INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

X.222
Amendment 1
(10/96)

SERIES X: DATA NETWORKS AND OPEN SYSTEM COMMUNICATION

Open System Interconnection – Connection-mode protocol specifications

Use of X.25 LAPB-compatible data link procedures to provide the OSI connection-mode data link service

Amendment 1: Frame relay mapping

ITU-T Recommendation X.222 – Amendment 1

(Previously CCITT Recommendation)

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FOREWORD

The ITU-T (Telecommunication Standardization Sector) is a permanent organ of the International Telecommunication Union (ITU). The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1 (Helsinki, March 1-12, 1993).

Amendment 1 to ITU-T Recommendation X.222 was prepared by ITU-T Study Group 7 (1993-1996) and was approved under the WTSC Resolution No. 1 procedure on the 5th of October 1996.

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NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

SUMMARY

Recommendation X.222 defines a method for providing the OSI Connection-mode Data Link Service (CO-DLS) specifying the detailed mapping between the CO-DLS and X.25/LAPB-compatible, DTE single link procedures as described in Recommendation X.25 and between detailed mappings between CO-DLS and the LAPF procedures described in Recommendation Q.922 in frame relay environments.

Amendment 1 to Recommendation X.222

USE OF X.25 LAPB-COMPATIBLE DATA LINK PROCEDURES
TO PROVIDE THE OSI CONNECTION-MODE DATA LINK SERVICE

(Former title 1995)

AMENDMENT 1

Frame relay mapping

(Geneva, 1996)

1)   *Replace the title of Recommendation X.222 (1995) with the following:*

USE OF X.25 LAPB-COMPATIBLE DATA LINK PROCEDURES
OR PROCEDURES DEFINED IN RECOMMENDATION Q.222
TO PROVIDE THE OSI CONNECTION-MODE DATA LINK SERVICE

2)   *Clause 1, replace the two paragraphs with the following:*

This Recommendation defines a method for providing the OSI Connection-mode Data Link Service (CO-DLS) through the use of the X.25 LAPB-compatible DTE data link procedures as described in Recommendations X.25 (abbreviated to X.25/LAPB, for the remainder of this Recommendation) or through the use of LAPF procedures defined in Recommendation Q.922 in Frame Relay environments.

This Recommendation specifies the detailed mappings between the CO-DLS and X.25/LAPB-compatible, DTE single link procedures as described in Recommendation X.25 and between CO-DLS and the LAPF procedures described in Recommendation Q.922 in Frame Relay environments.

3)   Not applicable.

4)   *Subclause 2.1, replace with the following:*

   –   ITU-T Recommendation X.200 (1994) | ISO/IEC 7498-1:1994, *Information technology – Open Systems Interconnection – Basic Reference Model: The Basic Model.*

   –   ITU-T Recommendation X.210 (1993) | ISO/IEC 10731:1994, *Information technology – Open Systems Interconnection – Basic Reference Model: Conventions for the definition of OSI services.*

   –   ITU-T Recommendation X.212 (1995) | ISO/IEC 8886:1996, *Information technology – Open Systems Interconnection – Data link service definition.*

5)   *Subclause 2.2, delete this subclause in its entirety and renumber 2.3 as 2.2.*

6)   *New subclause 2.2, replace with the following:*

–   ITU-T Recommendation X.25 (1996), *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.*

–   CCITT Recommendation Q.922 (1992), *ISDN data link layer specification for frame mode bearer services.*

–   CCITT Recommendation I.233 (1992), *Frame Mode Bearer Services.*

7)   *Clause 3, insert the following as the third paragraph:*

This Recommendation uses the following terms defined in Recommendation Q.922:

–   LAPF;

–   Link Release.

8)   *Clause 4, insert the following abbreviations, by alphabetical order:*

LAPF   Link Access Protocol – Frame Mode

SM   Set Mode

9)   *Subclause 5.1, replace the third paragraph with the following:*

When real equipment is considered, a data link consists of two Data Link Entities communicating according to X.25 LAPB-compatible protocol or according to Q.922 LAPF protocol, together with the interconnecting media supporting information exchange among the Data Link Entities.

10)   *Subclause 5.2, replace the first paragraph with the following:*

Primitives are abstractions of the behaviour of real systems engaging in data communication; in specifying the mapping between these abstract primitives and the activity of real implementations of DL-protocol entities, this allows freedom in modelling the timing of when primitives occur, so as to simplify the mapping specification.

11)   *Subclause 5.3, second paragraph, second sentence, replace with the following:*

For each mapping, the correspondence is between the DLSDU of a DL-DATA primitive and the basic delimited unit of data transfer in the protocol; that is, the contents of the Information field of a single frame conveying user data.

12)   *Clause 6, replace the heading of clause 6 with the following:*

Protocol mapping for X.25 LAPB single link procedure and/or Q.922 LAPF procedures

13)   *Subclause 6.1, first paragraph, add the following sentence at the end:*

Recommendation Q.922 supports multiplexing; however, Recommendation X.222 deals with only one DL connection between two DLSAPs.

14)   *Subclause 6.1, second paragraph, replace with the following:*

Table 1 specifies the mapping between the principal protocol functions of X.25 LAPB-SLP or Q.922 LAPF and the corresponding features of the OSI CO-DLS.

15)   *Subclause 6.1, replace the caption of Table 1 with the following:*

Mapping between principal X.25 LAPB or Q.922 LAPF protocol functions and CO-DLS features

16)   *Subclause 6.2, replace the first paragraph with the following:*

Table 2 specifies the mapping between DL-CONNECT primitives and the frames used for link set-up according to X.25 LAPB or Q.922 LAPF.

17)   *Subclause 6.2, replace Table 2 with the following:*

**Mapping between primitives and X.25 LAPB or Q.922 LAPF frames
at DLC establishment**

Primitive	Frame
DL-CONNECT request	SABM (X.25 LAPB), SABME (X.25 LAPB or Q.922 LAPF) or SM (X.25 LAPB) command transmitted when in disconnected mode, together with any retransmissions on time expiry.
DL-CONNECT indication	SABM (X.25 LAPB), SABME (X.25 LAPB or Q.922 LAPF), or SM (X.25 LAPB) command received when in disconnected mode.
DL-CONNECT response	UA response transmitted in response to SABM (X.25 LAPB), SABME (X.25 LAPB or Q.922 LAPF) or SM (X.25 LAPB) command received in disconnected mode.
DL-CONNECT confirm	UA response received for SABM (X.25 LAPB), SABME (X.25 LAPB or Q.922 LAPF) or SM (X.25 LAPB) command (re)transmitted in disconnected mode.

18)   *Subclause 6.3, first paragraph, replace with the following:*

Table 3 specifies the mapping between DL-DISCONNECT primitives and the frames used for link disconnection/release according to X.25 LAPB or Q.922 LAPF.

19)   *Subclause 6.3, replace Table 3 with the following:*

**Mapping between primitives and X.25 LAPB or Q.922 LAPF frames,
or events, at DLC release**

Primitive	Frame, etc.
DL-DISCONNECT request	DISC command transmitted when in information transfer phase, together with any retransmissions on timer expiry.
	DM response transmitted in response to SABM (X.25 LAPB), SABME (X.25 LAPB or Q.922 LAPF), or SM (X.25 LAPB) command received in disconnected mode (reception of DLC establishment).
DL-DISCONNECT indication	DISC command or DM response received when in information transfer phase.
	DM response received for SABM (X.25 LAPB), SABME (X.25 LAPB or Q.922 LAPF) or SM (X.25 LAPB) command (re)transmitted in disconnected mode (rejection of DLC establishment).
	DM response transmitted during information transfer phase (in response to received FRMR or unsolicited UA response, or to unsolicited response frame with F bit set to 1), together with any retransmissions on timer expiry.
	Entry to disconnected mode on retransmission-count expiry during information transfer phase or link set-up.
	Detection of loss of physical layer communication.

20)   *Subclause 6.4, first paragraph, replace the first sentence with the following:*

Each DL-DATA request primitive maps to transmission of an I-frame, together with any retransmissions required by the X.25 LAPB or Q.922 LAPF procedures for information transfer.

21)   *Subclause 6.5, first paragraph, replace with the following:*

Table 4 specifies the mapping between DL-RESET primitives and the frames used for link reset according to X.25 LAPB or Q.922 LAPF procedures.

22)   *Subclause 6.5, second paragraph, items a) and b), replace with the following:*

    a)   "DLS provider" and "Data Link error" if the primitive corresponds to an FRMR response transmitted or received, or to an SABM (X.25 LAPB), SABME (X.25 LAPB or Q.922 LAPF) or SM (X.25 LAPB) command transmitted by the DL-entity in response to an error, or

    b)   "unknown" and "reason unspecified" when the primitive corresponds to an SABM (X.25 LAPB), SABME (X.25 LAPB or Q.922 LAPF) or SM (X.25 LAPB) command received.

23)   *Subclause 6.5, Table 4, replace with the following:*

**Mapping between primitives and X.25 LAPB or Q.922 LAPF frames
for DLC reset/release**

Primitive	Frame
DL-RESET request	SABM (X.25 LAPB), SABME (X.25 LAPB or Q.922 LAPF) or SM (X.25 LAPB) command transmitted (Note 1).
DL-RESET indication	SABM (X.25 LAPB), SABME (X.25 LAPB or Q.922 LAPF) or SM (X.25 LAPB) command received (Note 1). SABM (X.25 LAPB), SABME (X.25 LAPB or Q.922 LAPF) or SM (X.25 LAPB) command transmitted on receiving unsolicited response frame with F bit set to 1 (Note 1). FRMR response received (Note 1). FRMR response transmitted on entry to frame rejection exception condition (Note 1).
DL-RESET response (Note 2)	Following a DL-RESET indication: UA response transmitted or received, as appropriate, to complete a link reset. Time-out waiting for UA response, after sending UA response to a colliding SABM (X.25 LAPB), SABME (X.25 LAPB or Q.922 LAPF) or SM (X.25 LAPB) command received.
DL-RESET confirm (Note 2)	Following a DL-RESET request: same mapping as for DL-RESET response.

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