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# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

## Electricity metering data exchange – The DLMS/COSEM suite – Part 3-1: Use of local area networks on twisted pair with carrier signalling

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## Échange des données de comptage de l'électricité – La suite DLMS/COSEM – Partie 3-1: Utilisation des réseaux locaux sur paire torsadée avec signal de porteuse

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

# ELECTRICITY METERING DATA EXCHANGE – THE DLMS/COSEM SUITE –

## Part 3-1: Use of local area networks on twisted pair with carrier signalling

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International Standard IEC 62056-3-1 has been prepared by IEC technical committee 13: Electrical energy measurement, tariff- and load control.

This first edition cancels and replaces the first edition of IEC 62056-31, issued in 1999, and constitutes a technical revision.

The main technical changes with regard to the previous edition are as follows:

- addition of a profile which makes use of the IEC 62056 DLMS/COSEM Application layer and COSEM object model,
- review of the data link layer which is split into two parts:
  - a pure Data Link layer;
  - a "Support Manager" entity managing the communication media;
- ability to negotiate the communication speed, bringing baud rate up to 9 600 bauds.

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

| FDIS | Report on voting |
|---|---|
| 13/1546/FDIS | 13/1552/RVD |

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

A list of all parts of IEC 62056 series, published under the general title *Electricity metering data exchange – The DLMS/COSEM suite*, can be found on the IEC website.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next eidition.

The numbering scheme has changes from IEC 62056-XY to IEC 62056-X-Y. For example, IEC 62056-31 becomes IEC 62056-3-1.

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# ELECTRICITY METERING DATA EXCHANGE – THE DLMS/COSEM SUITE –

## Part 3-1: Use of local area networks on twisted pair with carrier signalling

## 1 Scope

This part of IEC 62056 describes three profiles for local bus data exchange with stations either energized or not. For non-energized stations, the bus supplies energy for data exchange.

Three different profiles are supported:

- base profile: this three-layer profile provides remote communication services;

  NOTE This first profile has been published in IEC 61142:1993 and became known as the Euridis standard.

- profile with DLMS: this profile allows using DLMS services as specified in IEC 61334-4-41;

  NOTE This second profile has been published in IEC 62056-31 Ed. 1.0:1999;

- profile with DLMS/COSEM: this profile allows using the DLMS/COSEM Application layer and the COSEM object model as specified in IEC 62056-5-3 Ed. 1.0:— and in IEC 62056-6-2 Ed. 1.0:— respectively.

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The three profiles use the same physical layer and they are fully compatible, meaning that devices implementing any of these profiles can be operated on the same bus.

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The transmission medium is twisted pair using carrier signalling and it is known as the Euridis Bus.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61334-4-41:1996, *Distribution automation using distribution line carrier systems – Part 4: Data communication protocol – Section 41: Application protocols – Distribution line message specification*

IEC 62056-51:1998 *Electricity Metering – Data exchange for meter reading, tariff and load control – Part 51: Application Layer Protocols*

IEC 62056-5-3 Ed. 1.0:—, *Electricity metering data exchange – The DLMS/COSEM suite – Part 5-3: DLMS/COSEM application layer*

ISO/IEC 8482:1993, *Information technology – Telecommunications and information exchange between systems – Twisted pair multipoint interconnections*

EIA 485 – *Standard for Electrical Characteristics of Generators and Receivers for Use in Balanced Digital Multipoint Systems*

## 3 Abbreviations

| Abbreviation | English rendering |
|---|---|
| ADP | Primary Station Address |
| ADG | General Secondary Address. Broadcast Address |
| ADS | Secondary Station Address |
| AGN | Normal Wakeup |
| AGT | General call for a General Energized Station |
| APDU | Application Protocol Data Unit |
| APG | General Primary Address |
| ARJ | COM field value: Rejection of authentication in remote programming exchange |
| ASDU | Application Service Data Unit |
| ASO | COM field value: Call to Forgotten Stations |
| AUT | COM field value: Authentication command |
| COM | Control field of the Data Link layer |
| COSEM | Companion Specification for Energy Metering |
| DAT | COM field value: Response of remote reading exchange |
| DES | Data Encryption Standard |
| DLMS | Distribution Line Message Specification (IEC 61334-4-41)<br>Device Language Message Specification (IEC 62056-5-3) |
| DSDU | Data link Service Data Unit |
| DRJ | COM field value: Data Rejected<br>Value of COM notifying the rejection of remote programming exchange data |
| Dsap | Transport data unit label. Coded over 3 bits. Its value is 6. |
| DTSAP | Destination of Transport Service Access Point |
| ECH | COM field value: Echo of remote programming exchange data |
| ENQ | Remote reading exchange request |
| EOS | COM field value: End of remote programming exchange |
| IB | Initialisation of the bus |
| MaxRetry | Maximum number retransmissions. Limited to 2. |
| MaxRSO | Maximum number of RSO listening windows. Fixed at 3. |
| PDU | Protocol Data Unit |
| PRE | COM field value: Pre-selection of energised stations |
| REC | COM field value: Remote programming exchange request |
| RSO | COM field value: Response to a call to forgotten stations |
| SEL | COM field value: Acknowledgement of the pre-selection of energized stations |
| STSAP | Source Transport Service Access Point |
| TAB | In the case of the Euridis profiles without DLMS and without DLMS/COSEM: data code.<br>In the case of profiles using DLMS or DLMS/COSEM: value at which the equipment is programmed for Discovery |
| TABi | List of TAB field |
| TASB | Duration of an Alarm Signal on the Bus |
| TOAG | Maximum wait time for an energized station once selected, to recognise a general call AGN |
| TOALR | Wait before sending an AGN after reception of an AGN or AGT |
| TOL | Maximum waiting time for a request from the upper layer |

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| Abbreviation | English rendering |
|---|---|
| TOPRE | Maximum waiting time for a response to a pre-selection. |
| TPDU | Transport Protocol Data Unit |
| TSDU | Transport Protocol Service Unit |
| TRA | COM field value: Acknowledgement of point to point transfer |
| TRB | COM field value: Broadcast remote transfer frame not acknowledged |
| TRF | COM field value: Point to point remote transfer exchange |
| T1 | Time out to wait for a response according to a request |
| XBA | COM field value: Response to a change of speed request |
| XBR | COM field value: Change of speed request |
| ZA1 | Field reserved for bidirectional programming authentication |
| ZA2 | Field reserved for bidirectional programming authentication |

# 4 General description

## 4.1 Basic vocabulary

All communication calls upon two systems called Primary Station and Secondary Station. The Primary Station is the system that decides to initialize a communication with a remote system called Secondary Station; these designations remain valid throughout the duration of the communication.

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A communication is broken down into a certain number of transactions. Each transaction consists of a transmission from the Transmitter to the Receiver. During the sequence of transactions, the Primary Station and Secondary Station systems take turns to act as Transmitter and Receiver.

IEC 62056-3-1:2013
https://standards.iteh.ai/catalog/standards/sist/5c3981f1-588a-4173-a7da-5c22fb7f82f9/iec-62056-3-1-2013

For the local bus data exchange profile with DLMS or DLMS/COSEM, the terms Client and Server have the same meaning as for the DLMS model (refer to IEC 61334-4-41 or IEC 62056-5-3 Ed. 1.0:—). The Server (which is a Secondary Station) receives and processes all submissions of specific service requests. The Client (which is a Primary Station) is the system that uses the Server for a specific purpose by means of one or more service requests.

## 4.2 Profiles, layers and protocols

### 4.2.1 Overview

This standard specifies three profiles as shown in Figure 1.

- the base profile (without DLMS), see 4.2.2;
- the profile with DLMS, see 4.2.3;
- the profile with DLMS/COSEM; see 4.2.4.

The physical layer in the three profiles is the same except that in the DLMS/COSEM profile speed negotiation is available. This common physical layer allows stations using different profiles to be installed on the same bus.

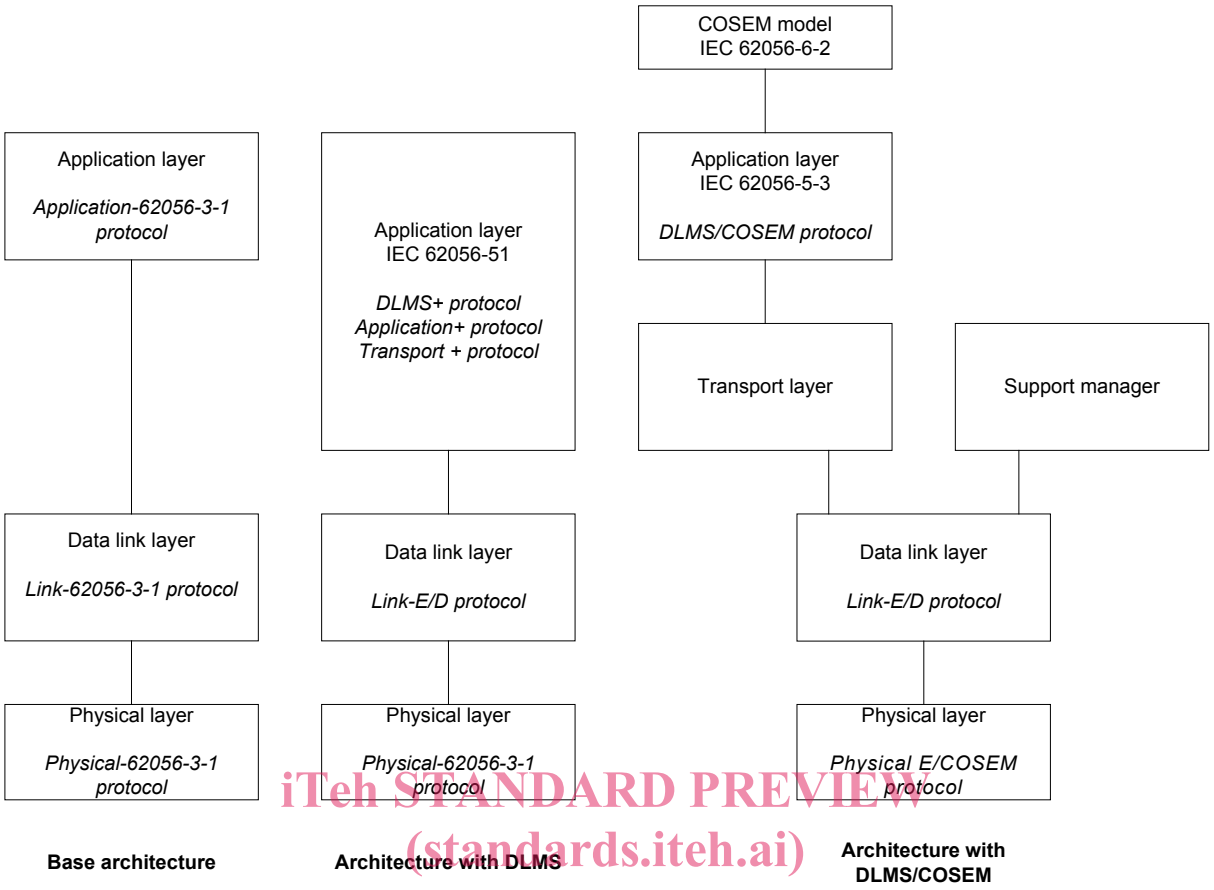


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**Figure 1 – IEC 62056-3-1 communication profiles**

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### 4.2.2 Base profile (without DLMS)

The base profile (without DLMS) uses three protocol layers:

- the physical layer with the *Physical-62056-3-1* protocol specified in 5.1;
- the data link layer with the *Link-62056-3-1* protocol, specified in 5.2, and
- the application layer with the *Application-62056-3-1* protocol specified in 5.3.

This profile allows remote reading, remote programming, point-to-point remote transfer – which is a simplified remote programming service – broadcast remote transfer, remote supply of secondary stations, detecting forgotten stations and alarm functions. The related communication services are specified in 4.4.

### 4.2.3 Profile with DLMS

The profile with DLMS uses three protocol layers:

- the same physical layer as the base profile, specified in 5.1;
- the data link layer using the *Link-E/D* protocol, specified in 6.2; and
- the application layer specified in IEC 62056-51, using the *Transport+, Application+* and *DLMS+* protocols, see 6.3.

This profile also allows using DLMS as specified in IEC 61334-4-41. The related communication services are specified in 4.5.

#### 4.2.4 Profile with DLMS/COSEM

The profile with DLMS/COSEM uses four protocol layers:

- the physical layer, similar to the one used in the base profile and the profile with DLMS, specified in 5.1, but with speed negotiation, see 7.2;
- the data link layer using the *Link-E/D* protocol. This is the same as the data link layer of the profile with DLMS, except that it interfaces with the support manager layer and the transport layer. See 7.3;
- the support manager layer supports some specific process for the management of the bus, see 0;
- the transport layer provides segmentation and reassembly of APDUs, see 0;
- the application layer as specified in IEC 62056-5-3 Ed. 1.0:—taking into account some restrictions of the Euridis bus, see 0.

The profile with DLMS/COSEM allows using the COSEM object model and the DLMS services accessing the COSEM objects over the Euridis bus.

### 4.3 Specification language

In this standard, the protocol of each layer is described by state transitions represented in the form of tables. The syntax used in making up these tables is defined by a specification language described in Annex A.

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In the event of a difference in interpretation between part of the text and a state transition table, the table is always taken as the reference.

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### 4.4 Communication services for local bus data exchange without DLMS

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#### 4.4.1 Overview

The list of available services at the Application level layer is:

a) remote reading of data, see 0;

b) remote programming of data, see 4.4.3;

c) point to point remote transfer, which is a simplified remote programming service, see 4.4.4;

d) broadcast remote transfer, 4.4.5;

e) bus initialization, 4.4.6;

f) forgotten station call, 4.4.7.