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Integrated Services Digital Network (ISDN) – Data-Link Layer Signaling Specification for Application at the User-Network Interface

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Integrated Services Digital Network (ISDN) – Data-Link Layer Signaling Specification for Application at the User–Network Interface

1 Scope, purpose, and application

1.1 Scope and purpose

This standard specifies the Link Access Procedure on the D-channel, LAPD. The purpose of LAPD is to convey information between layer-3 entities across the ISDN user–network interface using the D-channel. LAPD is a protocol operating at the data-link layer of the OSI architecture. The frame structure, elements of procedure, format of fields, and procedures for the proper operation of LAPD are specified.

1.2 Application

This standard specifies the use of LAPD on a duplex, bit-transparent D-channel on an ISDN interface.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this American National Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

ITU-T Recommendation Q.920, *Digital Subscriber Signalling System No. 1 (DSS1) – ISDN user–network interface – General aspects* (3/93)[1)]

ITU-T Recommendation Q.921, *Digital Subscriber Signalling System No. 1 – ISDN user–network interface – Data link layer specification* (3/93)[1)]

3 Definitions, abbreviations, and acronyms

3.1 Definitions

3.1.1 ASCII (American Standard Code for Information Interchange): A 7-bit code for 128 alphanumeric and control characters for the general interchange of information among information processing systems, communications systems, and associated equipment, defined in ANSI X3.4.

3.1.2 B-channel: A 64-kbit/s channel accompanied by timing, intended to carry a wide variety of user information streams, such as voice encoded at 64 kbit/s, data information at bit rates less than or equal to 64 kbit/s, wide band voice encoded at 64 kbit/s, and voice encoded at bit rates less than 64 kbit/s alone or combined with other digital information streams.

[1)] Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036.

3.1.3 BRI (Basic Rate Interface): An ISDN user-network interface where the interface structure is composed of two B-channels and one D-channel, 2B+D. The bit rate of the D-channel in this structure is 16 kbit/s.

3.1.4 D-channel: A 16- or 64-kbit/s channel carrying control and signaling information and, optionally, packetized information and telemetry.

3.1.5 ISDN (Integrated Services Digital Network): Defined as a network, in general evolving from an existing telephony network, which provides end-to-end digital connectivity to support a wide range of both voice and non-voice services. User access to ISDN is via a limited set of standard multipurpose interfaces.

3.1.6 ITU-T (International Telecommunication Union – Telecommunication Standardization Sector): The ITU has been a specialized agency of the United Nations since 1948. As the oldest international treaty organization, it traces its formal beginnings to 1865. The ITU-T traces its formal beginnings to 1954, when its predecessor, the International Telegraph and Telephone Consultative Committee (CCITT) was founded for the purpose of promoting and ensuring the operation of international telecommunications systems.

3.1.7 Network or network-side: The system or equipment on one side of the ISDN user-network interface (basic rate or primary rate) that provides a port through which the user gains access to the telecommunication services offered by the ISDN.

3.1.8 PRI (Primary Rate Interface): An ISDN user-network interface where the interface structure is composed of multiple B-channels and one D-channel. The bit rate of the D-channel in this structure is 64 kbit/s. When a 1544-kbit/s primary rate interface is provided, the interface structure is 23B+D.

3.1.9 User or user-side: The call control in the user equipment that communicates to the network across the basic or primary rate interface.

3.2 Abbreviations and acronyms

AI	Action Indicator
ASP	Assignment source point
CEI	Connection endpoint identifier
CES	Connection endpoint suffix
C/R	Command/response field bit
DISC	Disconnect
DL-	Communication between Layer 3 and the data link layer
DLCI	Data link connection identifier
DM	Disconnected mode
EA	Extended address field
ET	Exchange termination
FCS	Frame check sequence
FRMR	Frame reject
I	Information
ID	Identity
L1	Layer 1
L2	Layer 2
L3	Layer 3
LAPB	Link access procedure – balanced
LAPD	Link access procedure on the D-channel
M	Modifier function bit
MDL-	Communication between the management entity and the data link layer
MPH-	Communication between system management and the physical layer
N(R)	Receive sequence number
N(S)	Send sequence number
NT	Network Termination

OSI	Open systems interconnection
P/F	Poll/final bit
PH-	Communication between the data link layer and the physical layer
RC	Retransmission counter
REC	Receiver
REJ	Reject
Ri	Reference number
RNR	Receiver not ready
RR	Receiver ready
S	Supervisory or Supervisory function bit
SABME	Set asynchronous balanced mode
SAP	Service access point
SAPI	Service access point identifier
TE	Terminal Equipment
TEI	Terminal Equipment Identifier
TX	Transmit
U	Unnumbered
UA	Unnumbered acknowledgment
UI	Unnumbered information
V(A)	Acknowledge state variable
V(M)	Recovery state variable
V(R)	Receive state variable
V(S)	Send state variable
XID	Exchange identification

4 Requirements

The American National Standard for signaling at the data link layer shall be the 1993 ITU-T Recommendations Q.920 and Q.921, with the changes and additions specified in clause 5.

5 Changes to ITU-T recommendation Q.921 (3/93)

The following changes and additions to the ITU-T recommendation Q.921 shall apply to all equipment conforming to ANSI T1.602:

1) On page 12 of Q.921, item a) under paragraph 1 of clause 3.6.11 shall be modified to read:

   a) the receipt of a command or response control field that is undefined **or not implemented.**

2) On page 13 of Q.921, note 5 under figure 6/Q.921 shall be modified to read:

   5 W set to 1 indicates that the control field received and returned in octets 5 and 6 was undefined **or not implemented.**

3) On page 22 of Q.921, in item b) of paragraph 2 of clause 5, the note associated with the FRMR shall be modified to read:

   NOTE – On receipt of this frame action according to 5.8.6 of this specification shall be taken.

4) On page 33 of Q.921, paragraph 10 of clause 5.5.1.2 shall be modified to read:

   If the data link layer entity is unable to enter the multiple-frame-established state, it shall respond with a DM response with the F bit set to the same binary value as the P bit in the received SABME command**, except in cases where the data link layer entity is unable to enter the multiple-frame-established state due to D-channel backup procedures, in which case the data link layer entity may optionally ignore the SABME command.**

5) On page 38 of Q.921, item ii) under paragraph 4 of clause 5.6.5 shall be modified to read:

   ii) if it is already in a timer recovery condition, **add one to its retransmission count variable, and** continue as indicated below.

6) On page 38 of Q.921, item a) under paragraph 5 shall be modified to read:

   a) if the value of the retransmission count variable is less than N200:

      – transmit an appropriate supervisory command (see note 2) with a P bit set to 1;

      – restart T200; and

7) On page 40 of Q.921, paragraph 2 of clause 5.6.7 shall be modified to read:

If timer T200 expires, the data link entity shall:

– if it is not in the timer recovery condition, enter the timer recovery condition and reset the retransmission count variable;

– if it is already in the timer recovery condition, **add one to its retransmission count variable, and** continue as indicated below.

8) On page 40 of Q.921, item a) under paragraph 3 of clause 5.6.7 shall be modified to read:

a) if the value of the retransmission count variable is less than N200:

– restart T200; and either

– transmit an appropriate supervisory command (see note 2 in 5.6.5) with a P bit set to 1; or

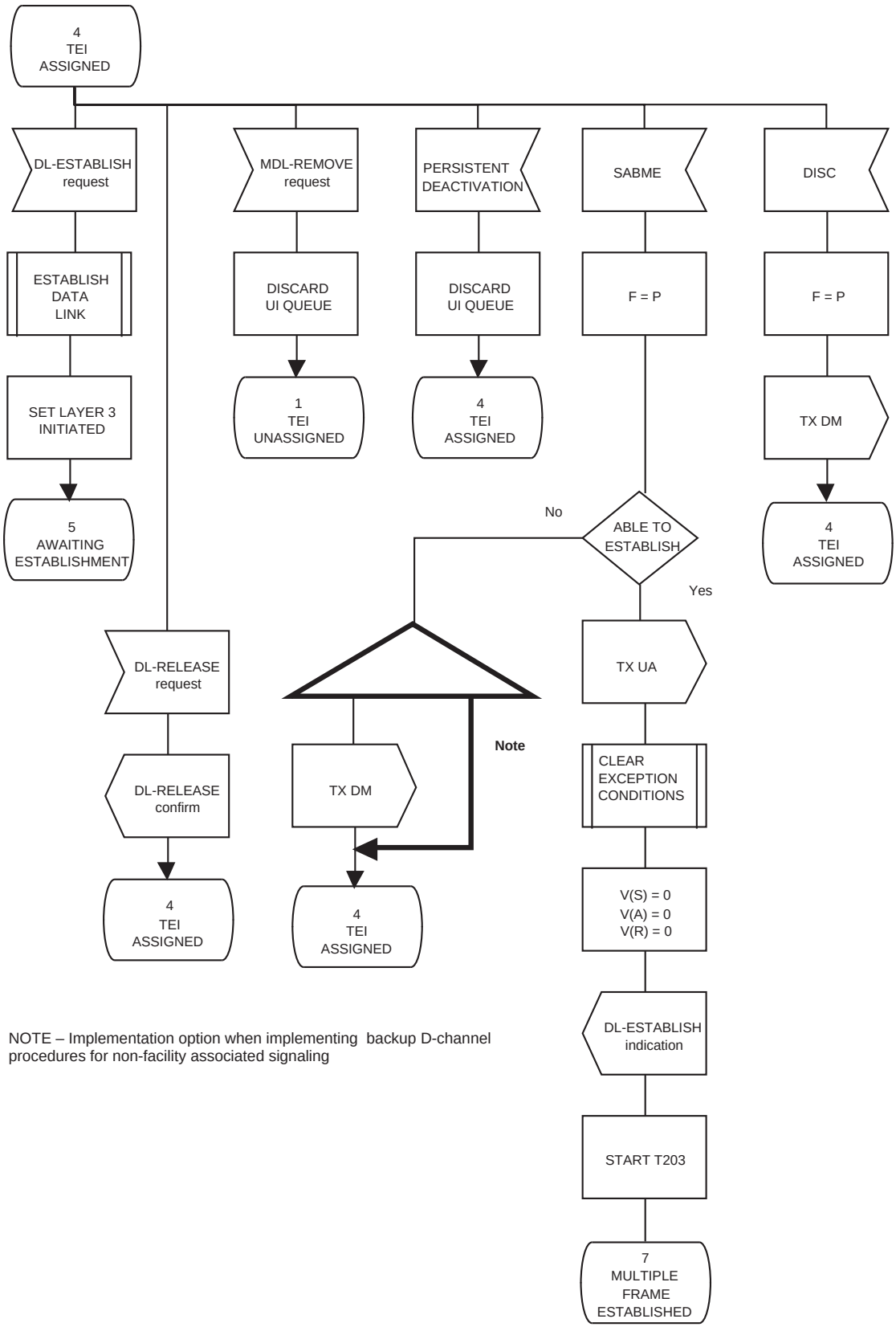
– retransmit the last transmitted I frame [V(S) - 1] with the P bit set to 1; or

9) On page 42 of Q.921, item a) under paragraph 1 of clause 5.8.5 shall be modified to read:

a) the receipt of an undefined **or unimplemented** frame (see 3.6.1, third paragraph);

10) Annexes A, B, C, D, and E are informative and are not an integral part of this recommendation.

11) On page 54 of Q.921, the SDL in figure B.4/Q.921 (sheet 1 of 2) shall be replaced with the SDL shown in Figure 1.



NOTE – Implementation option when implementing backup D-channel procedures for non-facility associated signaling

Figure 1 – Replacement for figure B.4/Q.921 (sheet 1 of 2)

Annex A
(informative)

Bibliography

ANSI X3.4-1986, *Information systems – Coded character sets – 7-bit American National Standard code for information interchange (7-bit ASCII)*