TECHNICAL REPORT

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Information technology — Telecommunications and information exchange between systems — List of standard data link layer protocols that utilize high-level data link control (HDLC) classes of procedures and list of standardized XID format identifiers and private parameter set identification values

Technologies de l'information — Télécommunications et échange d'information entre systèmes — Liste de protocoles normalisés pour la couche liaison de données employant des classes de procédures de commande de liaison de données à haut niveau (HDLC) et liste d'identificateurs normalisés de format XID et jeu privé de paramètres de valeurs d'identification

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Contents

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

The main task of technical committees is to prepare International Standards. In exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

— type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;

— type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;

— type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/IEC TR 10171, which is a Technical Report of type 3, was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology,* Subcommittee SC 6, *Telecommunications and information exchange between systems.*

Introduction

The HDLC classes of procedures have been utilized in a number of International Standards and ITU-T (formally CCITT) Recommendations as the basis for specific data link layer protocol specifications. This Technical Report provides an indication of the class of procedures and optional functions used in the realization of each designated data link layer protocol. The protocols covered include:

- ISO/IEC 7776
- ISO/IEC 8802-2 LLC type 1 and type 2
- ITU-T Recommendation G.764
- ITU-T Recommendation Q.921 (I.441) LAPD
- ITU-T Recommendation T.90
- ITU-T Recommendation V.42
- ITU-T Recommendation V.120
- ITU-T Recommendations X.25/X.32
- ITU-T Recommendation X.25 LAPB
- ITU-T Recommendation X.75 SLP

Table 1 in clause 4 of this Technical Report lists these protocols, indicates the basic class of procedures used, and identifies the standard optional functions used to realize the specific data link layer protocol. The footnotes following table 1 provide additional explanation concerning the application of the optional function identified.

As additional standard usages of the HDLC classes of procedures are identified, this Technical Report will be updated. The Technical Report will serve as the repository of record of applications of the HDLC concepts, principles and classes of procedures in the realization of standard data link layer protocols.

This Technical Report also serves as the repository of record for the XID format identifiers and private parameter set identifiers defined in ISO/IEC 8885, as amended.

Information technology — Telecommunications and information exchange between systems — List of standard data link layer protocols that utilize high-level data link control (HDLC) classes of procedures and list of standardized XID format identifiers and private parameter set identification values

1 Scope

This Technical Report lists the standard data link layer protocols that utilize HDLC based classes of procedures as defined in ISO/IEC 7809 in their realization. The list indicates the basic repertoire (i.e. class of procedures) used plus the optional functions employed.

This Technical Report lists the standardized XID information field format identifiers. The list identifies the source document as well as describing the characteristics of the information provided.

This Technical Report lists the standardized private parameter set identification values, as well as indicating the source and use of the private parameter

Note – With the exception of ISO 7776 and ITU-T X.25 LAPB, which are designed to be complementary, the protocols listed do not interwork. (There are differences in the usage of certain functions by different protocols.)

2 References

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.*

ISO/IEC 7809:1993, *Information technology – Telecommunications and information exchange between systems – High-level data link control (HDLC) procedures – Classes of procedures.*

ISO 8802-2:1989, *Information processing systems – Local area networks – Part 2: Logical link control.*

ISO/IEC 8885:1993, *Information technology – Telecommunications and information exchange between systems – High-level data link control (HDLC) procedures – General purpose XID frame information field content and format.*

ITU-T Recommendation G.764, *Voice packetization - Packetized voice protocol*

ITU-T Recommendation Q.921 (I.441), *ISDN user-network interface - Data link layer specification*

ITU-T Recommendation T.90, *Characteristics and protocol for terminals for telematic services in ISDN*

ITU-T Recommendation V.42, *Error-correcting procedures for DCEs using asynchronous to synchronous conversion*

ITU-T Recommendation V.42bis, *Data Compression procedures for DCEs using error correcting procedures.*

ITU-T Recommendation V.120, *Support by an ISDN of data terminal equipment with V-series type interfaces with provision for statistical multiplexing*

ITU-T 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*

ITU-T 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*

ITU-T Recommendation X.75, *Terminal and transit call control procedures and data transfer system on international circuits between packet-switched data networks: Link layer procedures between signalling terminals*

Note - Further study is required to determine the applicability of including ITU-T Recommendations T.30, T.70, T.71. and Signalling System No.7 Link Layer Recommendations in this Technical Report.

3 Abbreviations

CCITT	International Telegraph and Telephone Consultative Committee
DCE	Data Circuit-terminating Equipment
DTE	Data Terminal Equipment
FCS	Frame Check Sequence
HDLC	High-level Data Link Control
I	Information
ISDN	Integrated Services Digital Network
ITU-T	International Telecommunication Union Telecommunication Standardization Sector (formally CCITT)
LAPB	Link Access Procedures Balanced
LAPD	Link Access Protocol on the D-Channel
LAPM	Link Access Protocol for Modems
LLC	Logical Link Control
MAC	Medium Access Control
OSI	Open Systems Interconnection
RD	Request Disconnect
REJ	REJect
RSET	ReSET
RIM	Request Initialization Mode
SIM	Set Initialization Mode
SLP	Single Link Procedures
SREJ	Selective REJect
UI	Unnumbered Information
UP	Unnumbered Polling
XID	eXchange IDentification

4 List of Data Link Layer protocols using HDLC classes of procedures

Table 1 lists the data link layer protocols, indicates the basic class of procedures used, and identifies the standard optional functions used to realize the specific data link layer protocol. The footnotes following table 1 provide additional explanation concerning the application of the optional function identified.

5 Standardized XID information field format identifiers

Table 2 lists the format identifier values for the standardized XID formats that were identified at the time of publication of this Technical Report. The source document for each is shown, and a brief statement of the characteristics of each format is given.

6 Parameter identifiers for private parameter negotiation subfields

ISO/IEC 8885 defines a private parameter data link layer subfield within the XID information field. This subfield provides for the negotiation of private parameters, which include implementation-specific data link layer parameters supported by users, manufacturers, or standards committees desiring to use single-XID-exchange negotiation procedures to unambiguously negotiate private parameters.

Each private parameter negotiation subfield must contain a Parameter Set Identification value, which is associated with the Parameter Identifier of value zero (i.e., PI = 0). These Parameter Set Identification values are determined by prior agreement, and are not a subject of ISO/IEC 8885, as amended.

In order to provide an easily up-dated repository to record those Parameter Set Identification values that have been selected by standards committees (as differentiated from those selected by users or manufacturers), table 3 lists the values that were identified at the time of publication of this Technical Report. Further information on each identified parameter set may be found in the referenced source document. Additional entries for table 3 should be made known to ISO/IEC JTC1/SC6/WG1 for publication in the next revision of this Technical Report.

Table 1 - Applications of HDLC Classes of Procedures

		ISO/IEC 7776	ISO 8802-2 LLC[1] type 1	ISO 8802-2 LLC[1] type 2	ITU-T G.764[11]	ITU-T Q.921 (I.441) LAPD	ITU-T T.90 LAPX
Fundamental class of procedures							
UNC - Unbalanced operation normal response mode class							
UAC - Unbalanced operation asynchronous response mode class							
BAC - Balanced operation asynchronous balanced mode class		X[9]		X		X	X
UCC - Unbalanced operation Connectionless-mode class							
BCC - Balanced operation Connectionless-mode class			X		X		
Optional function							
1 - Add command/response:	XID		X			O[12]	O[12]
2 - Add command/response:	REJ	X		X		X	X
3.1 - Add command/response: For single individual frame retransmission	SREJ						
3.2 - Add command/response: Use multi-selective reject option	SREJ						
4 - Add command/response:	UI		X[3]		X	X[3]	
5 - Add command:	SIM						
- Add response:	RIM						
6 - Add command:	UP						
7 - Use extended addressing format instead of basic addressing format			X[4]	X[4]	X	X	
8 - Delete response:	I	X				X	X
9 - Delete command:	I						
10 - Use extended control field format instead of basic control field format		O[5]		X		X	O
11 - Add command:	RSET						
12 - Add command/response:	TEST		X				
13 - Add response:	RD						
14 - Use the 32-bit FCS instead of the 16-bit FCS			O[7]	O[7]			
15.1 - Use start/stop transmission with basic transparency instead of synchronous transmission							
15.2 - Use start/stop transmission with basic transparency and flow-control transparency instead of synchronous transmission							
15.3 - Use start/stop transmission with basic transparency and control-character octet transparency instead of synchronous transmission							
16 - Use seven bit transparency							

Key to table Blank: Not used O: Optionally used X: Used

Table 1 (Continued)

Table 1 – Applications of HDLC Classes of Procedures (concluded)

		ITU-T V.42 LAPM	ITU-T V.120	ITU-T X.25 LAPB	ITU-T X.25/ X.32[10]	ITU-T X.75 SLP
Fundamental class of procedures						
UNC - Unbalanced operation normal response mode class UAC - Unbalanced operation asynchronous response mode class BAC - Balanced operation asynchronous balanced mode class UCC - Unbalanced operation Connectionless-mode class BCC - Balanced operation Connectionless-mode class		X	X	X	X	X[2]
Optional function						
1 - Add command/response:	XID	X[12]			O[12]	
2 - Add command/response:	REJ	X		X	X	X
3.1 - Add command/response: For single individual frame retransmission	SREJ	O				
3.2 - Add command/response: Use multi-selective reject option	SREJ					
4 - Add command/response:	UI	X	X			
5 - Add command:	SIM					
- Add response:	RIM					
6 - Add command:	UP					
7 - Use extended addressing format instead of basic addressing format		O	X			
8 - Delete response:	I	X		X	X	X
9 - Delete command:	I					
10 - Use extended control field format instead of basic control field format		X	X	O[6]	O[6]	O
11 - Add command:	RSET					
12 - Add command/response:	TEST	O				
13 - Add response:	RD					
14 - Use the 32-bit FCS instead of the 16-bit FCS		O[8]				
15.1 - Use start/stop transmission with basic transparency instead of synchronous transmission						
15.2 - Use start/stop transmission with basic transparency and flow-control transparency instead of synchronous transmission						
15.3 - Use start/stop transmission with basic transparency and control-character octet transparency instead of synchronous transmission						
16 - Use seven bit transparency						

Key to table Blank: Not used O: Optionally used X: Used

NOTES associated with table 1 -

1 Frame delimiting is not provided by flags, but at the MAC sublayer.
2 For an interim period some networks use a two octet control field for U format command and responses.
3 Used only as a command frame.
4 Uses non-HDLC standard address extension mechanism - fixed length, multiple octet address field - at the LLC sublayer.
5 The choice between basic and extended control field format option is made at subscription time for DTE/DCE applications and by bilateral agreement for DTE/DTE applications.
6 Extended control field format is an option provided by some networks in the X.25 1984 and later versions. It is not provided in the X.25 1980 version.
7 FCS checking not defined as an LLC sublayer function, rather as a medium access control (MAC) sublayer function. Included here to note the use of the 32-bit FCS optional function in Local Area Network applications of HDLC procedures.
8 The 16-bit FCS is the default value. The 32-bit FCS is negotiable via an XID exchange.
9 Uses P/F checkpoint recovery
10 Uses turn-around checkpoint retransmission
11 This protocol also uses elements outside the current definition of HDLC procedures
12 The format of the information field of the XID frame of these protocols follows the specifications in ISO/IEC 8885.

Table 2 - Standardized XID information field format identifiers

Format Identifier value (low order bit first)	**Source document**	**Format characteristics**
1 0 0 0 0 0 0 1	ISO 8802-2, Information processing systems - Local Area Networks - Part 2, Logical Link Control	Provides means for exchanging details of operational capabilities, including types operations supported (i.e., connectionless or connection-mode, or both) and, in the case of connection-mode operation, the receive window size supported.
0 1 0 0 0 0 0 1	ISO/IEC 8885, Information processing systems - Data communication - High-level data link control procedures - General purpose XID frame information field content and format.	Provides means for resolving data link layer address assignments, negotiating data link layer protocol features and parameters (including private parameters), and transferring higher layer information (e.g., data link layer management messages) transparently between stations.
1 1 0 0 0 0 0 1	ITU-T Recommendation G.764, Voice packetization - Packetized voice protocol.	Provides means for performing various procedures concerning the operation of packet voice networks.
0 0 1 0 0 0 0 1	ITU-T Recommendation T.90, Characteristics and protocol for terminals for Telematic services in ISDN	Provides means for identification of various services/applications involved in terminals, and for performing various procedures concerning the operation of Telematic terminal characteristics.

Table 3 - Standardized private parameter set identification values

Parameter Set identification value	**Source document**
IA5 characters "V42"	ITU-T Recommendation V.42bis - Data compression procedures for DCEs using error correcting procedures