IEC 62056-7-3

Edition 1.0 2017-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Electricity metering data exchange – The DLMS/COSEM suite – Part 7-3: Wired and wireless M-Bus communication profiles for local and neighbourhood networks

Echange des données de comptage de l'électricité – La suite DLMS/COSEM – Partie 7-3: Profils de communication M-Bus filaire et sans fil pour les réseaux locaux et les réseaux de voisinage

IEC 62056-7-3:2017-03(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 17.220.20; 35.100.01; 91.140.50

ISBN 978-2-8322-5510-0

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DLMS[1] User Association
Zug/Switzerland
www.dlms.com

International Standard IEC 62056-7-3 has been prepared by IEC technical committee 13: Electrical energy measurement and control.

This bilingual version (2018-04) corresponds to the monolingual English version, published in 2017-03.

The text of this standard is based on the following documents:

FDIS	Report on voting
13/1729/FDIS	13/1731/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

The French version of this standard has not been voted upon.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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1 Device Language Message Specification.

INTRODUCTION

As defined in IEC 62056-1-0, the IEC 62056 DLMS/COSEM suite provides specific communication profile standards for communication media relevant for smart metering.

Such communication profile standards specify how the COSEM data model and the DLMS/COSEM application layer can be used on the lower, communication media-specific protocol layers.

Communication profile standards refer to communication standards that are part of the IEC 62056 DLMS/COSEM suite or to any other open communication standard.

This International Standard specifies DLMS/COSEM communication profiles for wired and wireless M-Bus networks using the lower layers specified in the EN 13757 series.

It follows the rules defined in IEC 62056-5-3, Annex A.

The DLMS/COSEM wired and wireless M-Bus communication profiles for local and neighbourhood networks may be used for smart energy data exchange with meters as well as with simple consumer displays and home automation systems.

ELECTRICITY METERING DATA EXCHANGE – THE DLMS/COSEM SUITE –

Part 7-3: Wired and wireless M-Bus communication profiles for local and neighbourhood networks

1 Scope

This International Standard specifies DLMS/COSEM wired and wireless M-Bus communication profiles for local and neighbourhood networks.

Setting up and managing the M-Bus communication channels of M-Bus devices, the M-Bus network, registering slave devices and – when required – repeaters is out of the scope of this International Standard.

The scope of this communication profile standard is restricted to aspects concerning the use of communication protocols in conjunction with the COSEM data model and the DLMS/COSEM application layer. Data structures specific to a communication protocol are out of the scope of this standard. Any project-specific definitions of data structures and data contents may be provided in project-specific companion specifications.

Annex A (informative) provides information on M-Bus frame structures, addressing schemes and an encoding example.

Annex B (normative) points to COSEM interface classes to set up and manage the wired and wireless M-Bus communication channel.

Annex C (informative) provides MSCs for representative instances of communication.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 62056-5-3:2016, *Electricity metering data exchange – The DLMS/COSEM suite – Part 5-3: DLMS/COSEM application layer*

IEC 62056-6-1:2015, *Electricity metering data exchange – The DLMS/COSEM suite – Part 6-1: Object identification system (OBIS)*

IEC 62056-6-2:2016, *Electricity metering data exchange – The DLMS/COSEM suite – Part 6-2: COSEM interface classes*

IEC 62056-6-2:—[2] , *Electricity metering data exchange – The DLMS/COSEM suite – Part 6-2: COSEM interface classes*

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2 Under preparation. Stage at the time of publication: IEC/CDV 62056-6-2:2016.

EN 13757-1, *Communication system for meters – Part 1: Data exchange*

EN 13757-2:2004, *Communication system for and remote reading of meters – Part 2: Physical and link layer*

EN 13757-3:2013, *Communication systems for and remote reading of meters – Part 3: Dedicated application layer*

EN 13757-4:2013, *Communication systems for meters and remote reading of meters – Part 4: Wireless meter readout (Radio meter reading for operation in SRD bands)*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62056-5-3, IEC 62056-6-1, IEC 62056-6-2 and in the EN 13757 series apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.2 Abbreviated terms

The following M-Bus specific abbreviated terms are used in this standard.

Abbrev.	Term	Standard domain
ACC	Access number field	M-Bus
ALA	Application Layer Address	M-Bus
CFG	Configuration byte	M-Bus
CI_{ELL}	CI field introducing the extended link layer (wireless M-Bus)	M-Bus
CI Field	Control Information field	M-Bus
CI_{TL}	CI field introducing the transport layer	M-Bus
DTSAP	Destination Transport Service Access Point	Telecontrol
ELL	Extended Link Layer	M-Bus
ELLA	Extended Link Layer Address	M-Bus
FIN (bit)	Final bit	Telecontrol
FT1.2	Data integrity format class FT1.2	Telecontrol
FT3	Data integrity format class FT3	Telecontrol
LLA	Link Layer Address	M-Bus
MSC	Message Sequence Chart	General
STS	Status byte	M-Bus
STSAP	Source Transport Service Access Point	Telecontrol
TL	Transport layer	M-Bus
wM-Bus	Wireless M-Bus	M-Bus

4 Targeted communication environments

In the context of the smart metering architecture introduced in IEC 62056-1-0 and shown in Figure 1, the wired and wireless M-Bus communication profiles for local and neighbourhood networks cover the following interfaces:

- the C interface between an NNAP and metering devices;
- the M interface between an LNAP and metering devices;
- the H1 interface between a metering device and a simple consumer display;
- the H2 interface between an LNAP and a home automation system.

In all cases, metering devices act as DLMS/COSEM servers.

On the C and M interface, metering devices act as M-Bus slaves. The M-Bus master is the NNAP or the LNAP.

On the H1 and H2 interfaces the metering device acts as a DLMS/COSEM server. It may operate in pull mode or push mode, as M-Bus master or M-Bus slave, depending on the selection of wired or wireless M-Bus and the operating mode for wireless M-Bus.

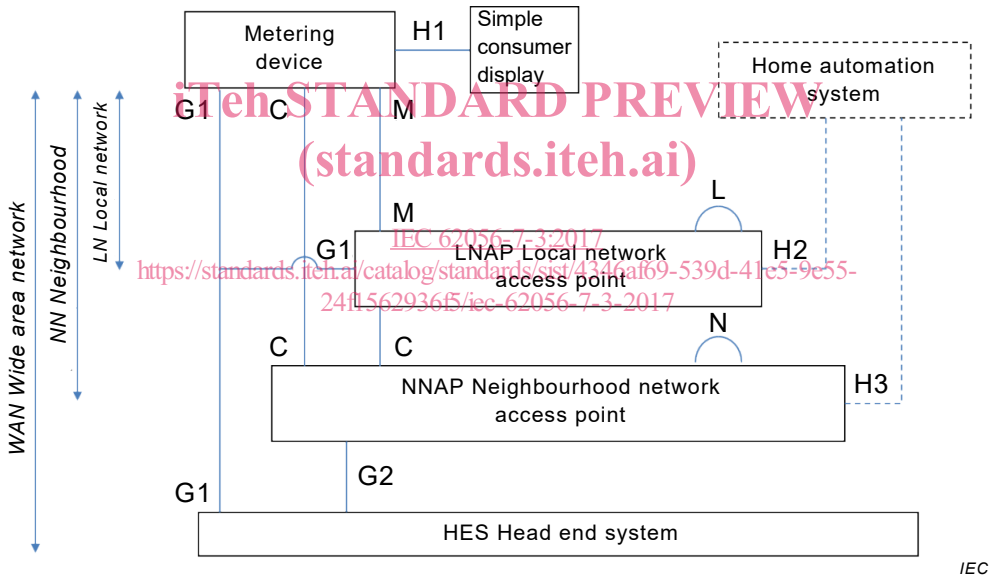

Figure 1 – Entities and interfaces of a smart metering system using the terminology of IEC 62056-1-0

5 Use of the communication layers for this profile

5.1 Information related to the use of the standard specifying the lower layers

The DLMS/COSEM wired and wireless M-Bus communication profiles for local and neighbourhood networks use the lower-layer protocols specified in the EN 13757 series.

Subclause 5.3.3 provides additional information on the use of the M-Bus transport layer in this communication profile.

5.2 Structure of the communication profiles

The structure of the DLMS/COSEM M-Bus wired and wireless M-Bus communication profiles is shown in Figure 2.

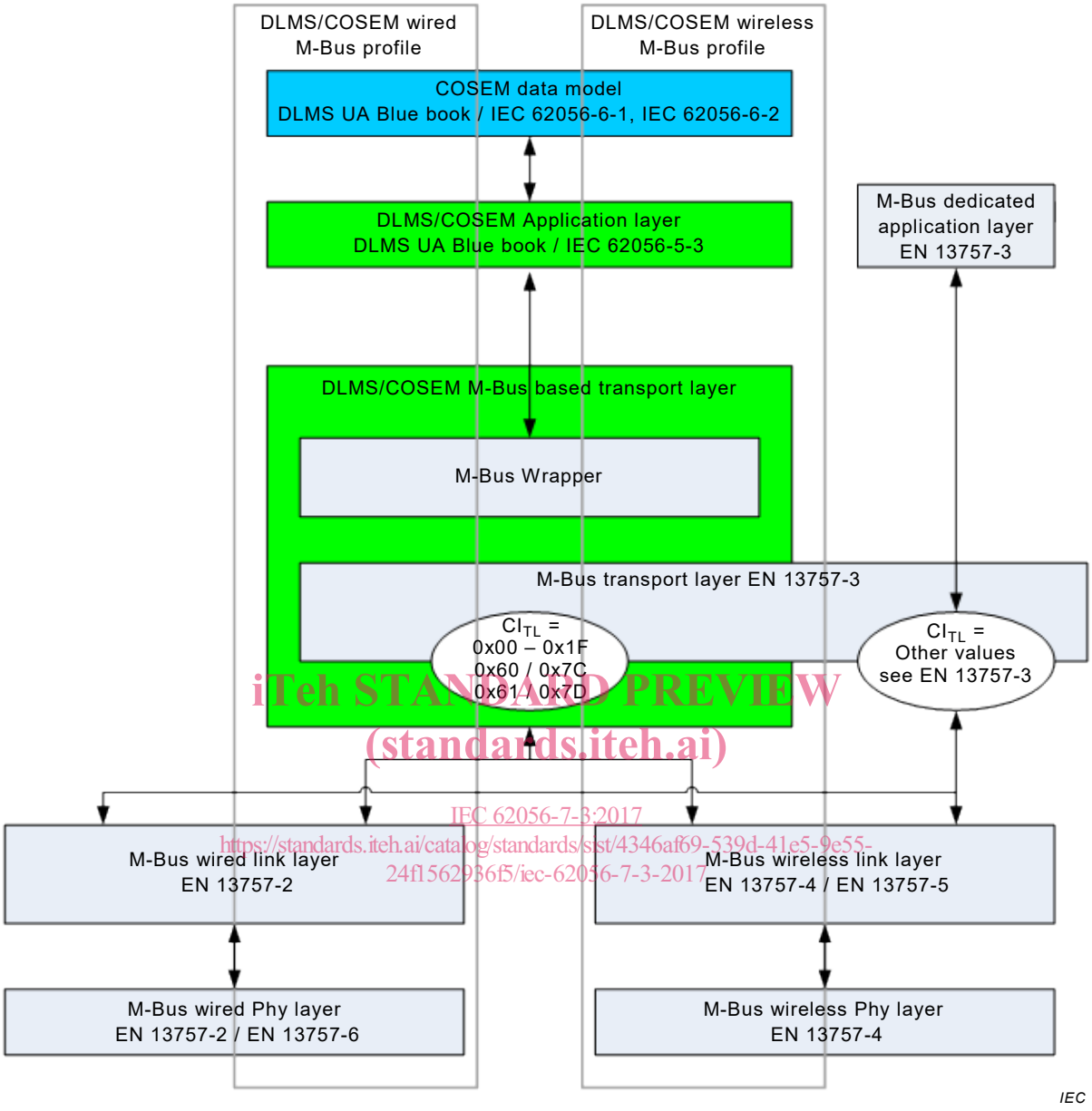

Figure 2 – The DLMS/COSEM wired and wireless M-Bus communication profiles

5.3 Lower protocol layers and their use

5.3.1 Physical layer

The physical layer is as specified in EN 13757-2:2004 (wired, twisted pair based) and in EN 13757-4:2013 (wireless).

For battery-operated masters and/or a small number of connected meters, a wired M-Bus physical layer is specified in EN 13757-6 (twisted pair based for short distances).

5.3.2 Link layer

The M-Bus link layer is as specified in EN 13757-2:2004 (wired) and in EN 13757-4:2013 (wireless).

NOTE For wireless meter readout EN 13757-5:2015 supports simple retransmission (single-hop repeating) as well as routed wireless networks that allow extending the range of transmission.

5.3.3 Transport layer

The M-Bus transport layer is as specified in EN 13757-3:2013.

Together with an M-Bus wrapper specified in 6.6, it constitutes the DLMS/COSEM M-Bus-based transport layer (TL) that acts as an adaptation layer between the link layer and the DLMS/COSEM AL.

The M-Bus TL allows several application layers to co-exist over the M-Bus lower layers. These can be:

- the M-Bus dedicated AL;
- the DLMS/COSEM AL; or
- some other AL that may be specified in the future.

The AL used is selected by the Control Information (CI) field of the M-Bus frame.

In the communication profiles specified in this document, only the DLMS/COSEM AL is used.

There are also CI field values for network management purposes. M-Bus frames carrying such CI field values do not necessarily carry application data.

5.4 Service mapping and adaptation layers

5.4.1 Overview

As already mentioned in 5.3.3, in the wired and wireless M-Bus communication profiles for local and neighbourhood networks the DLMS/COSEM M-Bus-based TL acts as an adaptation layer between the M-Bus link layer and the DLMS/COSEM AL.

It comprises the transport layer specified in EN 13757-3:2013 and a wrapper layer.

It provides OSI-style connectionless data services with optional segmentation and reassembly to the service user DLMS/COSEM AL.

The M-Bus wrapper – specified in 6.6 – provides the addressing capability required to address client and server DLMS/COSEM APs.

The service primitives are shown in Figure 3 and they are the same on the client and server side.

The .request service primitive is used to send a COSEM APDU to the peer TL.

The .indication service primitive indicates the reception of a COSEM APDU from the peer TL.

The .confirm service primitive is locally generated. It provides information to the AL about the status of sending the COSEM APDU.

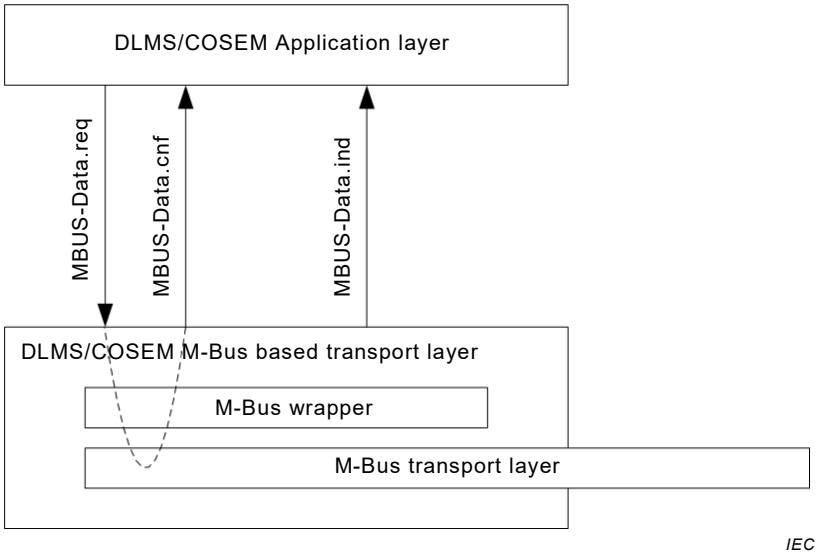

Figure 3 – Summary of DLMS/COSEM M-Bus-based TL services

5.4.2 MBUS-DATA service primitives

5.4.2.1 MBUS-DATA.request

Function

The MBUS-DATA.request primitive is used by the DLMS/COSEM AL to request the DLMS/COSEM M-Bus-based TL to send a COSEM APDU to (a) peer DLMS/COSEM M-Bus-based transport layer(s).

NOTE Multicast or broadcasting is available only in the direction client to server.

Semantics

The primitive shall provide the service parameters as follows:

MBUS-DATA.request (
M-Bus_Data_Header_Type,
STSAP,
DTSAP,
Data
)

The M-Bus_Data_Header_Type parameter indicates the M-Bus data header type to be used in the M-Bus frame to be sent. Its value can be *None_M-Bus_Data_Header*, *Short_M-Bus_Data_Header* or *Long_M-Bus_Data_Header*, see Figure 6.

The STSAP parameter indicates the TL service access point (SAP) belonging to the device / AP requesting to send the Data.

The DTSAP parameter indicates the TL SAP belonging to the device(s) / AP(s) to which the Data is to be transmitted.

The Data parameter contains the COSEM APDU to be transferred to the peer AL.

Use

The MBUS-DATA.request service primitive is invoked by either the client or the server DLMS/COSEM AL to request sending a COSEM APDU to a single peer AL or – in the case of multicast or broadcasting (by the client only) – to multiple peer ALs.

The reception of this primitive shall cause the DLMS/COSEM M-Bus-based TL to build the appropriate M-Bus data header accordingly and to construct the TPDU data unit to be passed to the M-Bus data link layer.

When the APDU to be sent is too long to fit in a single M-BUS frame, then segmentation may be used, see 5.4.3.

5.4.2.2 MBUS-DATA.indication

Function

The MBUS-DATA.indication primitive is used by the DLMS/COSEM M-Bus-based TL to pass a COSEM APDU received from the peer DLMS/COSEM M-Bus-based TL to the service user DLMS/COSEM AL.

Semantics

The primitive shall provide the service parameters as follows:

MBUS-DATA.indication (
M-Bus_Data_Header_Type,
STSAP,
DTSAP,
Data
)

The M-Bus_Data_Header_Type parameter indicates M-Bus data header type used in the M-Bus frame received. Its value can be *None_M-Bus_Data_Header*, *Short_M-Bus_Data_Header* or *Long_M-Bus_Data_Header*, see Figure 6.

The STSAP parameter indicates the TL SAP belonging to the device / AP that has sent the Data.

The DTSAP parameter indicates the TL SAP belonging to the device / AP that has received the Data.

The Data parameter contains the COSEM APDU received from the peer AL.

Use

The MBUS-DATA.indication service primitive is generated by the DLMS/COSEM M-Bus-based TL to indicate to the service user DLMS/COSEM AL that a COSEM APDU from the peer layer entity has been received.

According to the received M-Bus data header, the TL allocates and passes only the M-Bus_Data_Header_Type to the DLMS/COSEM AL, but not the values of the received M-Bus data header.

If the STSAP or DTSAP are not valid – meaning that there is no AA bound to the given SAPs – the message received shall be simply discarded.

NOTE If the CI_{TL} field and the elements of the short or long M-Bus data header do not match, the TPDU is discarded by the EN 13757 M-Bus TL.