

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Electricity metering data exchange – The DLMS/COSEM suite –  
Part 7-5: Local data transmission profiles for Local Networks (LN)**

**Échange des données de comptage de l'électricité – La suite DLMS/COSEM –  
Partie 7-5: Profils de transmission de données locales pour réseaux locaux (LN)**

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## CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references .....	10
3 Terms, definitions and abbreviations .....	11
3.1 Terms and definitions .....	11
3.2 Abbreviations .....	11
4 Targeted communication environments .....	11
5 Use of the communication layers for these profiles .....	12
5.1 Information related to the use of the standards specifying the lower layers .....	12
5.2 Structure of the profile.....	12
5.3 Use of the lower layers.....	13
5.3.1 Overview .....	13
5.3.2 Physical layer .....	14
5.3.3 MAC layer.....	14
5.3.4 Data link layer.....	14
5.4 Service mapping and adaptation layers.....	14
5.4.1 For the default HDLC based data link layer.....	14
5.4.2 For other lower layers.....	15
5.5 Registration and connection management.....	15
6 Identification and addressing scheme.....	15
6.1 General identification and addressing scheme.....	15
6.2 Addressing for the default HDLC based data link layer.....	15
6.3 Addressing for other data link layers.....	15
7 Specific considerations for the application layer services.....	15
7.1 Overview .....	15
7.2 Application Association establishment and release: ACSE services.....	15
7.3 xDLMS services .....	15
7.4 Security mechanisms .....	16
7.5 Transferring long application messages.....	16
7.6 Media access, bandwidth and timing considerations.....	16
8 Communication layer configuration and management .....	17
9 The COSEM application process (AP).....	17
9.1 Model and services .....	17
9.2 COSEM interface classes (IEC 62056-6-2) to configure the LDTI .....	18
9.3 Security environment (not valid for legacy mode) .....	19
9.4 Restrictions for interfaces supporting “Legacy operating modes” .....	20
10 Additional considerations for the use of this profile – Safety .....	21
Annex A (normative) Media specific profile: Optical interface .....	22
A.1 IEC 62056-21 port.....	22
A.2 IEC 62056-21 port operating in legacy mode.....	23
Annex B (normative) Media specific Profile: TP with carrier signalling Interface.....	25
B.1 IEC 62056-3-1 port.....	25
B.2 IEC 62056-3-1 port operating in legacy mode .....	26
Annex C (normative) Media specific profile: EIA-485, TIA-232-F interface .....	29

C.1	Electrical port RS485/232.....	29
Annex D (normative)	Media specific profile: M-Bus EN 13757-2 .....	31
D.1	M-Bus with the HDLC based data link layer .....	31
Annex E (normative)	IP profile .....	33
E.1	IP profile .....	33
Annex F (informative)	LDTI configuration examples .....	35
F.1	Example 1: only one value (active energy A+) pushed.....	35
Annex G (informative)	LDTI encoding examples .....	37
G.1	xDLMS APDUs used (without protection and without general-block-transfer) .....	37
G.2	Example 1: Only one value is pushed .....	37
G.3	Example 2: The OBIS code and one value is pushed.....	38
Index	.....	40
Figure 1	– LDTI DLMS/COSEM client as part of a consumer device .....	9
Figure 2	– LDTI DLMS/COSEM client as part of a local adaptor .....	9
Figure 3	– Entities and interfaces of a smart metering system.....	12
Figure 4	– IEC 62056-7-5 LDTI interface in the context of the smart metering architecture .....	12
Figure 5	–Local data transmission reference model .....	13
Figure 6	– LDTI – the interface to a pre-established DLMS/COSEM-LDTI client.....	18
Figure 7	– Interface classes modelling the push operation .....	19
Figure 8	– Example of a security environment for an LDTI using global keys .....	20
Figure 9	– LDTI – operating in “legacy mode” .....	21
Figure A.1	– Structure of the optical interface profile .....	22
Figure A.2	– Structure of the optical interface – “operating in legacy mode” – profile .....	24
Figure B.1	– Structure of the TP with carrier signalling profile .....	25
Figure B.2	– Structure of the TP with carrier signalling – “operating in legacy mode” – profile.....	27
Figure C.1	– Structure of the RS485/232 profile.....	29
Figure D.1	– Structure of the “M-Bus with HDLC based data link layer” profile.....	31
Figure E.1	– Structure of the IP profile .....	33
Table 1	– Features of communication profiles using DLMS/COSEM compatible and legacy protocol modes .....	9
Table 2	– Conformance block for the LDTI association.....	16
Table 3	– Configuration of a LDTI operating in "legacy mode" .....	20
Table A.1	– Mandatory setup attribute values for an optical IEC 62056-21 interface supporting IEC 62056-5-3 .....	23
Table A.2	– Mandatory setup attribute values for an optical IEC 62056-21 operating in the “legacy mode” .....	24
Table B.1	– Mandatory setup attribute values for a TP IEC 62056-3-1 supporting IEC 62056-5-3 .....	26
Table B.2	– Mandatory setup attribute values for a TP IEC 62056-3-1 operating in the “legacy mode” .....	28
Table C.1	– Mandatory setup attribute values for an electrical RS485/232 IEC 62056-21 interface supporting IEC 62056-5-3 .....	30

Table D.1 – Mandatory setup attribute values for an M-Bus port with HDLC based data link layer..... 32

Table E.1 – Mandatory setup attribute values for an IP port ..... 34

Table F.1 – Configuration example: one value pushed every 10 s via optical port..... 35

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THE DLMS/COSEM SUITE –****Part 7-5: Local data transmission profiles for Local Networks (LN)**

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International Standard IEC 62056-7-5 has been prepared by technical committee 13:  
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The text of this standard is based on the following documents:

CDV	Report on voting
13/1605/CDV	13/1650/RVC

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

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

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

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## 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 transmitting metering data modelled by COSEM interface objects through Local Data Transmission Interfaces (LDTI). The LDTI may be part of a meter or of a Local Network Access Point (LNAP) hosting a DLMS/COSEM server.

The specification of the communication profiles follows the rules defined in IEC 62056-5-3:2016, Annex A.

A major driver for the introduction of smart metering is to provide the consumer with suitable metering information to optimise his/her energy consumption and/or production. For that purpose, smart meters are equipped with local interfaces providing metering data for the consumer on consumer devices.

IEC 62056-21 and IEC 62056-3-1 are communication standards that specify direct local data exchange and data exchange through local networks. They provide protocol modes that support the DLMS/COSEM application layer and thus the COSEM object model. They also specify legacy modes that do not support the DLMS/COSEM application layer.

In order to allow connecting legacy consumer equipment to the LDTI, this International Standard also specifies communication profiles using protocol modes that do not support the DLMS/COSEM application layer.

It is assumed, however, that in all cases the metering application is modelled by COSEM interface objects.

It is also assumed that the meter has interfaces that fully support DLMS/COSEM and allow the configuration of the local data transmission interface by a DLMS/COSEM client.

The requirements on the physical type of the interface, the choice of the data transmitted and the transmitting pattern highly depends on the markets and projects the meter is designed for.

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

### Part 7-5: Local data transmission profiles for Local Networks (LN)

#### 1 Scope

This part of IEC 62056 specifies DLMS/COSEM communication profiles for transmitting metering data modelled by COSEM interface objects through a Local Data Transmission Interface (LDTI). The LDTI may be part of a meter or of a Local Network Access Point (LNAP) hosting a DLMS/COSEM server.

The main body of this standard specifies the common aspects of the different communication profiles for the LDTI interface.

The Annexes specify the communication protocol specific elements. The Annexes form an integral part of this International Standard.

Annex A (normative) specifies a communication profile using the protocol specified in IEC 62056-21. Clause A.1 specifies the communication profile that supports the DLMS/COSEM application layer and Clause A.2 specifies the communication profile using the legacy Mode D. The physical interface is the optical interface specified in IEC 62056-21:2002, 4.3.

Annex B (normative) specifies a communication profile using the protocol specified in IEC 62056-3-1. Clause B.1 specifies the communication profile that supports the DLMS/COSEM application layer and Clause B.2 specifies the communication profile using the legacy mode. The physical interface is twisted pair using carrier signalling known as the Euridis Bus.

Annex C (normative) specifies a communication profile based on the DLMS/COSEM 3-layer, connection oriented HDLC based profile specified in IEC 62056-7-6. The physical interface is RS 485 or TIA-232-F.

Annex D (normative) specifies a communication profile using the physical layer specified in EN 13757-2 and the HDLC based data link layer specified in IEC 62056-46. The physical interface is twisted pair with baseband signalling.

Annex E (normative) specifies a communication profile using UDP/IP. The physical layer is out of the scope of this International Standard.

The communication profiles in Clauses A.1, B.1, and Annexes C, D and E support the DLMS/COSEM application layer.

Annex F (informative) specifies an LDTI configuration example.

Annex G (informative) provides encoding examples.

Additional communication profiles for other media/communication protocols may be added in the future.

Table 1 shows the features of communication profiles using DLMS/COSEM compatible and legacy protocol modes.

**Table 1 – Features of communication profiles using DLMS/COSEM compatible and legacy protocol modes**

Feature	Communication profiles supporting	
	DLMS/COSEM compatible modes	Legacy modes
<b>Application model</b>	COSEM interface objects; any attribute value can be transmitted	COSEM interface objects; a limited set of attribute values can be transmitted
<b>Data formats</b>	A-XDR encoded	Protocol specific (typically ASCII strings)
<b>DLMS/COSEM application layer support</b>	Yes (xDLMS APDUs)	No
<b>Cryptographic protection</b>	COSEM attributes and COSEM APDUs	Out of scope (protocol specific)
<b>Data transmission triggers</b>	Time or event based, controlled by COSEM interface objects. Refresh rate can support time-critical applications.	Time or event based. Interface specific restrictions may apply.

The consumer device may directly support the LDTI communication protocol and data formats. In this case the LDTI DLMS/COSEM client is part of the consumer device as shown in Figure 1.

When the consumer device does not support the LDTI communication protocol and data formats then a local adaptor is necessary converting the communication medium and protocol of the LDTI to the communication means of the consumer device. In this case, the local adaptor may be part of the meter or LNAF as shown in Figure 2. The local adaptor and the data exchange between the local adaptor and the consumer device are out of the scope of this International Standard.

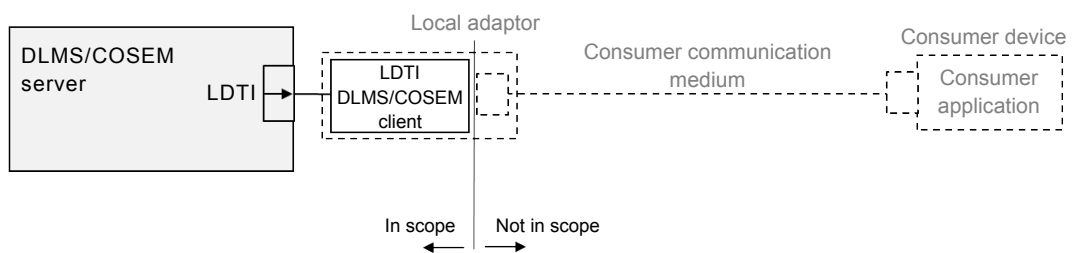
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This difference is not relevant for this standard, so the arrangement shown in Figure 1 is assumed.

The consumer device is also out of the scope of this International Standard.



**Figure 1 – LDTI DLMS/COSEM client as part of a consumer device**



**Figure 2 – LDTI DLMS/COSEM client as part of a local adaptor**

The scope of these communication profiles is restricted to aspects concerning the use of communication protocols in conjunction with the DLMS/COSEM data models. Data structures specific to a communication protocol should be defined in the specific protocol standards. Any project specific definitions of data structures and data contents shall be provided in project specific companion specifications.

## 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 60050-300, *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 60950-1:2005, *Information technology equipment – Safety – Part 1: General requirements*  
Amendment 1:2009  
Amendment 2:2013

IEC TR 62051, *Electricity metering – Glossary of terms*

IEC TR 62051-1, *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*

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IEC 62056-1-0, *Electricity metering data exchange – The DLMS/COSEM suite – Part 1-0: Smart metering standardization framework*

IEC 62056-21:2002, *Electricity metering – Data exchange for meter reading, tariff and load control – Part 21: Direct local data exchange*

IEC 62056-3-1:2013, *Electricity metering data exchange – The DLMS/COSEM suite – Part 3-1: Use of local area networks on twisted pair with carrier signalling*

IEC 62056-46: 2002, *Electricity metering – Data exchange for meter reading, tariff and load control – Part 46: Data link layer using HDLC protocol*  
Amendment 1:2006

IEC 62056-4-7:2015, *Electricity metering data exchange – The DLMS/COSEM suite – Part 4-7: DLMS/COSEM transport layer for IP networks*

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 62056-9-7, *Electricity metering data exchange – The DLMS/COSEM suite – Part 9-7: Communication profile for TCP-UDP/IP networks*

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

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

### 3 Terms, definitions and abbreviations

For the purposes of this document, the terms and definitions in IEC 60050-300, IEC TR 62051, IEC TR 62051-1 as well as the following apply.

NOTE Where there is a difference between the definitions in the glossary and those contained in product standards produced by TC 13, then the latter take precedence in applications of the relevant standard.

#### 3.1 Terms and definitions

##### 3.1.1

##### **communication medium**

physical medium to transmit signals carrying information

##### 3.1.2

##### **Local Data Transmission Interface**

##### **LDTI**

interface providing data at the location of the DLMS/COSEM server device

#### 3.2 Abbreviations

AA	Application Association
AARE	A-Associate Response – an APDU of the ACSE
AARQ	A-Associate Request – an APDU of the ACSE
AP	Application Process
LDTI	Local Data Transmission Interface
Sys-T	System Title as defined in IEC 62056-5-3:2016

### 4 Targeted communication environments

This clause identifies the communication environment(s), for which the communication profiles are specified.

Figure 4 shows the LDTI in the context of the smart metering architecture introduced in IEC 62056-1-0. Typically the LDTI is part of the metering device and therefore covers the H1 interface.

NOTE The data transmitted via the LDTI is generic enough to support any consumer application; i.e. it is not limited to „Simple Consumer Displays“.

However, it is also possible that the LDTI becomes part of an LNAP supporting the H2 interface as shown in Figure 3 and Figure 4. For both cases the scope as defined in Clause 1

applies. In particular, it is always assumed that the LDTI is part of a device including a DLMS/COSEM server.

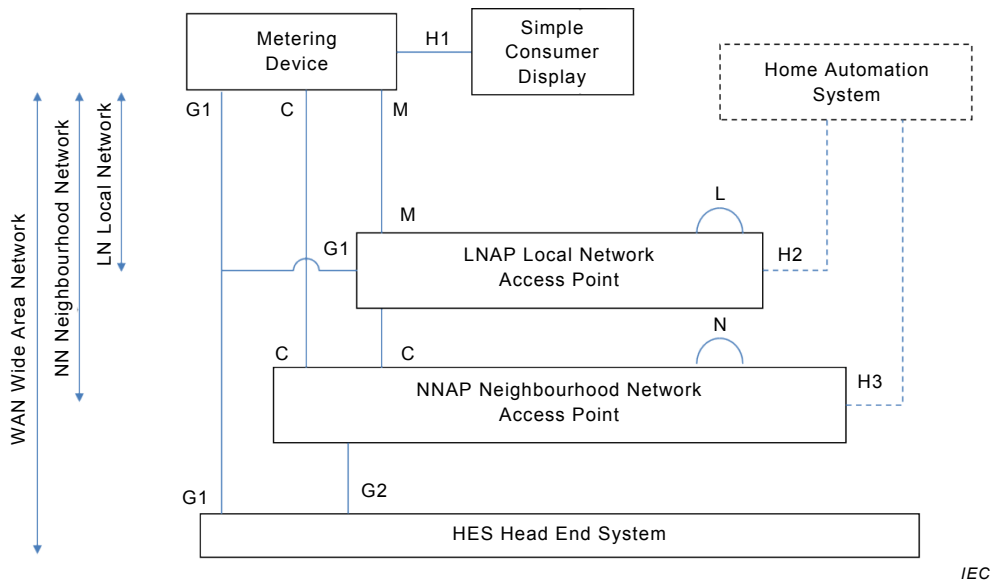


Figure 3 – Entities and interfaces of a smart metering system

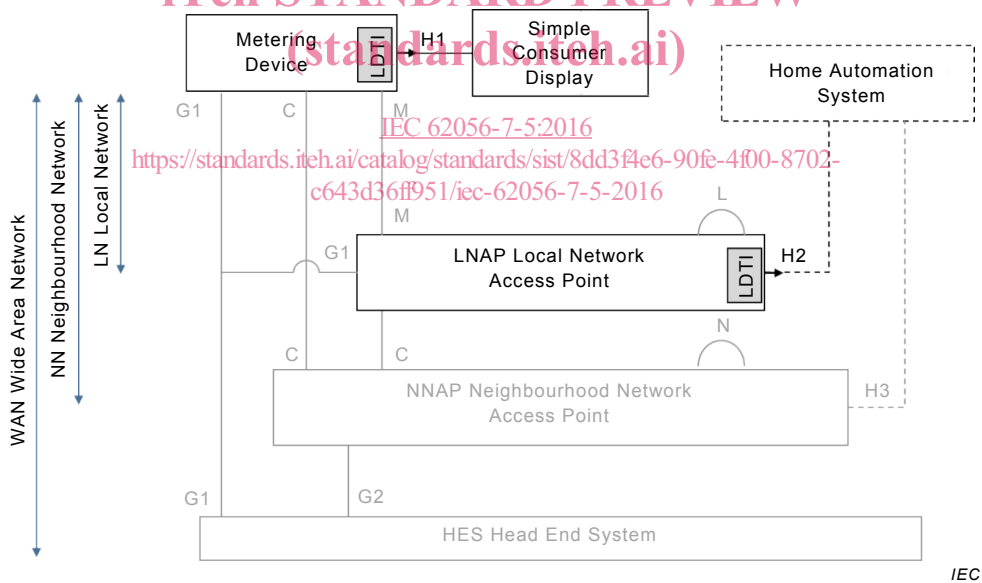


Figure 4 – IEC 62056-7-5 LDTI interface in the context of the smart metering architecture

## 5 Use of the communication layers for these profiles

### 5.1 Information related to the use of the standards specifying the lower layers

Detailed information on a particular, medium specific profile can be found in the corresponding Annex.

### 5.2 Structure of the profile

Figure 5 shows the common reference model used for the local data transmission profiles. It is based on the collapsed three layer architecture typically used in the IEC 62056 profiles.

The Application Process, the application layer and the data link layer are specified in the IEC 62056 standards referenced in Figure 5. HDLC is the default data link layer – other (link) layers may be used for media specific profiles. The medium specific profiles are described in the Annexes of this International Standard.

NOTE The box „other layers“ in Figure 5 may include UDP and IP.

Due to the limited functionality of the local data transmission interface some restrictions may apply to the Application Process, the application layer and the data link layer as described in Clauses 5, 7 and 9.

For interfaces based on “legacy operating modes” of IEC 62056-21:2002 and IEC 62056-3-1:2013 – not supporting the transport of xDLMS-APDUs – the COSEM application process just provides the functionality to select the data and the re-transmission period for the interface (see 9.4).

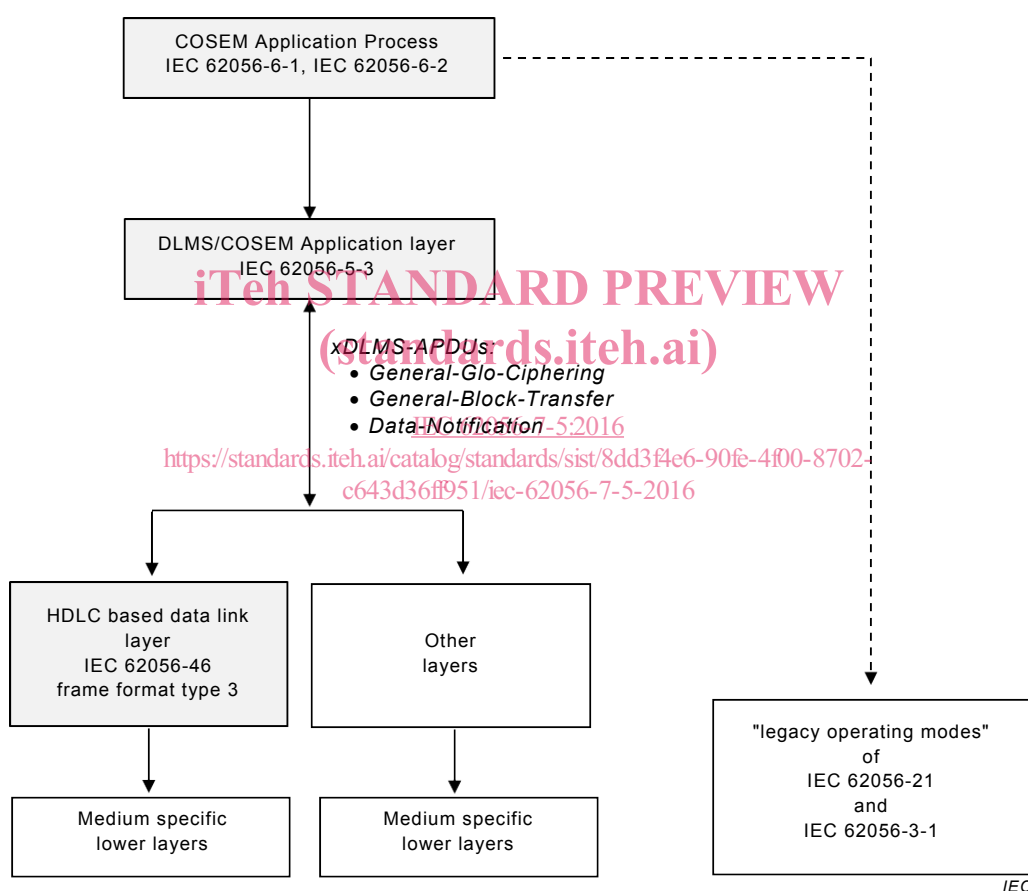


Figure 5 –Local data transmission reference model

## 5.3 Use of the lower layers

### 5.3.1 Overview

The profile specifications in the Annexes of this International Standard contain the relevant information and the references to the appropriate standards for the lower layers. In order to provide interoperability for the configuration of the different media, the corresponding COSEM setup interface classes shall be considered. For new media the set of setup interface classes in IEC 62056-6-2 will be extended.