INTERNATIONAL STANDARD

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Information technology — Telecommunications and information exchange between systems — High-level data link control procedures — Description of the X.25 LAPB-compatible DTE data link procedures

Technologies de l'information — Télécommunications et échange d'information entre systèmes — Procédures de commande de liaison de données de haut niveau — Description des procédures de liaison de données ETTD compatibles X.25 *LAPB*

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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 7776 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

This second edition cancels and replaces the first edition (ISO 7776:1986), and consolidates Amendment 1:1992, as well as Technical Corrigenda 1, 2 and 3.

Annex A forms an integral part of this International Standard. Annex B is for information only.

Introduction

This document provides the ISO/IEC description of the ITU-T Recommendation X.25 LAPB interface operation as viewed by the DTE. It is the DTE counterpart of the X.25 LAPB DCE description.

This document also provides the ISO/IEC description of how two DTEs are capable of communicating directly with one another at the Data Link layer using the X.25 LAPB procedures without an intervening public data network.

The Data Link layer provides the DTE with three basic functions:

a) link initialization: necessary for the DTE to begin communication in a known state;

b) flow control: control of the flow of frames between the DTE and the other station (DCE or DTE) to ensure that they are not sent more quickly than they can be received; and

c) error control: provided in two forms:

   1) a cyclic redundancy check (CRC) using a 16-bit polynomial to detect mutilated frames, and

   2) use of sequence numbers to ensure against losing entire frames.

   (The Data Link layer endeavours to ensure correct receipt of all frames by retransmission of mutilated or missing frames.)

This International Standard repeats requirements of other International Standards. Annex B contains a list of these repeated requirements and references to the corresponding International Standards.

To evaluate conformance of a particular implementation, it is necessary to have a statement of which capabilities and options have been implemented. Such a statement is called a "Protocol Implementation Conformance Statement" (PICS), as defined in ISO/IEC 9646-1. This International Standard provides such a PICS proforma in compliance with the relevant requirements, and in accordance with the relevant guidance, given in ISO/IEC 9646-2.

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1 Scope

This International Standard defines an application of the following HDLC standards: ISO/IEC 3309, ISO/IEC 4335, ISO 7478, and ISO/IEC 7809. When there is difficulty in the interpretation of a reworded requirement from one of the other International Standards, the original requirement of ISO/IEC 3309, ISO/IEC 4335, ISO 7478 or ISO/IEC 7809 is definitive. It also defines the structure, elements and procedures for the operation of a DTE using the X.25 LAPB protocol as specified in ITU-T Recommendation X.25.[1)] The procedures are applicable to data interchange between a DTE and a DCE, or between two DTEs. The procedures are defined for use on duplex links, using synchronous transmission or start/stop transmission.

Clause 3 describes two frame structures: one for basic (modulo 8) operation and one for extended (modulo 128) operation. Basic (modulo 8) operation is the ISO/IEC balanced asynchronous class of procedure with optional functions 2 and 8 (BAC, 2, 8). Extended (modulo 128) operation is the ISO/IEC balanced asynchronous class of procedure with optional functions 2, 8 and 10 (BAC, 2, 8, 10). For those DTE/DCE connections that support both basic (modulo 8) operation and extended (modulo 128) operation, the choice is made at subscription-time only. For those DTE/remote DTE connections that support both basic (modulo 8) operation and extended (modulo 128) operation, the choice is made by bilateral agreement.

NOTE — The procedure herein described as basic (modulo 8) operation is the only one available in all public data networks.

Clause 3 also describes two methods for encoding the frames, as sequences of bits when synchronous transmission is used, and as sequences of octets when start/stop transmission is used. The start/stop encoding specifies optional mechanisms, for use in environments that are sensitive to transmission of octets with values that could be interpreted as ISO/IEC 646 control characters, and/or in environments that support transfer of only seven data bits per start/stop character. The choice of encoding is made by bilateral agreement, or other suitable means, to suit the data transmission characteristics of the environment.

Clause 4 describes the elements of procedures. Some aspects are only operable for the basic (modulo 8) operation and some for the extended (modulo 128) operation.

Clauses 5 and 6 describe the single link procedure (SLP) which is derived from the frame structure and the elements of procedures, and an optional multilink procedure (MLP), respectively. The SLP is used for data interchange over a single data link and the MLP is used for data interchange over a multiple of parallel SLPs. An MLP is required if the effects of individual SLP failures are not to disrupt the higher layer operation. An MLP can also be used over a single SLP by prior bilateral agreement. For DTE/DCE connections the choice of an MLP operation or not is made at subscription-time only. For DTE/remote DTE connections, the choice is made by bilateral agreement.

Where choices among alternative actions are indicated in the procedures, a recommended choice is usually indicated. Unless specifically stated otherwise, the choice of action does not affect interoperability with other implementations of this International Standard although efficiency of operation may be affected. Where such choices do affect interoperability, the procedures explicitly state that prior bilateral

1) Future revisions of this International Standard will be made in accordance with revisions of ITU-T Recommendation X.25. The present version is based on the 1993 ITU-T Recommendation X.25

agreement on the choice of procedure with the remote end is needed. An attempt has been made to minimize such choices consistent with the need to satisfy a broad range of applications. A basic requirement for all implementations of this International Standard is that they be capable of responding, as specified, to any actions taken at the remote end that are permitted by this International Standard (except possibly for those procedures whose use involves prior bilateral agreement.)

Clause 7 covers the Static Conformance requirements, the Dynamic Conformance requirements, and the Protocol Implementation Conformance Statement (PICS).

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 listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO/IEC 646: 1991, *Information technology — ISO 7-bit coded character set for information interchange.*

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 procedure.*

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

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

ISO/IEC 9646-1:1994, *Information technology — Open Systems Interconnection — Conformance testing methodology and framework — Part 1: General concepts.*

ISO/IEC 9646-2:1994, *Information technology — Open Systems Interconnection — Conformance testing methodology and framework — Part 2: Abstract Test Suite specification.*

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.*