

High-level data link control (HDLC) procedures —

Part 6: Specification for multilink procedures

UDC 681.327.8:621.391

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Information Systems Technology Standards Policy Committee (IST/-) to Technical Committee IST/6, upon which the following bodies were represented:

- Association for Payment Clearing Services
- British Computer Society
- British Telecommunications Plc
- Business Equipment and Information Technology Association
- Department of Trade and Industry (Information Technology Standards Unit)
- Department of Trade and Industry (National Physical Laboratory)
- Electricity Supply Industry in England and Wales
- Electronic Engineering Association
- HM Treasury (Central Computer and Telecommunications Agency)
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- Inter-Universities Computing Committee
- Joint Network Team
- National Computing Centre Ltd.
- National Health Service
- OFTEL (Office of Telecommunications)
- Post Office
- Telecommunication Engineering and Manufacturing Association
- Telecommunications Managers Association

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National foreword

This Part of BS 5397 has been prepared under the direction of the Information Systems Technology Standards Policy Committee. It is identical with ISO 7478:1987, “*Information processing systems — Data communication — Multilink procedures*”, published by the International Organization for Standardization (ISO) and incorporates Technical Corrigendum 1:1989 (ISO 7478:1987/Cor. 1:1989). It is a revision of BS 5397-6:1985 to align the text with ISO 7478 and Technical Corrigendum 1 which were published subsequently. The UK has actively participated, through BSI Technical Committee IST/6, in the development of the International Standard.

A number of International Standards dealing with various aspects of High-level Data Link Control (HDLC) procedures have been published by ISO and these have been issued as separate parts of BS 5397. With the exception of Part 9 and Part 1, all parts are currently being revised to ensure alignment of the British Standard with the latest ISO text.

Other parts are as follows:

- *Part 1: Specification for frame structure;*
- *Part 2: Specification for consolidation of elements of procedures;*
- *Part 5: Specification for consolidation of classes of procedures;*
- *Part 7: Specification for X.25 LAPB-compatible DTE data link procedures;*
- *Part 8: Specification for frame level address assignment;*
- *Part 9: Specification for general purpose XID frame information field content and format.*

Up-to-date information on existing and projected British Standards publications for Open Systems Interconnection is included in the “Basic List”, published as part of the BSI Information Technology Service (BITS) initiative. For details contact: Marketing Department, BSI, Linford Wood, Milton Keynes, MK14 6LE. A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 12, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

0 Introduction

Multilink procedures reference the layers of the ISO Open Systems Interconnection (OSI) reference model; specifically the physical, data link, and network layers. The multilink procedures (MLP) reside in the data link layer.

Multilink procedures provide the means for accepting data units from the network layer, scheduling data units for transmission and retransmission over a group of parallel data links, and reordering the received data units prior to delivering them to the network layer. Multilink procedures provide the following general features:

- a) achieve economy and reliability of service by providing multiple connections between data stations;
- b) permit addition and deletion of connections without interrupting the service provided by the multiple connections;
- c) optimize bandwidth utilization of a group of connections through load sharing;
- d) achieve graceful degradation of service when a connection(s) fails;
- e) provide each multiple connection group with a single logical data link appearance to the network layer; and
- f) provide, when required, resequencing of the received data units prior to delivering them to the network layer.

1 Scope and field of application

This International Standard specifies multilink procedures where a multiplicity of parallel data links at the data link layer are used to provide a variable bandwidth data link between network layer entities. The multilink procedures (MLP) exist as a new upper sublayer of the data link layer, operating between the network layer and a multiplicity of single data link protocol functions (SLPs) in the data link layer (see Figure 1).

This International Standard does not specify the way in which the SLPs indicate to the MLP that the transmission of a multilink frame has successfully been completed.

These multilink procedures do not preclude the use of different single link procedures, each with differing delay characteristics and/or line speeds to form one multilink group.

When the procedures defined by this International Standard are to be used on one or more parallel data links, both ends of the data link must know that these procedures are to be used before the first multilink frame is sent. This could be achieved by a prior agreement that all communications on this data link will use these procedures, or by one of the SLPs negotiating the use of these procedures, or by some other means. The method by which both ends achieve a common understanding as to the use or non-use of these multilink procedures is not defined in this International Standard.

2 Definitions and parameters

2.1

MLP reset confirmation bit (C)

the MLP reset confirmation bit is used in reply to the R bit set to 1 to confirm that all of the MLP state variables have been reset. The C bit set to 0 is used in normal communication; i.e., no reset request has been activated. The C bit set to 1 is used to reply to the multilink frame with the R bit set to 1, and indicates that the MLP state variable reset process has been completed. In this C = 1 case, the multilink frame is used without a data unit field

2.2

multilink procedures (MLP)

the protocols employed to transfer data over one or more SLPs which form a group

2.3

multilink send sequence number [MN(S)]

value of the multilink sequence number assigned to a multilink frame

NOTE The number assigned lies in the range of 0 to 4 095 inclusive and is used to resequence, when resequencing is required, and to detect missing or duplicate multilink frames at the receiving multilink procedure data station (MLP) before data units are delivered to the network layer.

2.4

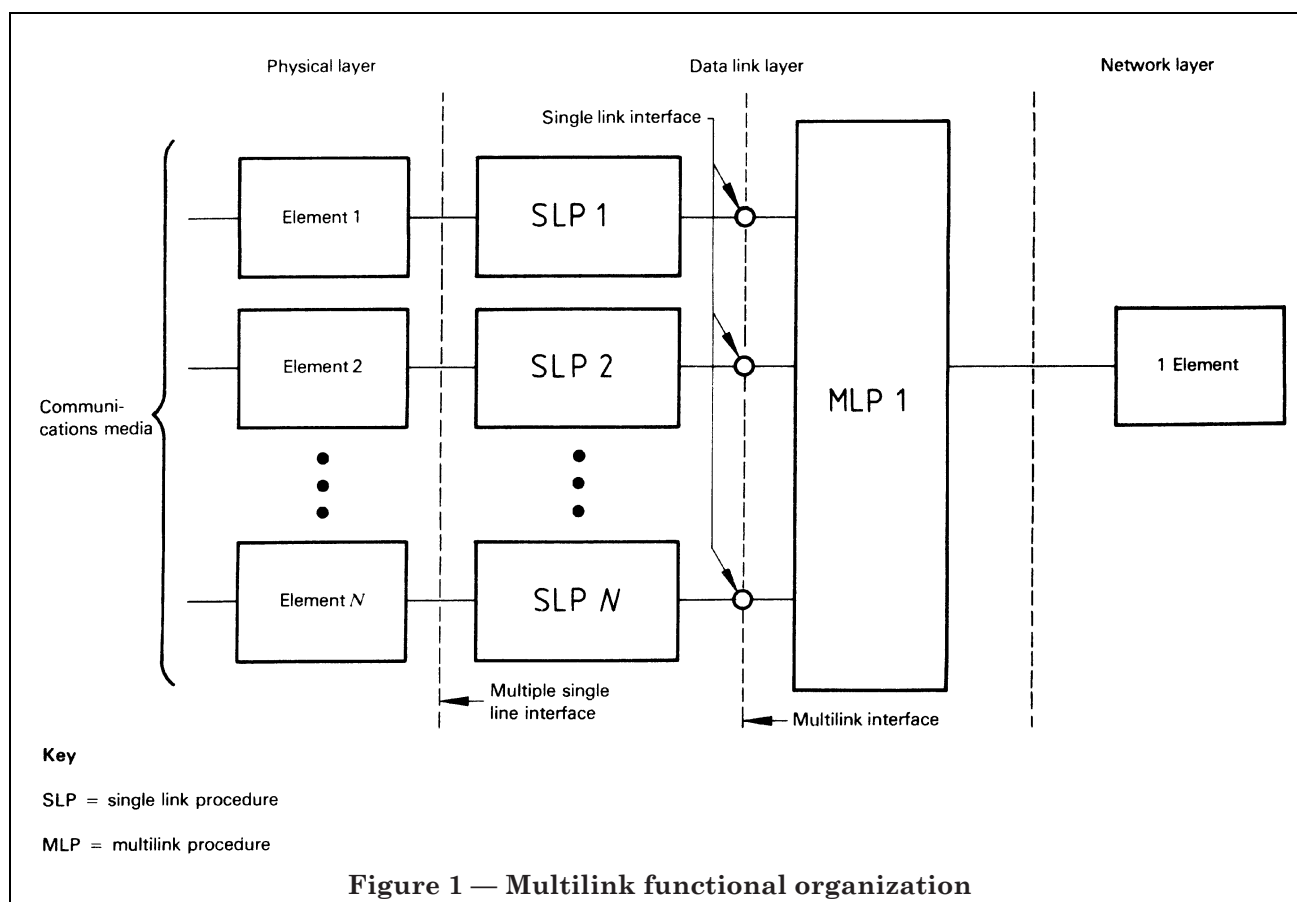
lost multilink frame timer (MT1)

during low traffic periods, the expiration of this timer provides the means to determine that the multilink frame with MN(S) equal to MV(R) is lost

2.5

group busy timer (MT2)

optional. At the receiving MLP, the expiration of this timer provides the means to determine that a "blocked" condition exists because buffers were exhausted before resequencing could be accomplished



2.6 MLP reset confirmation timer (MT3)

timer MT3 is used to provide a means of identifying that the multilink frame with the C bit set to 1 that is expected following the transmission of the multilink frame with the R bit set to 1 has not been received

2.7 multilink receive state variable [MV(R)]

denotes the MN(S) of the next in-sequence multilink frame to be transferred to the network layer

NOTE The MV(R) identifies the lower edge of the receive window.

2.8 multilink send state variable [MV(S)]

denotes the next in-sequence MN(S) to be assigned to a multilink frame to be sent over this multilink group

2.9 multilink frame acknowledgement state variable [MV(T)]

denotes the MN(S) of the oldest multilink frame awaiting an indication of acknowledgement from the local SLP

NOTE The MV(T) identifies the lower edge of the transmit window.

2.10 multilink window size (MW)

for a given direction of transmission, both the transmitting MLP and the receiving MLP shall use the same value of MW

NOTE The transmit window contains the sequence numbers MV(T) to MV(T) + MW - 1 inclusive. The receive window contains the sequence numbers MV(R) to MV(R) + MW - 1 inclusive.¹⁾

¹⁾ MW is a system parameter which can never exceed 4 095 - MX. Factors which will affect the value of parameter MW include, but are not limited to, link transmission and propagation delays, the number of links, the range of multilink frame lengths, and single link parameters (N retransmission attempts, response times, and outstanding number of unacknowledged I frames).