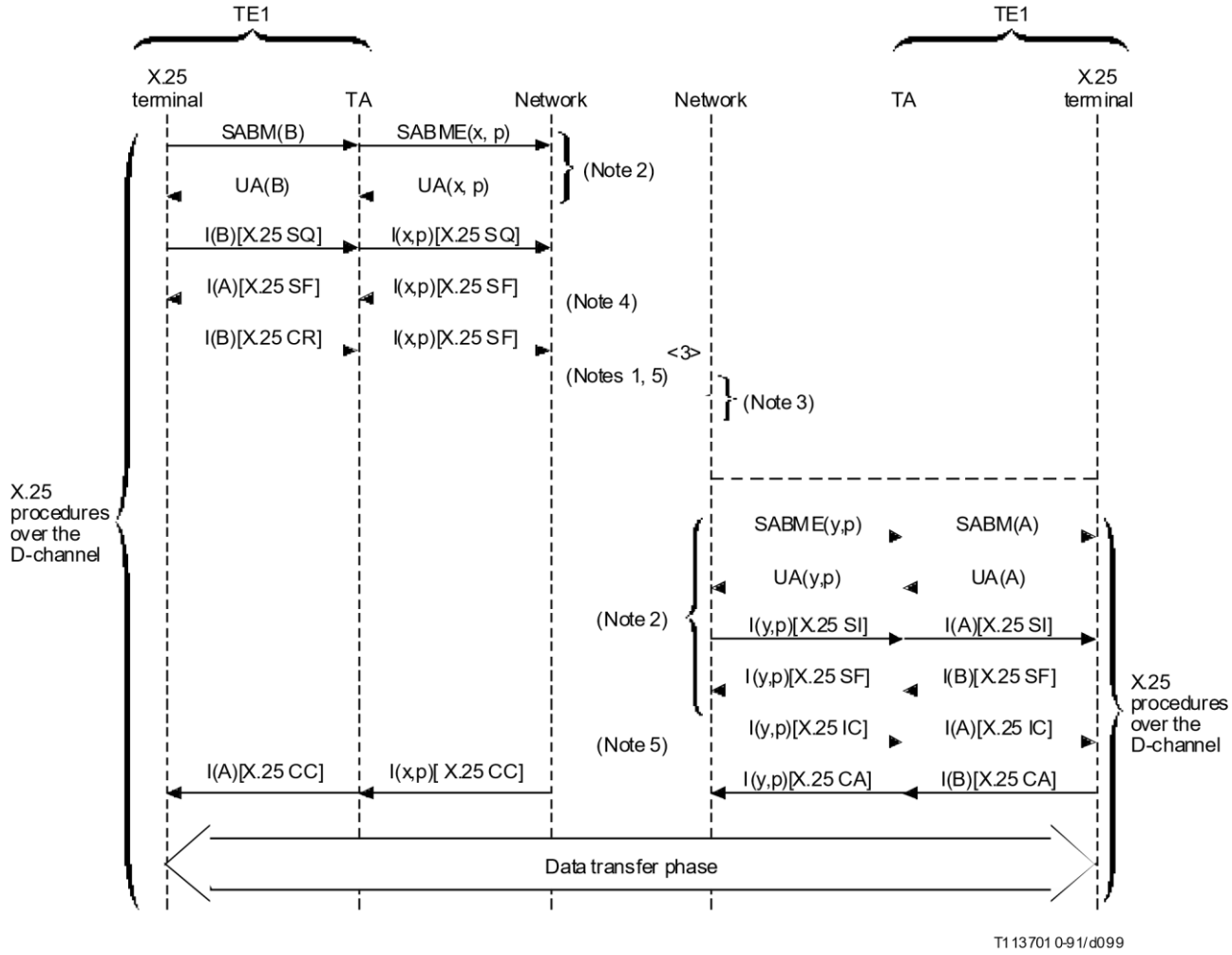
3 The network starts Timer T320, if implemented.

4 The network cancels Timer T320, if implemented and running.

5 This sequence is only required if the terminal does not wish to continue with further communication.

FIGURE II.2/Q.931

Example message sequence for the ISDN virtual circuit service
B-channel access – Last virtual call cleared in this channel



NOTES

1 When the called side establishes the call using B-channel access, the message sequence will continue as from point <1> in Figure II.1.

2 If SAPI 16 link is not already established.

3 The incoming call may be offered to the TA using the procedures shown in Figures II.5 and II.7.

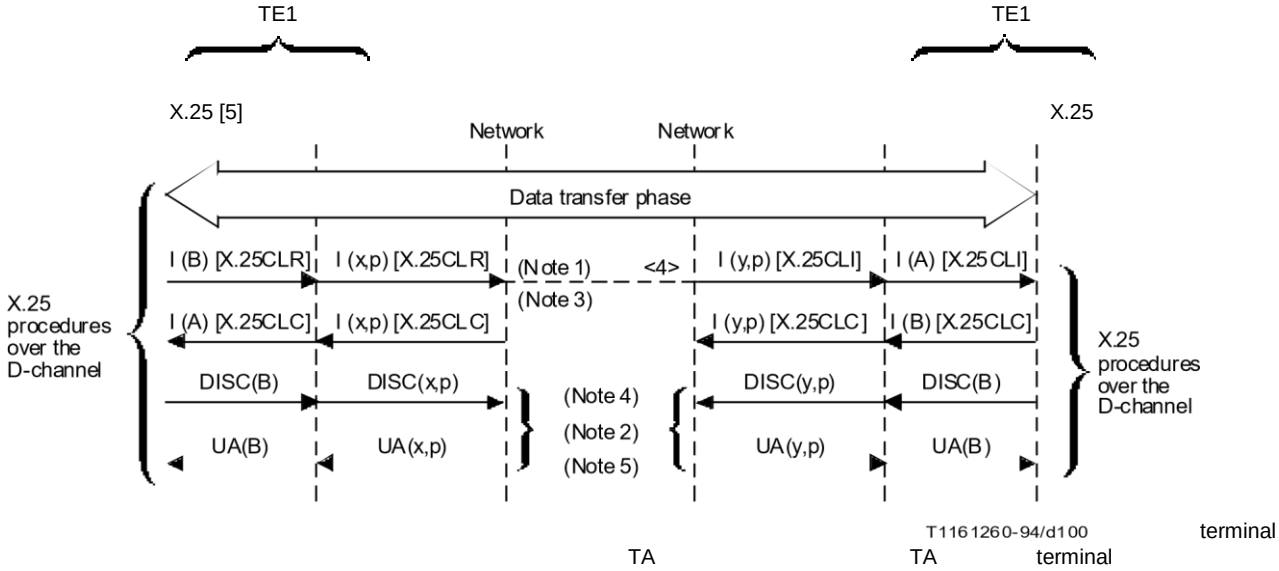
4 The network starts timer T320, if implemented.

5 The network cancels timer T320, if implemented and running.

6 Not shown in the diagram; is a possible X.25 restart procedure performed after link set-up.

FIGURE II.3/Q.931

Example message sequence for the ISDN virtual circuit service
D-channel access – First virtual call set-up in this SAPI = 16 link



NOTES

1 When the cleared side has set up the call using B-channel access, the message sequence at the clearedside will be as from point <2> in Figure II.2.

2 This sequence is only required if the X.25 DTE does not wish to continue with further communications.3

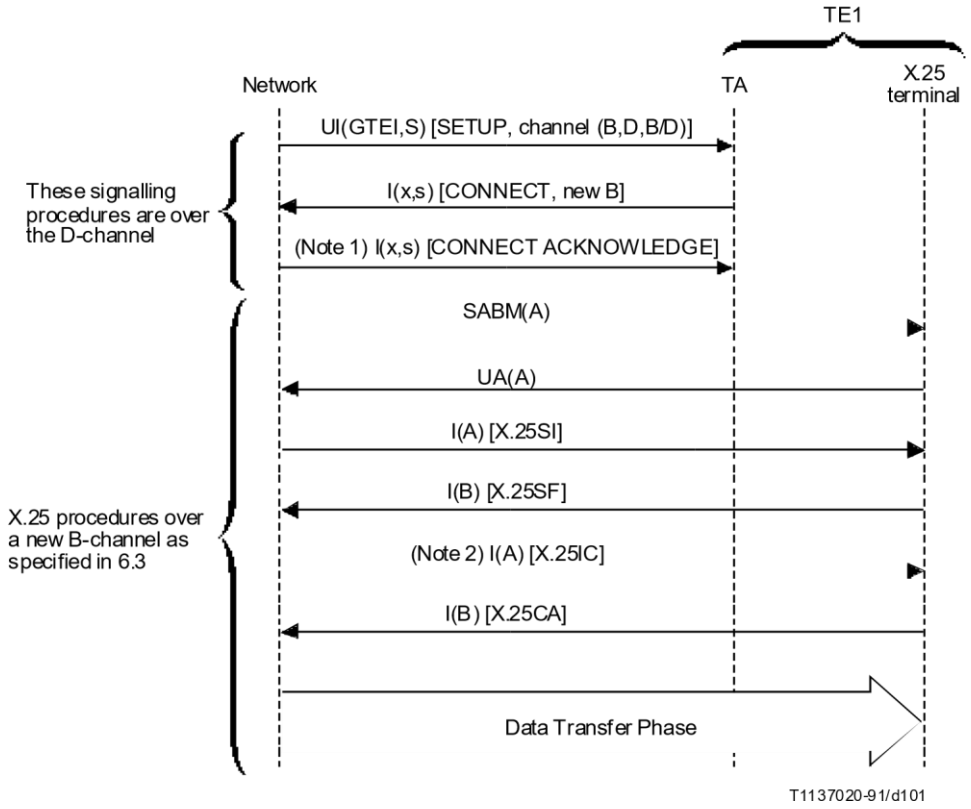
The network starts timer T320, if implemented.

4 The network cancels timer T320, if implemented and running.

5 Link layer release may be initiated by the network upon expiry of Timer T320, if implemented (see 6.4).

FIGURE II.4/Q.931

Example message sequence for the ISDN virtual circuit service
D-channel access – Last virtual call cleared in this SAPI = 16 link



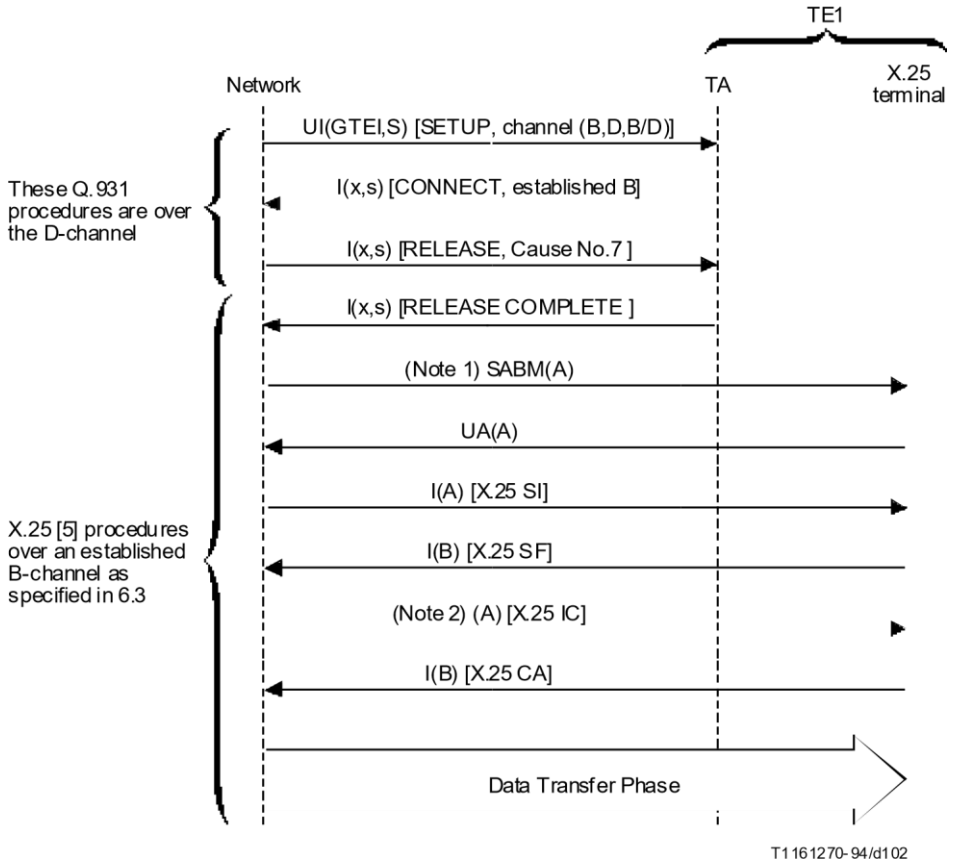
NOTES

1 The network starts Timer T320, if implemented.

2 The network cancels Timer T320, if implemented and running.

FIGURE II.5/Q.931

Example of incoming call offering procedures using signalling on SAPI = 0 link – Terminal accepts call on a new B-channel



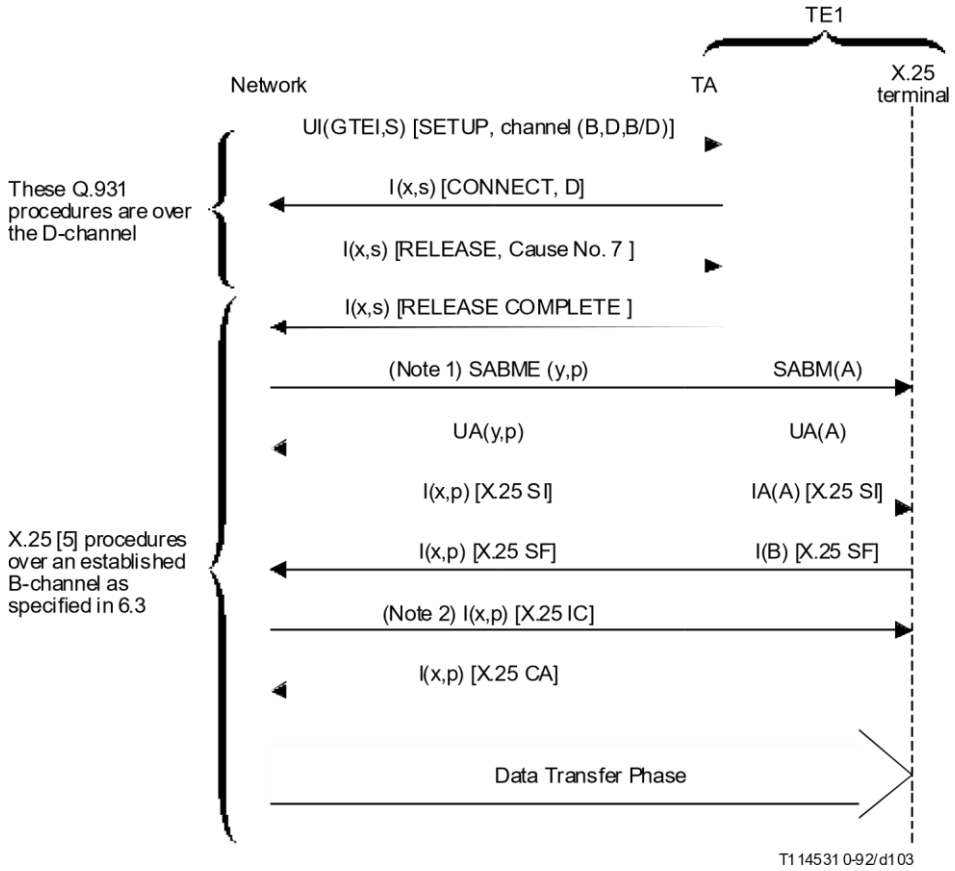
NOTES

1 The network establishes the link layer in the B-channel if it is not already established (see 6.3).

2 The network cancels Timer T320, if implemented and running.

FIGURE II.6/Q.931

Example of incoming call offering procedures using signalling on SAPI = 0 link – Terminal accepts call on an established B-channel



NOTES

1 The network establishes the link layer in the B-channel if it is not already established (see 6.3). The network starts Timer T320, if implemented.

2 The network cancels Timer T320, if implemented and running.

FIGURE II.7/Q.931

Example of incoming call offering procedures using signalling on SAPI = 0 link – Terminal accepts call on the D-channel

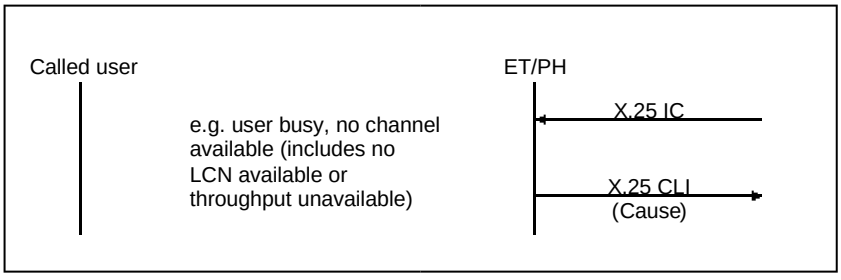
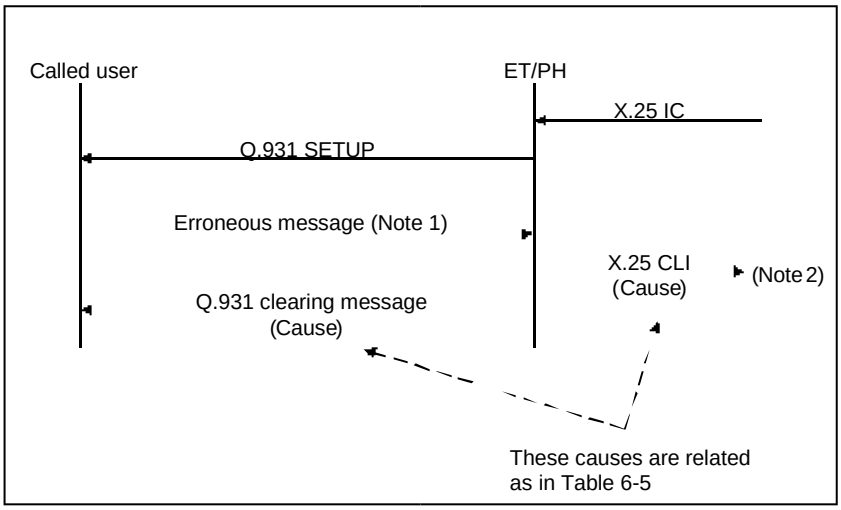


FIGURE II.8/Q.931

Undeliverable call



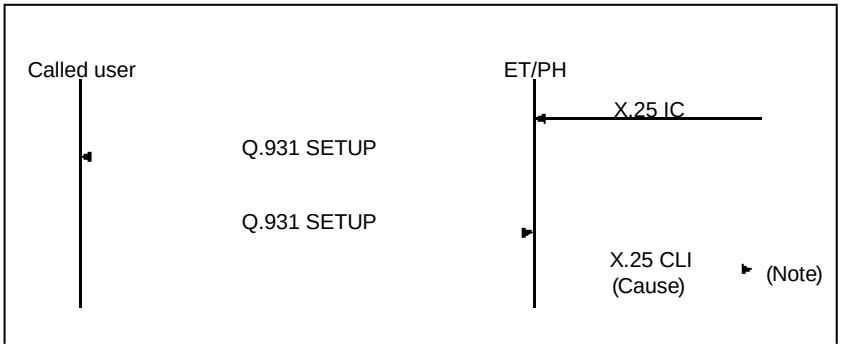
NOTES

1 This figure only applies to the case where the erroneous message results in aQ.931 clearing message. See 6.4.3 for more information.

2 This message would be sent after the expiry of timer T303 on a multipoint interface.

FIGURE II.9/Q.931

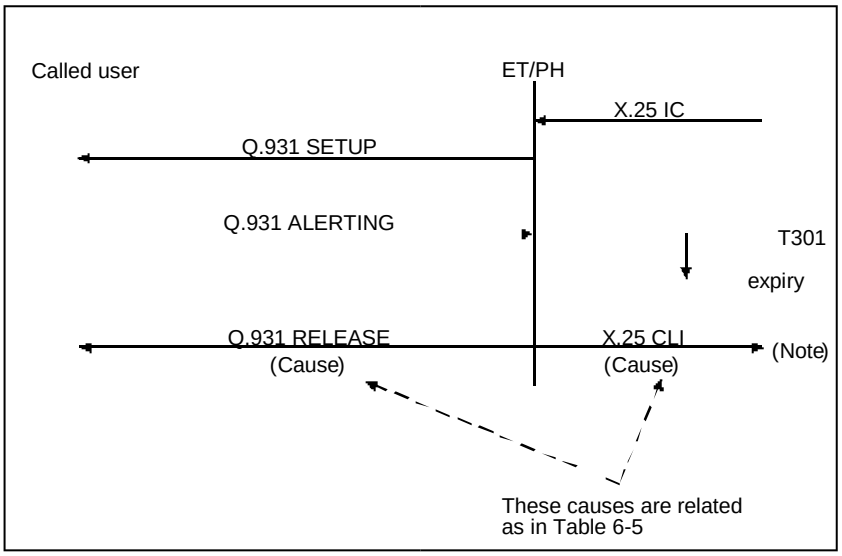
Erroneous message (e.g. format error)



NOTE – This message is sent after the second expiry of timer T303.

FIGURE II.10/Q.931

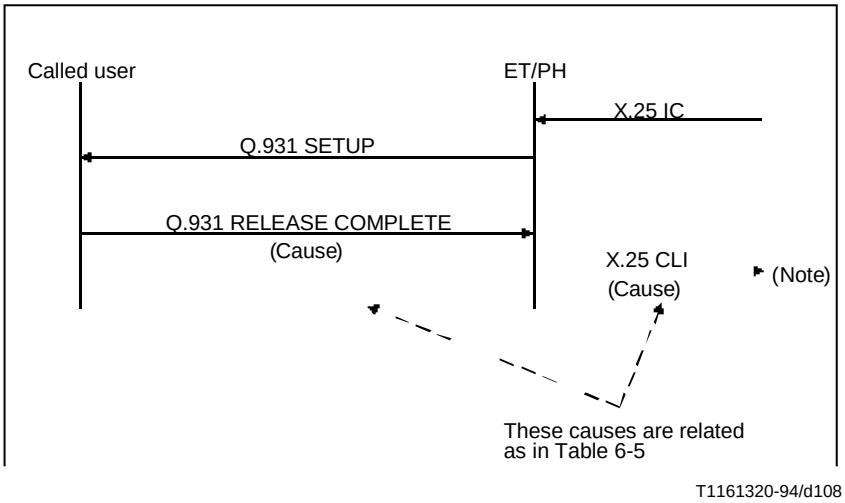
No responding user



NOTE – This message is sent after the expiry of timer T301.

FIGURE II.11/Q.931

Expiry of timer T301



NOTE – This message would be sent after the expiry of T303 when on a multipoint interface.

FIGURE II.12/Q.931

Call rejection by called party

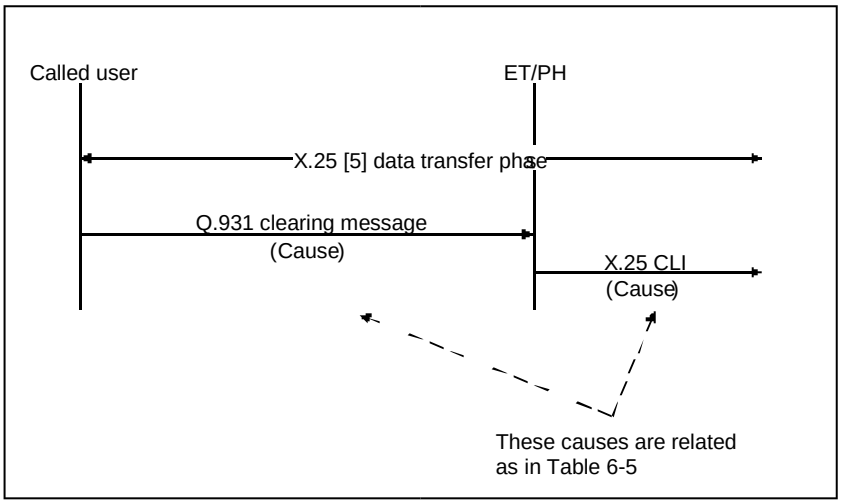
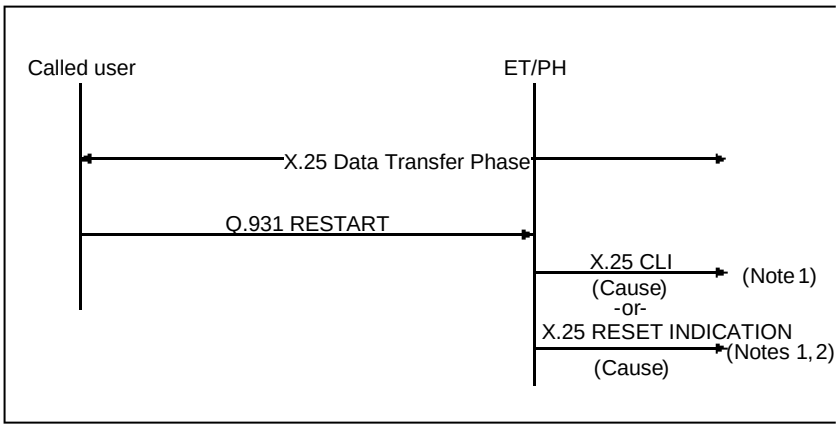


FIGURE II.13/Q.931

Q.931 clearing during X.25 data transfer phase



NOTES

1 This cause parameter in the X.25 packet will indicate “out of order” with diagnostic value 0.

2 For permanent virtual circuits only.

FIGURE II.14/Q.931

Q.931 RESTART during X.25 data transfer phase

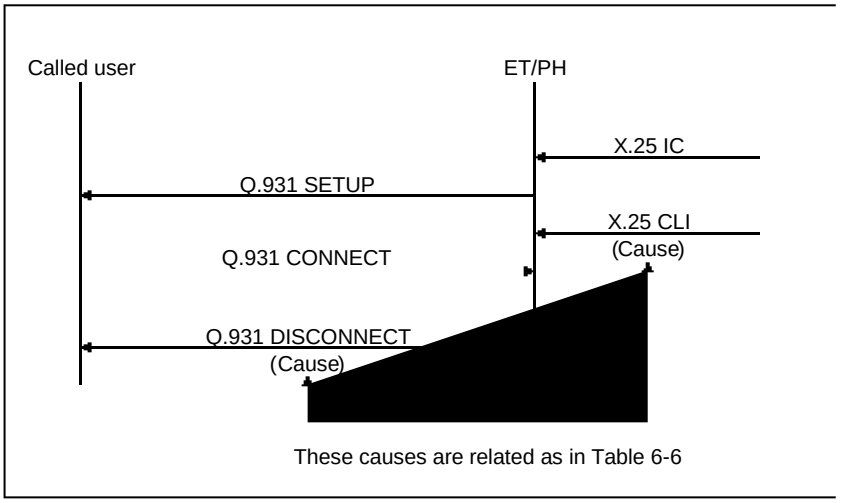
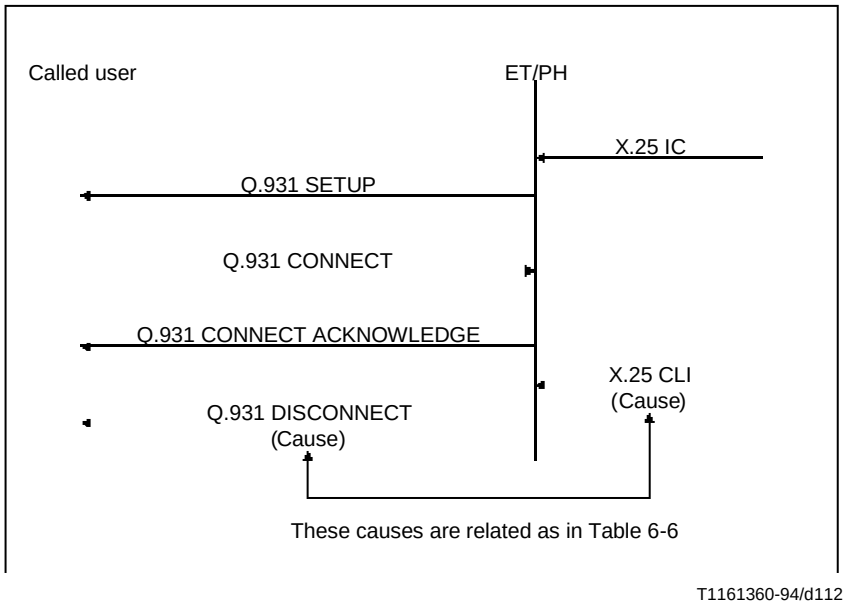


FIGURE II.15/Q.931

Premature clearing of the virtual call
(e.g. expiry of X.25 Timer T21)



NOTE – This is the case when an X.25 incoming call packet has NOT been delivered.

FIGURE II.16/Q.931

Premature clearing of the virtual call