

INTERNATIONAL STANDARD



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

(<https://standards.iteh.ai>)
Document Preview

[IEC 62056-3-1:2021](https://standards.iteh.ai/catalog/standards/iec/9ff1e465-7c6a-4fa1-9969-aa899a22486b/iec-62056-3-1-2021)

<https://standards.iteh.ai/catalog/standards/iec/9ff1e465-7c6a-4fa1-9969-aa899a22486b/iec-62056-3-1-2021>





THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2021 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, 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 either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC online collection - oc.iec.ch

Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 18 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

International Standards
standards.iteh.ai)
Document Preview

[IEC 62056-3-1:2021](https://standards.iteh.ai/catalog/standards/iec/9ff1e465-7c6a-4fa1-9969-aa899a22486b/iec-62056-3-1-2021)

<https://standards.iteh.ai/catalog/standards/iec/9ff1e465-7c6a-4fa1-9969-aa899a22486b/iec-62056-3-1-2021>



IEC 62056-3-1

Edition 2.0 2021-07
REDLINE VERSION

INTERNATIONAL STANDARD



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

Document Preview

[IEC 62056-3-1:2021](https://standards.iteh.ai/catalog/standards/iec/9ff1e465-7c6a-4fa1-9969-aa899a22486b/iec-62056-3-1-2021)

<https://standards.iteh.ai/catalog/standards/iec/9ff1e465-7c6a-4fa1-9969-aa899a22486b/iec-62056-3-1-2021>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 17.220.20; 35.110; 91.140.50

ISBN 978-2-8322-5174-4

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD	6
1 Scope	8
2 Normative references	8
3 Terms, definitions and abbreviated terms	9
3.1 Terms and definitions.....	9
3.2 Abbreviated terms.....	9
4 General description	10
4.1 Basic vocabulary.....	10
4.2 Profiles, layers and protocols.....	11
4.3 Specification language.....	12
4.4 Communication services for local bus data exchange without DLMS.....	12
4.5 Communication services for local bus data exchange with DLMS.....	21
4.6 Systems management.....	22
5 Local bus data exchange without DLMS	23
5.1 Physical layer	23
5.2 Data Link layer.....	35
5.3 Application layer	43
6 Local bus data exchange with DLMS	46
6.1 Physical layer	46
6.2 Data Link layer.....	47
6.3 Application layer	56
7 Local bus data exchange with DLMS/COSEM	56
7.1 Model	56
7.2 Physical Layer	56
7.3 Data Link layer.....	68
7.4 Support Manager layer.....	77
7.5 Transport Layer	81
7.6 Application Layer	85
8 Local bus data exchange – Hardware	86
8.1 General.....	86
8.2 General characteristics	86
8.3 Bus specification.....	91
8.4 Magnetic plug	93
8.5 Functional specifications of Primary Station transmitter (for 50 kHz signal).....	95
8.6 Functional specifications of Primary Station receiver (for 50 kHz signal).....	96
8.7 Functional specification of Secondary Station transmitter (for 50 kHz signal)	97
8.8 Functional specifications of Secondary Station receiver (for 50 kHz signal)	98
9 Unidirectional local data transmission interface	99
9.1 Introduction.....	99
9.2 General description.....	99
9.3 Historical TIC.....	99
9.4 Standard TIC	103
9.5 Unidirectional TIC Hardware	104
Annex A (normative) Specification language	111
A.1 Vocabulary and operating rules.....	111

A.2	Entity and Entity Invocation.....	112
Annex B (normative)	Timing types and characteristics	113
B.1	Timing type definition.....	113
B.2	Timing measurements and characteristics.....	114
Annex C (normative)	List of fatal errors.....	115
Annex D (normative)	Coding the command code field of frames.....	116
D.1	Command codes for local bus data exchange (Table D.1).....	116
D.2	Codes of commands for data exchange on the local bus with DLMS or DLMS/COSEM	116
Annex E (normative)	Principle of the CRC	118
E.1	General.....	118
E.2	Operations on the polynomials.....	118
E.3	Check procedure.....	118
E.4	Operating parameters	119
Annex F (normative)	Random integer generation for response from forgotten stations	120
F.1	General.....	120
F.2	Criterion for a random integer	120
F.3	Operating parameters	120
Annex G (normative)	Random number generation for authentication (profile without DLMS)	121
Annex H (normative)	Systems management implementation	122
Annex I (informative)	Information about exchanges.....	123
I.1	Non-energized station session (Figure I.1).....	123
I.2	Remote reading and programming exchanges (Figure I.2)	124
I.3	Bus initialization frame (Figure I.3).....	125
I.4	Forgotten station call exchange (Figure I.4)	126
Bibliography.....		127
Figure 1 – IEC 62056-3-1 communication profiles		11
Figure 2 – Alarm mechanism		21
Figure 3 – Exchanges in continuous operation.....		25
Figure 4 – Alarm event without any communication in progress		26
Figure 5 – Alarm event with a communication in progress.....		26
Figure 6 – Signal envelope on the bus		87
Figure 7 – Bus representation.....		88
Figure 8 – Power supply characteristics.....		88
Figure 9 – States associated to a session: for selected Secondary Station		89
Figure 10 – States associated to a session: for non-selected Secondary Station.....		89
Figure 11 – Simple and multiple Secondary stations		90
Figure 12 – Equivalent diagram of the test equipment.....		92
Figure 13 – Ferrite pot and bobbin		93
Figure 14 – Associated components of the magnetic plug		94
Figure 15 – Associated components of the energy supply plug		95
Figure 16 – Character transmission		100
Figure 17 – Historical TIC: information group structure		101
Figure 18 – Standard TIC: Application information group structure.....		103

Figure 19 – Standard TIC: Timestamped information group structure	103
Figure 20 – Equivalent diagram of the test equipment	107
Figure 21 – Signal envelope on the bus	108
Figure B.1 – Logical timing type	113
Figure B.2 – Physical timing type	113
Figure B.3 – Results processing for timing defined with low and high limits	114
Figure B.4 – Results processing for timing defined by a nominal value	114
Figure I.1 – Non-energized station session	123
Figure I.2 – Remote reading and programming exchanges	124
Figure I.3 – Bus initialization	125
Figure I.4 – Forgotten station call exchange	126
Table 1 – Primary Station timing	24
Table 2 – Secondary Station timing	25
Table 3 – Physical services and service primitives	26
Table 4 – <i>Physical-62056-3-1</i> state transitions: Primary Station	27
Table 5 – Power supply management state transitions (only for non-energized Secondary Station)	30
Table 6 – <i>Physical-62056-3-1</i> state transitions: Secondary Station	31
Table 7 – Meaning of the states listed in the previous tables	32
Table 8 – Definition of the procedures, functions and events classified in alphabetical order	33
Table 9 – Error summary table	35
Table 10 – Data Link services and service primitives	36
Table 11 – <i>Link-62056-3-1</i> state transitions: Primary Station	37
Table 12 – <i>Link-62056-3-1</i> State transitions: Secondary Station	40
Table 13 – Meaning of the states listed in the previous tables	41
Table 14 – Definition of the procedures and functions classified in alphabetical order	41
Table 15 – Error summary table	42
Table 16 – Application services and service primitives	43
Table 17 – <i>Application-62056-3-1</i> state transitions: Primary Station	44
Table 18 – <i>Application-62056-3-1</i> state transitions: Secondary Station	45
Table 19 – Meaning of the states listed in the previous tables	45
Table 20 – Definition of the procedures and functions classified in alphabetical order	46
Table 21 – Error summary table	46
Table 22 – Data Link services and service primitives	48
Table 23 – <i>Link-E/D</i> state transitions: Primary Station	49
Table 24 – <i>Link-E/D</i> state transitions: Secondary Station	51
Table 25 – Meaning of the states listed in the previous tables	53
Table 26 – Definition of the procedures and functions classified in alphabetical order	54
Table 27 – Error summary table	55
Table 28 – Client_connect function definition	56
Table 29 – E/COSEM Physical services and service primitives	57
Table 30 – <i>E/COSEM Physical</i> state transitions: Primary Station	59

Table 31 – Power supply management state transitions (only for non-energized Secondary Station)	61
Table 32 – <i>E/COSEM Physical</i> State transitions: Secondary Station	63
Table 33 – Meaning of the states listed in the previous tables	64
Table 34 – Definition of the procedures, functions and events classified in alphabetical order	65
Table 35 – Error summary table	68
Table 36 – Data Link services and service primitives	69
Table 37 – <i>DLMS/COSEM Data Link E/D</i> state transitions: Primary Station	71
Table 38 – <i>DLMS/COSEM Link E/D</i> state transitions: Secondary Station	73
Table 39 – Meaning of the states listed in the previous tables	75
Table 40 – Definition of the procedures and functions classified in alphabetical order	76
Table 41 – Commands managed by the Support Manager layer	77
Table 42 – List of parameters	79
Table 43 – Support Manager layer state transitions: Primary Station	79
Table 44 – Support Manager layer state transitions: Secondary Station	80
Table 45 – Meaning of the states listed in the previous table	80
Table 46 – Definition of procedures, functions and events	80
Table 47 – Transport services and services primitive	82
Table 48 – Transport state transitions	82
Table 49 – Meaning of the states listed in the previous table	84
Table 50 – Definition of the procedures and functions classified in alphabetical order	84
Table 51 – Primary station transmitter: Tev0 and Tev1 values	96
Table 52 – Primary station receiver: Tev0 and Tev1 values	96
Table 53 – Secondary station transmitter: Tev0 and Tev1 values	97
Table 54 – Secondary station receiver: Tev0 and Tev1 values	98
Table 55 – TIC terminal board pin out	105
Table 56 – Power supply characteristics	105
Table 57 – Signal characteristics	107
Table C.1 – FatalError error numbers	115
Table D.1 – Command codes for local bus data exchange	116
Table D.2 – Command codes with DLMS and DLMS/COSEM	117
Table H.1 – Discovery service	122
Table H.2 – Service specification	122

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**

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 itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 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 Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 62056-3-1:2013. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

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

This second edition cancels and replaces the first edition of IEC 62056-3-1, issued in 2013, 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 International Standard is based on the following documents:

CDV	Report on voting
13/1794/CDV	13/1823/RVC

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

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.

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

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

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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~~ two sets of profiles: the first set of profiles allows a bidirectional communication between a client and a server. This set of profiles is made of three profiles allowing 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 1 This first profile was 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 2 This second profile was published in IEC 62056-31:1999.
- 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 and in IEC 62056-6-2 respectively.

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

The second set of profiles allows unidirectional communication between a given Energy Metering device and a Customer Energy Management System. This second set is made up of three profiles.

Subclause 4.2.1 to Clause 8 included specify the bidirectional communication using twisted pair signalling and Clause 9 to 9.5 the unidirectional communication using twisted pair signalling.

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 61334-4-41:1996, *Distribution automation using distribution line carrier systems – Part 4: Data communication protocols – 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 62056-5-3:2017, *Electricity metering data exchange – The DLMS/COSEM suite – Part 5-3: DLMS/COSEM application layer*

IEC 62056-6-2:2017, *Electricity metering data exchange – The DLMS/COSEM suite – Part 6-2: COSEM interface classes*

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 Terms, definitions and abbreviated terms

3.1 Terms and definitions

No terms and definitions are listed in this document.

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

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) Device Language Message Specification (IEC 62056-5-3)
DSDU	Data link Service Data Unit
DRJ	COM field value: Data Rejected 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
LDTI	Local Data Transmission Interface
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. 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
TIC	Transmission of Information to the Customer
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
TOPRE	Maximum waiting time for a response to a pre-selection.
TOU	Time of Use
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.

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.

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). 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 document 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.

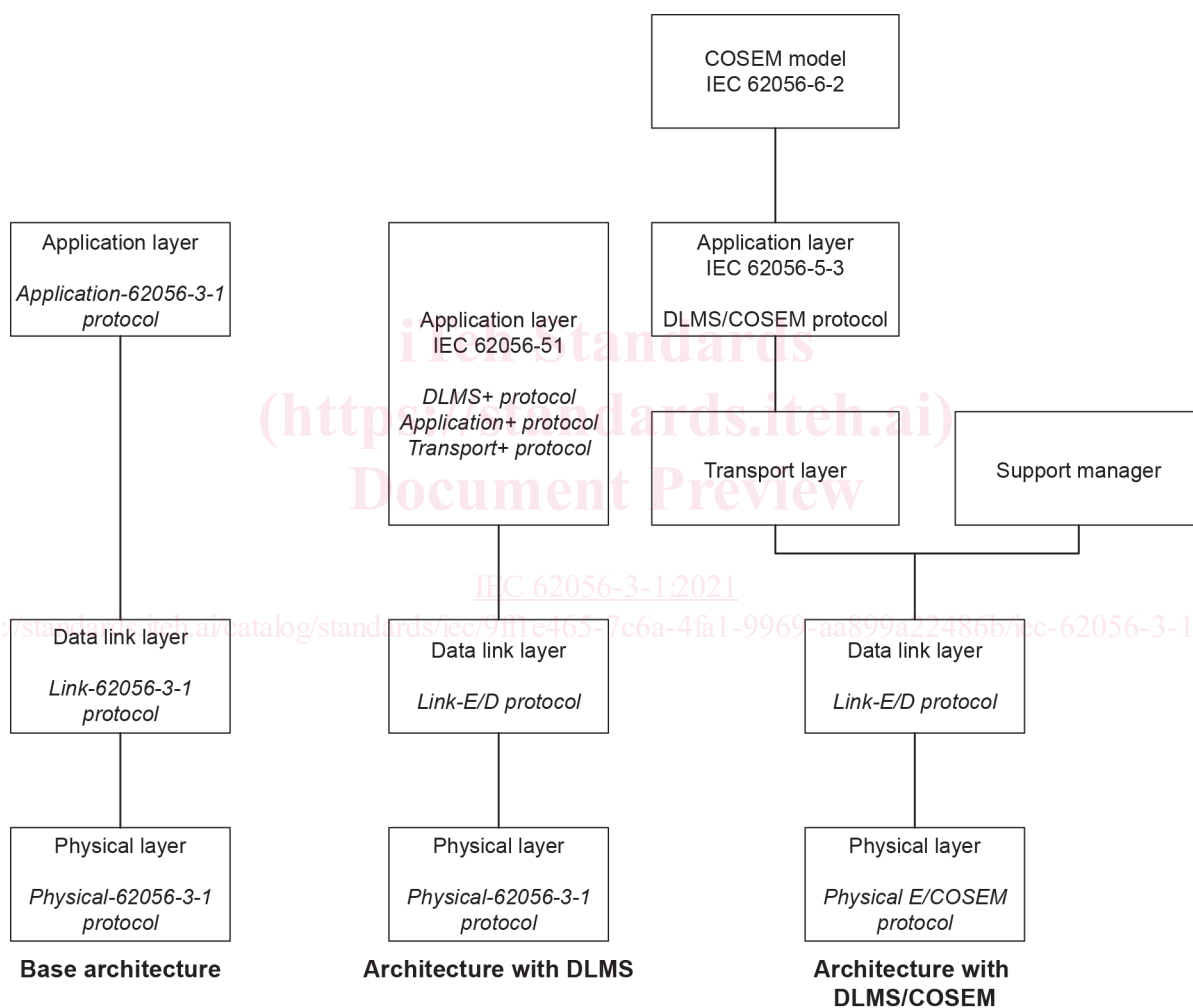


Figure 1 – IEC 62056-3-1 communication profiles

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 7.4;
- the transport layer provides segmentation and reassembly of APDUs, see 7.5;
- the application layer as specified in IEC 62056-5-3 taking into account some restrictions of the Euridis bus, see 7.6.

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 document, 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.

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.

4.4 Communication services for local bus data exchange without DLMS

4.4.1 Overview

The list of available services (see Annex I) at the Application level layer is:

- a) remote reading of data, see 4.4.2;
- 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.