INTERNATIONAL STANDARD

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Information technology — Telecommunications and information exchange between systems — High-level data link control (HDLC) procedures — General purpose XID frame information field content and format

Technologies de l'information — Télécommunications et échange d'informations entre systèmes — Procédures de commande de liaison de données à haut niveau (HDLC) — Format et contenu du champ d'information de la trame XID pour application générale

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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. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

International Standard ISO/IEC 8885 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 6, *Telecommunications and information exchange between systems*.

This third edition cancels and replaces the second edition (ISO/IEC 8885:1991), and incorporates ISO/IEC 8885 amendments 3, 4 and 5.

Annex A of this International Standard is for information only.

Introduction

High-level data link control (HDLC) procedures define the exchange identification (XID) command/response frame as an optional function for exchange of data link information. This International Standard defines the content and format for the general purpose XID frame information field.

Information technology — Telecommunications and information exchange between systems — High-level data link control (HDLC) procedures — General purpose XID frame information field content and format

1 Scope

The principal use of the XID frame is to exchange data link information between two or more HDLC stations. For the purpose of this International Standard, data link information shall include any and all essential operational characteristics such as identification, authentication and/or selection of optional functions and facilities concerning each station. This International Standard defines a single-exchange negotiation procedure for establishing operational characteristics when either one or more stations are capable of providing multiple selections.

This International Standard provides a means for interchanging the necessary information to establish, at a minimum, a data link connection between two correspondents wishing to communicate. It describes the general purpose XID frame information field content and format.

This International Standard defines encoding for information related to the basic HDLC standards only. Mechanisms are provided to permit the general-purpose XID frame information field to be used to negotiate private parameters in a single XID exchange simultaneously with negotiation of the defined basic parameters.

This International Standard does not limit or restrict the use of the XID frame information field from defining other standard formats for use in specific applications.

The following are examples of potential uses of the XID command/response frame interchange:

a) Identification of the calling and called stations when using circuit switched networks (including switched network backup applications).

b) Identification of stations operating on non-switched networks requiring identification at start-up.

c) The XID command frame with an individual, group or all-station address may be used to solicit XID response frame(s) from other station(s) on the data link, prior to or following data link establishment.

d) Negotiation of the Frame Check Sequence (FCS) to be used for subsequent information interchange, by stations that support both 16-bit FCS and 32-bit FCS capabilities.

e) Convey higher layer information that may be required prior to data link establishment.

f) Transmission of an XID response frame at any respond opportunity to request an XID exchange to modify some of the operational parameters (for example, window size) following data link establishment.

2 Normative references

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

ISO 2382-9 : 1984, *Data processing — Vocabulary — Part 09 : Data communication.*

ISO/IEC 3309 : 1993, *Information technology — Telecommunications and information exchange between systems — High-level data link control (HDLC) procedures — Frame structure.*

ISO/IEC 4335 : 1993, *Information technology — Telecommunications and information exchange between systems — High-level data link control (HDLC) procedures — Elements of procedures.*

ISO 7478 : 1987, *Information processing systems — Data communication — Multilink procedures.*

ISO 7498:1984 *Information processing systems — Open Systems Interconnection — Basic Reference Model.*

ISO 8471 : 1987, *Information processing systems — Data communication — High-level data link control balanced classes of procedures — Data link layer address resolution/negotiation in switched environments.*

3 Definitions

For the purpose of this International Standard the definitions given in ISO 7498 : 1984, ISO/IEC 4335 : 1993 and ISO 7478 : 1987 as well as the following definitions apply:

3.1 address resolution/negotiation : Procedure for exchanging/determining the data link layer identity of each data link layer entity.

3.2 basic HDLC standards : ISO/IEC 3309, ISO/IEC 4335, ISO 7478, ISO/IEC 7809, and ISO 8471, defining respectively the frame structure, elements of procedures, multilink procedures, and classes of procedures of HDLC, and the address resolution procedures for switched connections.

3.3 data link connection : See ISO 7498 : 1984.

3.4 format identifier : See ISO/IEC 4335 : 1993.

3.5 group identifier : Classifier of data link layer characteristics or parameters by function (for example, address resolution, parameter negotiation, user data).

3.6 HDLC-based protocol : A protocol which is a subset of the elements and classes of procedure and optional functions defined in the basic HDLC standards, and adopted as a standard by ISO or a recognized international standards body (e.g., CCITT).

3.7 layer parameter : The specification of data link layer characteristics and parameters, and their values, available or chosen.

3.8 private parameter : An implementation-specific data link layer parameter not defined in the basic HDLC standards.

3.9 single-exchange negotiation procedure : The initiating station indicates its "menu" of capabilities in its command frame, and the responding station indicates its choices from the menu in its response frame.

3.10 unique identifier : A unique bit/character sequence (for example, global telephone number, station identification, or equivalent) associated with each station.

3.11 user data : The information obtained from or delivered to the user of the data link layer.

4 XID frame information field structure

The general purpose XID frame information field general structure is shown in figure 1.

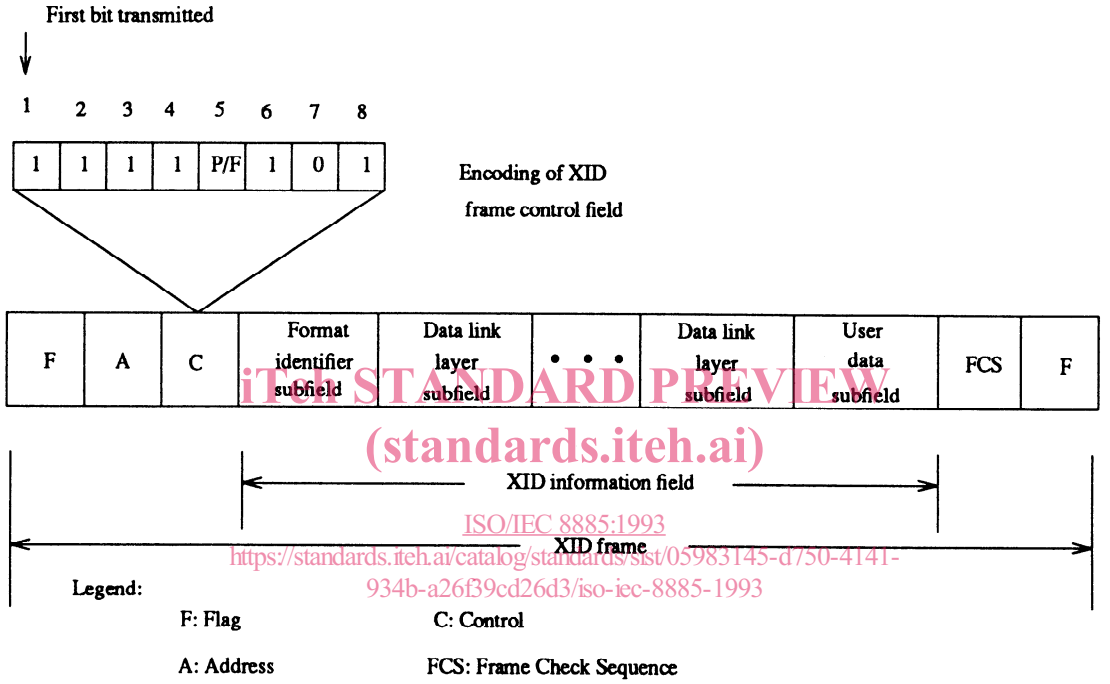

Figure 1 - General structure of the XID frame

The XID frame information field is composed of a number of subfields. These subfields are a Format Identifier (FI) subfield, several data link layer subfields, and a user data subfield. The amount of information (length) that can be accommodated in the XID information field is limited only by the maximum length restrictions on the HDLC frame information field.

4.1 Format identifier subfield

The format identifier (FI) subfield is defined in ISO/IEC 4335 : 1993. The list of standard format identifiers that are registered is given in ISO/IEC TR 10178.

The FI subfield is a fixed length of one octet. It is encoded to have a capability of designating 128 different standardized formats and 128 different user-defined formats.

This International Standard is concerned only with the general purpose format identifier, which defines the XID frame information field content and format used by two correspondents wishing to communicate in an HDLC environment.

4.2 Data link layer subfields

The general structure of a data link layer subfield is illustrated in figure 2.

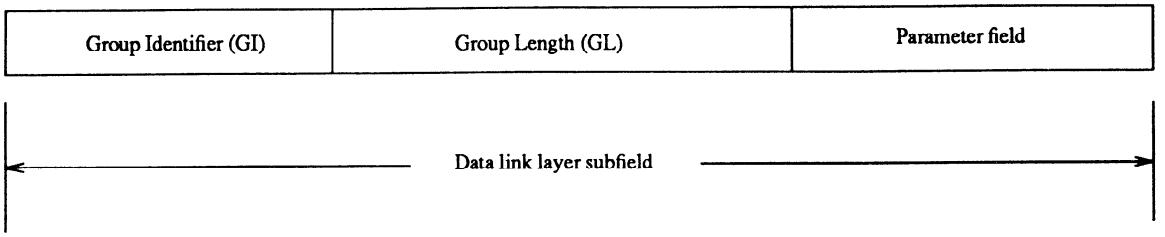

Figure 2 - Data link layer subfield structure

The data link layer subfields specify various data link layer characteristics and parameters. The contents of these subfields are generated by and consumed by the data link layer logic. The length of these subfields is limited only by the maximum length restrictions on the HDLC frame information field, taking into account the lengths of the FI subfield and the user data subfield.

NOTE - Actual system implementations may impose additional restrictions on the length of the XID frame.

In terms of figure 2, a data link layer subfield consists of

Group Identifier (1 octet),
Group Length (2 octets), and
Parameter field (n octets).

The Group Identifier (GI) identifies the function of that data link layer subfield. Four data link layer subfield identifiers are defined:

Address resolution,
Parameter negotiation,
Multilink parameter negotiation, and
Private parameter negotiation.

The Parameter field consists of a series of Parameter Identifier (PI) (1 octet), Parameter Length (PL) (1 octet), and Parameter Value (PV) (m octets) sets, one set for each defined data link layer subfield element. The structure of the PI/PL/PV sets defined is detailed in clause 6.

A data link layer subfield, therefore, has the general organization depicted in figure 3.

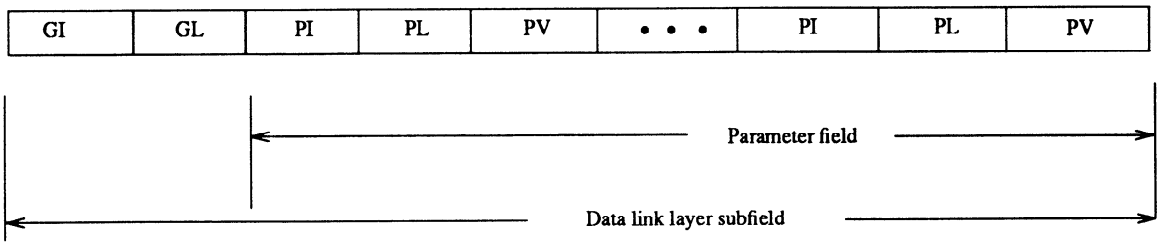

Figure 3 - A typical data link layer subfield

4.3 User data subfield

The user data subfield contains data link user information to be transferred during XID frame interchange. This data link user information is transported transparently across the data link and passed to the user of the data link. The amount of information (number of bits) that can be accommodated is limited only by the maximum length restrictions on the HDLC frame information field, taking into account the lengths of the FI subfield and the data link layer subfields.

NOTE - Actual system implementations may impose additional restrictions relative to octet orientation and/or the length of the XID frame.

The user data subfield is composed of

User data identifier (1 octet), and
User data field (n bits).

The user data subfield, therefore, has the organization illustrated in figure 4.

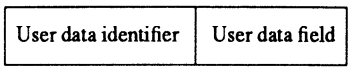

Figure 4 - User data subfield

4.4 Summary

The entire XID frame information field has the general structure illustrated in figure 5.

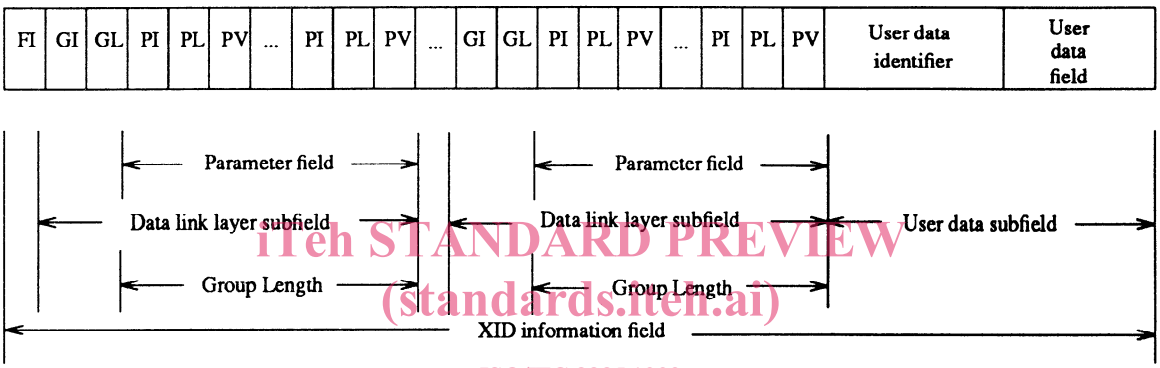

Figure 5 - XID information field structure

5 XID frame information field encoding

The general purpose format identifier subfield is always the first octet of the XID information field. The data link layer subfields, if present, follow in ascending order according to their GI values. Except where noted, specific data link layer subfields may appear only once in the standardized XID information field. The absence of a particular data link layer subfield should be interpreted to mean that parameters within this subfield shall maintain their present values. The user data subfield, if present, is always the last subfield of the XID information field.

5.1 Format identifier subfield encoding

The Format Identifier (FI) subfield is encoded as illustrated in figure 6.

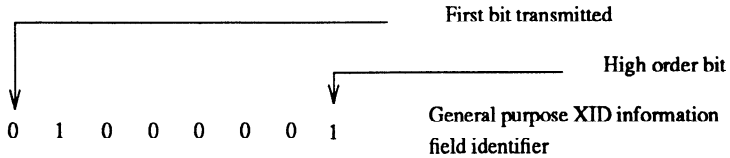

Figure 6 - Format identifier subfield encoding

5.2 Data link layer subfield encoding

5.2.1 Group identifier encoding

Group Identifiers identify various functions that pertain to the data link layer. Figure 7 indicates the GI encodings for the data link layer subfields covered in this International Standard.

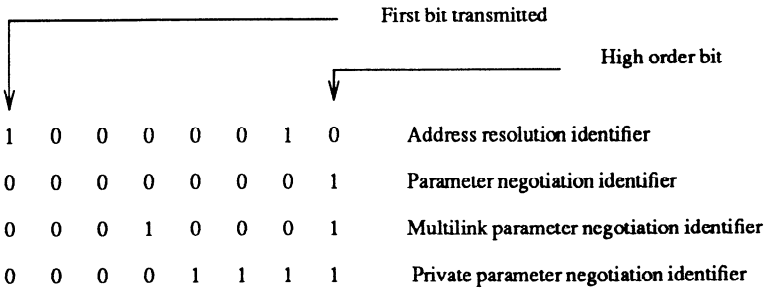

Figure 7 - Data link layer subfield encodings

NOTES

1 The parameter negotiation data link layer subfield and the private parameter negotiation data link layer subfield may each appear more than once in an XID information field. This allows a station to convey multiple menus of supportable parameters through a single XID frame exchange.

2 The GI encoding of all ones (1111 1111) is not used as a data link layer subfield encoding. All other unused GI encodings are reserved for future use.

5.2.2 Group length encodings

Group Length indicates the length of the associated Parameter field. This length is expressed as a two-octet binary number representing the length of the associated Parameter field in octets. The high order bits of the length value are in the first of the two octets.

NOTE - The Group Length value does not include the lengths of either itself or its associated Group Identifier.

A Group Length value of zero indicates that there is no associated Parameter field and that all parameters within the subfield specified by the associated Group Identifier should assume their default values.

5.2.3 Parameter field encoding

A Parameter field contains a series of Parameter Identifier (PI), Parameter Length (PL) and Parameter Value (PV) set structures in that order. Each PI identifies a parameter, and is one octet in length. Each PL indicates the length of the associated parameter value (PV), and is one octet in length. Each PV contains the parameter value, and is m octets in length.

NOTE - The value of PL does not include the lengths of either itself or its associated PI.

The value of PL is expressed as a one-octet binary number representing the length of the PV in octets. A PL value of zero indicates that the associated PV is absent, and that the parameter shall assume the default value.

A PI/PL/PV set may be omitted if it is not required for conveying information or if present values for the parameter are to be used. A Parameter field containing a PI that is not specified in this International Standard is defined as invalid and shall be ignored (except within the private negotiation subfield, in which PIs other than PI=0 may be defined by a prior agreement between the stations). Except where noted, duplicate PIs should not be sent within the same data link layer subfield. The behavior of the receiver upon receipt of duplicate PIs within the same data link layer subfield is not defined in this International Standard.

The encoding of each PI/PL/PV set is detailed in clause 6.

5.3 User data subfield encoding

5.3.1 User data identifier encoding

The user data identifier identifies the subfield as the user data subfield. Figure 8 provides its encoding.

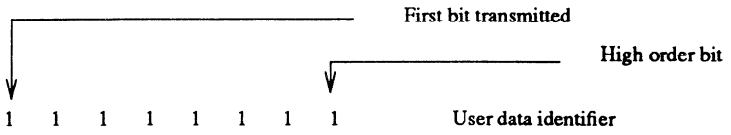

Figure 8 - User data subfield encoding

5.3.2 User data field encoding

The user data field is transported transparently by the data link and passed on to the user of the data link. The encoding of the user data field is the responsibility of the data link user, and may be any format that is mutually agreed upon by the data link users involved.

6 Definition and encoding of data link layer subfield parameter fields

The following is a list of parameter field elements that are defined for the address resolution, parameter negotiation, multilink parameter negotiation, and private parameter negotiation data link layer subfields.

The following legend explains the symbols used in tables 1, 2, 3, 4, and 5.

PI : Parameter Identifier, expressed as a decimal value.

PL : Parameter Length in octets, expressed as a decimal value.

E : Indicates the field is bit encoded. When this bit position is "1", the feature is present or supported by the sender. When the bit position is "0", the feature is absent or not supported by the sender.

B : Indicates this field is binary encoded.

N : Number of octets.

NA : Not applicable.

SD : System defined.

Bit No : Numerical order of bits transmitted.

TBD : To be determined.

Table 1 - Data link layer subfield parameter field elements

Address resolution (GI = 10000010)

PI	Parameter field element
1	Unique identifier
2	Local data link layer address