

INTERNATIONAL STANDARD

IEC 62056-46

Edition 1.1

2007-02

Edition 1:2002 consolidated with amendment 1:2006

**Electricity metering –
Data exchange for meter reading
tariff and load control –**

**Part 46:
Data link layer using HDLC protocol**

© IEC 2007 — Copyright - all rights reserved

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE **CL**

For price, see current catalogue

CONTENTS

FOREWORD	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references	7
3 Terms, definitions and abbreviations	8
4 Overview	9
4.1 The LLC sub-layer.....	9
4.2 The MAC sub-layer.....	9
4.3 Specification method	10
5 The LLC sub-layer.....	10
5.1 The role of the LLC sub-layer	10
5.2 Service specification for the LLC sub-layer.....	11
5.2.1 Setting up the Data Link Connection.....	11
5.2.2 Disconnecting the Data Link Connection.....	14
5.2.3 Data communication	18
5.3 Protocol specification for the LLC sub-layer.....	22
5.3.1 Overview	22
5.3.2 LLC protocol data unit (LPDU) structure	22
5.3.3 State transition tables for the LLC sub-layer	23
6 The MAC sub-layer.....	24
6.1 HDLC selections.....	24
6.2 Service specification for the MAC sub-layer.....	25
6.2.1 Setting up the MAC connection.....	25
6.2.2 Disconnecting the MAC connection.....	28
6.2.3 Data communication	33
6.3 Physical layer services used by the MAC sub-layer	35
6.3.1 Overview	35
6.3.2 Setting up a physical link.....	36
6.3.3 Disconnecting the physical link.....	36
6.3.4 Data communication	36
6.4 Protocol specification for the MAC sub-layer	36
6.4.1 The MAC PDU and the HDLC frame	36
6.4.2 MAC addressing	38
6.4.3 Command and response frames	42
6.4.4 Elements of the procedures	45
6.4.5 State transition diagram for the server MAC sub-layer	60
Annex A (informative) FCS calculation.....	62
Annex B (informative) Data model and protocol	65
Annex C (informative) Data link layer management services	66

Figure 1 – Data Link (LLC) services for setting up the Data Link Connection	11
Figure 2 – Data Link (LLC) services for disconnecting the Data Link Connection	15
Figure 3 – Data link layer data communication services	19
Figure 4 – The ISO/IEC 8802-2 LLC protocol data unit format.....	22
Figure 5 – The used LLC protocol data unit format.....	22
Figure 6 – MAC sub-layer services for setting up the MAC (DL) connection at the client and server sides	25
Figure 7 – MAC sub-layer services for disconnecting the MAC (DL) connection at the client and server sides	29
Figure 8 – MAC sub-layer data communication services	33
Figure 9 – Physical layer services used by the MAC sub-layer.....	36
Figure 10 – MAC sub-layer frame format (HDLC frame format type 3).....	36
Figure 11 – Multiple frames	37
Figure 12 – The frame format field	37
Figure 13 – MSC for long MSDU transfer in a transparent manner	54
Figure 14 – Example configuration to illustrate broadcasting.....	55
Figure 15 – Sending out a pending UI frame with a response data	56
Figure 16 – Sending out a pending UI frame with a response to a RR frame	57
Figure 17 – Sending out a pending UI frame on receipt of an empty UI frame	57
Figure 18 – State transition diagram for the server MAC sub-layer.....	61
Figure B.1 – The three-step approach of COSEM	65
Figure C.1 – Layer management services	66
Table 1 – State transition table of the client side LLC sub-layer	23
Table 2 – State transition table of the server side LLC sub-layer.....	24
Table 3 – Table of reserved client addresses	40
Table 4 – Table of reserved server addresses	40
Table 5 – Handling inopportunity address lengths.....	42
Table 6 – Command and response frames	42
Table 7 – Control field format.....	43
Table 8 – Example for parameter negotiation values with the SNRM/UA frames	50
Table 9 – Summary of MAC Addresses for the example.....	55
Table 10 – Broadcast UI frame handling	55

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICITY METERING – DATA EXCHANGE FOR METER READING, TARIFF AND LOAD CONTROL –

Part 46: Data link layer using HDLC protocol

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the informative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this International Standard may involve the use of a maintenance service concerning the stack of protocols on which the present standard IEC 62056-46 is based.

The IEC takes no position concerning the evidence, validity and scope of this maintenance service.

The provider of the maintenance service has assured the IEC that he is willing to provide services under reasonable and non-discriminatory terms and conditions for applicants throughout the world. In this respect, the statement of the provider of the maintenance service is registered with the IEC. Information may be obtained from:

DLMS¹ User Association
Geneva / Switzerland
www.dlms.ch

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights other than those identified above. IEC shall not be held responsible for identifying any or all such patent rights.

¹ Device Language Message Specification.

International Standard IEC 62056-46 has been prepared by IEC technical committee 13: Equipment for electrical energy measurement and load control.

This consolidated version of IEC 62056 consists of the first edition (2002) [documents 13/1267/FDIS and 13/1273/RVD] and its amendment 1 (2006) [documents 13/1376/FDIS and 13/1401/RVD].

The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience.

It bears the edition number 1.1.

A vertical line in the margin shows where the base publication has been modified by amendment 1.

Annexes A, B and C are for information only.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

INTRODUCTION (to amendment 1)

The amendment takes into account that in the third edition of ISO/IEC 13239, frame type 3 has been added as Annex H.4, as requested by IEC TC 13 WG 14, and that second editions of some parts of the IEC 62056 series are under preparation.

It specifies now that a secondary station may use more than one addressing scheme.

It contains some changes concerning the negotiation of the maximum information length field HDLC parameter for better efficiency.

References have been updated and some editorial errors have also been corrected.

Currently in preview, click buy full version

ELECTRICITY METERING – DATA EXCHANGE FOR METER READING, TARIFF AND LOAD CONTROL –

Part 46: Data link layer using HDLC protocol

1 Scope

This part of IEC 62056 specifies the data link layer for connection-oriented, HDLC-based, asynchronous communication profile.

In order to ensure a coherent data link layer service specification for both connection-oriented and connectionless operation modes, the data link layer is divided into two sub-layers: the Logical Link Control (LLC) sub-layer and the Medium Access Control (MAC) sub-layer.

This specification supports the following communication environments:

- point-to-point and point-to-multipoint configurations;
- dedicated and switched data transmission facilities;
- half-duplex and full-duplex connections;
- asynchronous start/stop transmission, with 1 start bit, data bits, no parity, 1 stop bit.

Two special procedures are also defined:

- transferring of separately received Service user layer PDU parts from the server to the client in a transparent manner. The server side Service user layer can give its PDU to the data link layer in fragments and the data link layer can hide this fragmentation from the client;
- event reporting, by sending UI frames from the secondary station to the primary station.

Annex B gives an explanation of the role of data models and protocols in electricity meter data exchange.

2 Normative references

The following reference documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-300:2001, *International Electrotechnical Vocabulary – Electrical and electronic measurements and measuring instruments – Part 311: General terms relating to measurements – Part 312: General terms relating to electrical measurements – Part 313: Types of electrical measuring instruments – Part 314: Specific terms according to the type of instrument*

IEC/TR 62051:1999, *Electricity metering – Glossary of terms*

IEC 62051-1:2004, *Electricity metering – Data exchange for meter reading, tariff and load control – Glossary of Terms – Part 1, Terms related to data exchange with metering equipment using DLMS/COSEM*

IEC 62056-42, *Electricity metering – Data exchange for meter reading, tariff and load control – Part 42: Physical layer services and procedures for connection oriented asynchronous data exchange* ¹⁾

IEC 62056-53:2006, *Electricity metering – Data exchange for meter reading, tariff and load control – Part 53: COSEM Application layer*

IEC 62056-61:2006, *Electricity metering – Data exchange for meter reading, tariff and load control – Part 61: OBIS Object identification system*

IEC 62056-62:2006, *Electricity metering – Data exchange for meter reading, tariff and load control – Part 62: Interface classes*

ISO/IEC 8802-2:1998, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 2: Logical link control*

ISO/IEC 13239:2002, *Information technology – Telecommunications and information exchange between systems – High-level data link control (HDLC) procedure*

¹⁾ To be published.