

REDLINE VERSION



Electricity metering data exchange – The DLMS/COSEM suite – Part 5-3: DLMS/COSEM application layer

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CONTENTS

FOREWORD.....	8
INTRODUCTION.....	2
1 Scope.....	11
2 Normative references	11
3 Terms, definitions and abbreviations	13
3.1 Terms and definitions	13
3.2 Abbreviations	13
4 Overview	15
4.1 DLMS/COSEM application layer structure	15
4.2 DLMS/COSEM application layer services	17
4.2.1 ASO services	17
4.2.2 Services provided for application association establishment and release	17
4.2.3 Services provided for data transfer	18
4.2.4 Layer management services	23
4.2.5 Summary of DLMS/COSEM application layer services	23
4.3 DLMS/COSEM application layer protocols	25
5 Information security in DLMS/COSEM	25
5.1 Definitions.....	25
5.2 General.....	25
5.3 Data access security	26
5.3.1 Overview	26
5.3.2 No security (lowest level security) authentication	26
5.3.3 Low Level Security (LLS) authentication	26
5.3.4 High Level Security (HLS) authentication	27
5.4 Data transport security	30
5.4.1 Applying, removing or checking the protection: ciphering and deciphering.....	30
5.4.2 Security context	31
5.4.3 Security policy	31
5.4.4 Security suite	32
5.4.5 Security material	32
5.4.6 Ciphered xDLMS APDUs.....	32
5.4.7 Cryptographic keys	36
5.4.8 The Galois/Counter Mode of Operation (GCM).....	39
6 DLMS/COSEM application layer service specification	48
6.1 Service primitives and parameters	48
6.2 The COSEM-OPEN service	50
6.3 The COSEM-RELEASE service	55
6.4 COSEM-ABORT service	58
6.5 Security parameters	58
6.5 Protection and general block transfer parameters	58
6.6 The GET service	63
6.7 The SET service	66
6.8 The ACTION service	68
6.9 The DataNotification service	72
6.10 The EventNotification service	73

6.11	The TriggerEventNotificationSending service	74
6.12	Variable access specification.....	75
6.13	The Read service	75
6.14	The Write service	79
6.15	The UnconfirmedWrite service	82
6.16	The InformationReport service.....	83
6.17	Client side layer management services: the SetMapperTable.request.....	84
6.18	Summary of services and LN/SN data transfer service mapping	85
7	DLMS/COSEM application layer protocol specification.....	85
7.1	The control function	85
7.1.1	State definitions of the client side control function.....	85
7.1.2	State definitions of the server side control function	87
7.2	The ACSE services and APDUs.....	88
7.2.1	ACSE functional units, services and service parameters	88
7.2.2	Registered COSEM names.....	91
7.2.3	APDU encoding rules	93
7.2.4	Protocol for application association establishment	93
7.2.5	Protocol for application association release	99
7.3	Protocol for the data transfer services	102
7.3.1	Negotiation of services and options – the conformance block	102
7.3.2	Confirmed and unconfirmed service invocations.....	103
7.3.3	Protocol for the GET service	105
7.3.4	Protocol for the SET service.....	108
7.3.5	Protocol for the ACTION service.....	111
7.3.6	Protocol of the DataNotification service	113
7.3.7	Protocol for the EventNotification service.....	113
7.3.8	Protocol for the Read service	113
7.3.9	Protocol for the Write service	117
7.3.10	Protocol for the UnconfirmedWrite service	121
7.3.11	Protocol for the InformationReport service	122
7.3.12	Protocol of general block transfer mechanism	123
8	Abstract syntax of ACSE and COSEM APDUs	134
Annex A (normative) Using the COSEM application layer in various communications profiles		149
A.1	General.....	149
A.2	Targeted communication environments	149
A.3	The structure of the profile	149
A.4	Identification and addressing schemes	149
A.5	Supporting layer services and service mapping.....	150
A.6	Communication profile specific parameters of the COSEM AL services.....	150
A.7	Specific considerations / constraints using certain services within a given profile	150
A.8	The 3-layer, connection-oriented, HDLC based communication profile	150
A.9	The TCP-UDP/IP based communication profiles (COSEM_on_IP)	150
A.10	The S-FSK PLC profile	150
Annex B (normative) SMS short wrapper		151
Annex C (informative) AARQ and AARE encoding examples		152
C.1	General.....	152
C.2	Encoding of the xDLMS InitiateRequest / InitiateResponse APDUs.....	152

C.3	Specification of the AARQ and AARE APDUs	155
C.4	Data for the examples	156
C.5	Encoding of the AARQ APDU	157
C.6	Encoding of the AARE APDU.....	160
Annex D (informative)	Encoding examples: AARQ and AARE APDUs using a ciphered application context.....	166
D.1	A-XDR encoding of the xDLMS InitiateRequest APDU, carrying a dedicated key	166
D.2	Authenticated encryption of the xDLMS InitiateRequest APDU	167
D.3	The AARQ APDU	168
D.4	A-XDR encoding of the xDLMS InitiateResponse APDU	169
D.5	Authenticated encryption of the xDLMS InitiateResponse APDU.....	170
D.6	The AARE APDU.....	171
D.7	The RLRQ APDU (carrying a ciphered xDLMS InitiateRequest APDU).....	172
D.8	The RLRE APDU (carrying a ciphered xDLMS InitiateResponse APDU).....	173
Annex E (informative)	Data transfer service examples	174
Annex F (informative)	Overview of cryptography.....	190
F.1	General.....	190
F.2	Hash functions	190
F.3	Symmetric key algorithms.....	191
F.3.1	General	191
F.3.2	Encryption and decryption	191
F.3.3	Advanced Encryption Standard (AES).....	192
F.3.4	Encryption Modes of Operation	192
F.3.5	Message Authentication Code	193
F.3.6	Key establishment.....	194
F.4	Asymmetric key algorithms	194
F.4.1	General	194
F.4.2	Digital signatures	195
F.4.3	Key establishment.....	195
Annex G (informative)	Significant technical changes with respect to IEC-62056-53 62056-5-3 Ed.1.0:2013	196
Bibliography		200
Index		203
Figure 1	– Structure of the COSEM Application layers	16
Figure 2	– Summary of DLMS/COSEM AL services.....	24
Figure 3	– LLS and HLS authentication	25
Figure 3	– Authentication mechanisms during AA establishment	29
Figure 4	– Data transport security in DLMS/COSEM	30
Figure 4	– Structure of service specific global ciphering and dedicated ciphering APDUs	34
Figure 5	– Ciphered xDLMS APDUs	35
Figure 5	– Structure of general global ciphering and dedicated ciphering APDUs	35
Figure 6	– Cryptographic protection of xDLMS APDUs using GCM	42
Figure 7	– Service primitives	48
Figure 8	– Time sequence diagrams.....	49

Figure 9 – Additional service parameters to control cryptographic protection and general block transfer	60
Figure 10 – Partial state machine for the client side control function	86
Figure 11 – Partial state machine for the server side control function	87
Figure 12 – MSC for successful AA establishment preceded by a successful lower layer connection establishment	95
Figure 13 – Graceful AA release using the A-RELEASE service	100
Figure 14 – Graceful AA release by disconnecting the supporting layer	101
Figure 15 – Aborting an AA following a PH-ABORT indication	102
Figure 16 – MSC of the GET service	105
Figure 17 – MSC of the GET service with block transfer	106
Figure 18 – MSC of the GET service with block transfer, long GET aborted	108
Figure 19 – MSC of the SET service	109
Figure 20 – MSC of the SET service with block transfer	109
Figure 21 – MSC of the ACTION service	111
Figure 22 – MSC of the ACTION service with block transfer	112
Figure 23 – MSC of the Read service used for reading an attribute	116
Figure 24 – MSC of the Read service used for invoking a method	116
Figure 25 – MSC of the Read Service used for reading an attribute, with block transfer	117
Figure 26 – MSC of the Write service used for writing an attribute	120
Figure 27 – MSC of the Write service used for invoking a method	120
Figure 28 – MSC of the Write service used for writing an attribute, with block transfer	121
Figure 29 – MSC of the Unconfirmed Write service used for writing an attribute	122
Figure 30 – Partial service invocations and GBT APDUs	125
Figure 31 – GET service with GBT, switching to streaming	127
Figure 32 – GET service with partial invocations, GBT and streaming, recovery of 4 th block sent in the 2 nd stream	128
Figure 33 – GET service with partial invocations, GBT and streaming, recovery of 4 th and 5 th blocks	129
Figure 34 – GET service with partial invocations, GBT and streaming, recovery of last block	130
Figure 35 – SET service with GBT, with server not supporting streaming, recovery of 3 rd block	131
Figure 36 – ACTION-WITH-LIST service with bi-directional GBT and block recovery	132
Figure 37 – DataNotification service with GBT with partial invocation	133
Figure B.1 – Short wrapper	151
Figure F.1 – Hash function	191
Figure F.2 – Encryption and decryption	192
Figure F.3 – Message Authentication Codes (MACs)	193
Table 1 – Clarification of the meaning of PDU Size for DLMS/COSEM	19
Table 2 – Security suites	32
Table 3 – Security control field	33
Table 3 – Ciphered xDLMS APDUs	33
Table 4 – Use of the fields of the ciphered APDUs	36

Table 5 – Cryptographic keys and their management.....	39
Table 6 – Security control byte.....	43
Table 7 – Plaintext and additional authenticated data	43
Table 8 – Example for ciphered APDUs.....	45
Table 9 – HLS example with GMAC.....	47
Table 10 – Codes for AL service parameters	50
Table 11 – Service parameters of the COSEM-OPEN service primitives.....	51
Table 12 – Service parameters of the COSEM-RELEASE service primitives.....	55
Table 13 – Service parameters of the COSEM-ABORT service primitives.....	58
Table 14 – Additional service parameters	61
Table 15 – Security parameters.....	62
Table 16 – Service parameters of the GET service	63
Table 17 – GET service request and response types	64
Table 18 – Service parameters of the SET service.....	66
Table 19 – SET service request and response types.....	67
Table 20 – Service parameters of the ACTION service	69
Table 21 – ACTION service request and response types.....	70
Table 22 – Service parameters of the DataNotification service primitives	72
Table 23 – Service parameters of the EventNotification service primitives.....	73
Table 24 – Service parameters of the TriggerEventNotificationSending.request service primitive	74
Table 25 – Variable Access Specification	75
Table 26 – Service parameters of the Read service	76
Table 27 – Use of the Variable_Access_Specification variants and the Read.response choices.....	77
Table 28 – Service parameters of the Write service	80
Table 29 – Use of the Variable_Access_Specification variants and the Write.response choices.....	80
Table 30 – Service parameters of the UnconfirmedWrite service	82
Table 31 – Use of the Variable_Access_Specification variants.....	83
Table 32 – Service parameters of the InformationReport service.....	84
Table 33 – Service parameters of the SetMapperTable.request service primitives	84
Table 34 – Summary of ACSE services	85
Table 35 – Summary of xDLMS services for LN referencing	85
Table 36 – Summary of xDLMS services for SN referencing.....	85
Table 37 – ACSE functional units, services and service parameters.....	89
Table 38 – Use of ciphered / unciphered APDUs	92
Table 39 – xDLMS Conformance block.....	103
Table 40 – GET service types and APDUs.....	105
Table 41 – SET service types and APDUs	108
Table 42 – ACTION service types and APDUs.....	111
Table 43 – Mapping between the GET and the Read services	114
Table 44 – Mapping between the ACTION and the Read services	114
Table 45 – Mapping between the SET and the Write services	118

Table 46 – Mapping between the ACTION and the Write service	119
Table 47 – Mapping between the SET and the UnconfirmedWrite services	122
Table 48 – Mapping between the ACTION and the UnconfirmedWrite services	122
Table 49 – Mapping between the EventNotification and InformationReport services	123
Table B.1 – Reserved Application Processes	151
Table C.1 – Conformance block	153
Table C.2 – A-XDR encoding of the xDLMS InitiateRequest APDU	154
Table C.3 – A-XDR encoding of the xDLMS InitiateResponse APDU	155
Table C.4 – BER encoding of the AARQ APDU	158
Table C.5 – Complete AARQ APDU	160
Table C.6 – BER encoding of the AARE APDU	161
Table C.7 – The complete AARE APDU	165
Table D.1 – A-XDR encoding of the xDLMS InitiateRequest APDU	166
Table D.2 – Authenticated encryption of the xDLMS InitiateRequest APDU	167
Table D.3 – BER encoding of the AARQ APDU	168
Table D.4 – A-XDR encoding of the xDLMS InitiateResponse APDU	170
Table D.5 – Authenticated encryption of the xDLMS InitiateResponse APDU	170
Table D.6 – BER encoding of the AARE APDU	171
Table D.7 – BER encoding of the RLRQ APDU	173
Table D.8 – BER encoding of the RLRE APDU	173
Table E.1 – Objects used in the examples	174
Table E.2 – Example: Reading the value of a single attribute without block transfer	175
Table E.3 – Example: Reading the value of a list of attributes without block transfer	176
Table E.4 – Example: Reading the value of a single attribute with block transfer	178
Table E.5 – Example: Reading the value of a list of attributes with block transfer	180
Table E.6 – Example: Writing the value of a single attribute without block transfer	183
Table E.7 – Example: Writing the value of a list of attributes without block transfer	184
Table E.8 – Example: Writing the value of a single attribute with block transfer	185
Table E.9 – Example: Writing the value of a list of attributes with block transfer	187

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTRICITY METERING DATA EXCHANGE –
THE DLMS/COSEM SUITE –****Part 5-3: DLMS/COSEM application layer****FOREWORD**

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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
Zug/Switzerland
www.dlms.com

¹ Device Language Message Specification.

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This Redline version provides you with a quick and easy way to compare all the changes between this standard and its previous edition. 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 62056-5-3 has been prepared by IEC technical committee 13: Electrical energy measurement and control.

This second edition cancels and replaces the first edition of IEC 62056-5-3 published in 2013. It constitutes a technical revision.

The significant technical changes with respect to the previous edition are listed in Annex G (informative).

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

FDIS	Report on voting
13/1648/FDIS	13/1657/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.

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

A list of all the 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.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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.

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INTRODUCTION

This second edition of IEC 62056-5-3 has been prepared by IEC TC13 WG14 with a significant contribution of the DLMS User Association, its D-type liaison partner.

This edition is in line with the DLMS UA Green Book Edition 7.0 Amendment 3. The main new features are the DataNotification service, the general protection and the general block transfer mechanisms and the SMS short wrapper.

In 2014, the DLMS UA has published Green Book Edition 8.0 adding several new features regarding functionality, efficiency and security while keeping full backwards compatibility.

The intention of the DLMS UA is to bring also these latest developments to international standardization. Therefore, IEC TC13 WG14 launched a project to bring these new elements also to the IEC 62056 series that will lead to Edition 3.0 of the standard.

Clause 5 and Annex F are based on parts of NIST documents. Reprinted courtesy of the National Institute of Standards and Technology, Technology Administration, U.S. Department of Commerce.

ELECTRICITY METERING DATA EXCHANGE – THE DLMS/COSEM SUITE –

Part 5-3: DLMS/COSEM application layer

1 Scope

This part of IEC 62056 specifies the DLMS/COSEM application layer in terms of structure, services and protocols for COSEM clients and servers, and defines how to use the DLMS/COSEM application layer in various communication profiles.

It defines services for establishing and releasing application associations, and data communication services for accessing the methods and attributes of COSEM interface objects, defined in IEC 62056-6-2²:2016, using either logical name (LN) or short name (SN) referencing.

Annex A (normative) defines how to use the COSEM application layer in various communication profiles. It specifies how various communication profiles can be constructed for exchanging data with metering equipment using the COSEM interface model, and what are the necessary elements to specify in each communication profile. The actual, media-specific communication profiles are specified in separate parts of the IEC 62056 series.

Annex B (normative) specifies the SMS short wrapper.

Annex C, Annex D and Annex E (informative) include encoding examples for APDUs.

Annex F (informative) provides an overview of cryptography.

Annex G (informative) lists the main technical changes in this edition of the standard.

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 protocols – Section 41: Application protocols – Distribution line message specification*

IEC 61334-6:2000, *Distribution automation using distribution line carrier systems – Part 6: A-XDR encoding rule*

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

² ~~To be published simultaneously with this part of IEC 62056.~~

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

IEC 62056-6-1:2015, *Electricity metering data exchange – The DLMS/COSEM suite – Part 6-1: Object Identification System (OBIS)*³

IEC 62056-6-2:2016, *Electricity metering data exchange – The DLMS/COSEM suite – Part 6-2: COSEM interface classes*⁴

IEC 62056-8-3:2013, *Electricity metering data exchange – The DLMS/COSEM suite – Part 8-3: Communication profile for PLC S-FSK neighbourhood networks*⁵

ISO/IEC 8824-1:2008, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation*

ISO/IEC 8825-1:2008, *Information technology – ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)*

ISO/IEC 15953:1999, *Information technology – Open Systems Interconnection – Service definition for the Application Service Object Association Control Service Element*

NOTE This standard cancels and replaces ISO/IEC 8649-1:1999 and its Amd. 1:1997 and Amd. 2:1998, of which it constitutes a technical revision.

ISO/IEC 15954:1999, *Information technology – Open Systems Interconnection – Connection-mode protocol for the Application Service Object Association Control Service Element*

NOTE This standard cancels and replaces ISO/IEC 8650-1:1999 and its Amd. 1:1997 and Amd. 2:1998, of which it constitutes a technical revision.

~~FIPS PUB 180-1:2002, *Secure hash standard*~~

FIPS PUB 180-4:2012, *Secure hash standard*

FIPS PUB 197:2001, *Advanced Encryption Standard (AES)*

NIST SP 800-38D:2007, *Recommendation for Block Cipher Modes of Operation: Galois/Counter Mode (GCM) and GMAC*

NIST SP 800-57:2006, *Recommendation for Key Management – Part 1: General (Revised)*

The following RFCs are available online from the Internet Engineering Task Force (IETF): <http://www.ietf.org/rfc/std-index.txt>, <http://www.ietf.org/rfc/>

³ ~~To be published simultaneously with this part of IEC 62056.~~

⁴ ~~To be published simultaneously with this part of IEC 62056.~~

⁵ ~~To be published simultaneously with this part of IEC 62056.~~

RFC 1321:~~1992, Internet Engineering Task Force (IETF), The MD5 Message-Digest Algorithm.~~ Edited by R. Rivest (MIT Laboratory for Computer Science and RSA Data Security, Inc.) April 1992 ~~Available from: <http://www.rfc-editor.org/rfc/rfc1321.txt>~~

RFC 3394:~~2002, Internet Engineering Task Force (IETF), Advanced Encryption Standard (AES) Key Wrap Algorithm.~~ Edited by J. Schaad (Soaring Hawk Consulting) and R. Housley (RSA Laboratories) September 2002 ~~Available from: <http://www.rfc-editor.org/rfc/rfc3394.txt>~~

RFC 4106:~~2005, The Use of Galois/Counter Mode (GCM) in IPsec Encapsulating Security Payload (ESP)~~

~~NOTE See also the Bibliography.~~

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Electricity metering data exchange – The DLMS/COSEM suite –
Part 5-3: DLMS/COSEM application layer**

**Échange des données de comptage de l'électricité – La suite DLMS/COSEM –
Partie 5-3: Couche application DLMS/COSEM**

CONTENTS

FOREWORD.....	8
INTRODUCTION.....	10
1 Scope.....	11
2 Normative references	11
3 Terms, definitions and abbreviations	13
3.1 Terms and definitions	13
3.2 Abbreviations	13
4 Overview	15
4.1 DLMS/COSEM application layer structure	15
4.2 DLMS/COSEM application layer services	16
4.2.1 ASO services	16
4.2.2 Services provided for application association establishment and release	16
4.2.3 Services provided for data transfer	17
4.2.4 Layer management services	22
4.2.5 Summary of DLMS/COSEM application layer services	22
4.3 DLMS/COSEM application layer protocols	22
5 Information security in DLMS/COSEM	23
5.1 Definitions.....	23
5.2 General.....	23
5.3 Data access security	24
5.3.1 Overview	24
5.3.2 No security (lowest level security) authentication	24
5.3.3 Low Level Security (LLS) authentication	24
5.3.4 High Level Security (HLS) authentication.....	25
5.4 Data transport security	27
5.4.1 Applying, removing or checking the protection: ciphering and deciphering.....	27
5.4.2 Security context	28
5.4.3 Security policy	28
5.4.4 Security suite.....	29
5.4.5 Security material	29
5.4.6 Ciphered xDLMS APDUs.....	29
5.4.7 Cryptographic keys	31
5.4.8 The Galois/Counter Mode of Operation (GCM).....	34
6 DLMS/COSEM application layer service specification	43
6.1 Service primitives and parameters	43
6.2 The COSEM-OPEN service	45
6.3 The COSEM-RELEASE service	50
6.4 COSEM-ABORT service	52
6.5 Protection and general block transfer parameters	53
6.6 The GET service	57
6.7 The SET service	59
6.8 The ACTION service	62
6.9 The DataNotification service.....	66
6.10 The EventNotification service	67
6.11 The TriggerEventNotificationSending service	68

6.12	Variable access specification.....	69
6.13	The Read service.....	69
6.14	The Write service.....	73
6.15	The UnconfirmedWrite service.....	76
6.16	The InformationReport service.....	77
6.17	Client side layer management services: the SetMapperTable.request.....	78
6.18	Summary of services and LN/SN data transfer service mapping	78
7	DLMS/COSEM application layer protocol specification.....	79
7.1	The control function	79
7.1.1	State definitions of the client side control function.....	79
7.1.2	State definitions of the server side control function	81
7.2	The ACSE services and APDUs.....	82
7.2.1	ACSE functional units, services and service parameters	82
7.2.2	Registered COSEM names.....	85
7.2.3	APDU encoding rules	87
7.2.4	Protocol for application association establishment	87
7.2.5	Protocol for application association release	92
7.3	Protocol for the data transfer services	95
7.3.1	Negotiation of services and options – the conformance block.....	95
7.3.2	Confirmed and unconfirmed service invocations.....	96
7.3.3	Protocol for the GET service	98
7.3.4	Protocol for the SET service.....	101
7.3.5	Protocol for the ACTION service.....	104
7.3.6	Protocol of the DataNotification service	106
7.3.7	Protocol for the EventNotification service.....	106
7.3.8	Protocol for the Read service	106
7.3.9	Protocol for the Write service	110
7.3.10	Protocol for the UnconfirmedWrite service	114
7.3.11	Protocol for the InformationReport service	115
7.3.12	Protocol of general block transfer mechanism.....	116
8	Abstract syntax of ACSE and COSEM APDUs	127
Annex A (normative) Using the COSEM application layer in various communications profiles		142
A.1	General.....	142
A.2	Targeted communication environments.....	142
A.3	The structure of the profile	142
A.4	Identification and addressing schemes	142
A.5	Supporting layer services and service mapping.....	143
A.6	Communication profile specific parameters of the COSEM AL services.....	143
A.7	Specific considerations / constraints using certain services within a given profile	143
A.8	The 3-layer, connection-oriented, HDLC based communication profile.....	143
A.9	The TCP-UDP/IP based communication profiles (COSEM_on_IP)	143
A.10	The S-FSK PLC profile	143
Annex B (normative) SMS short wrapper		144
Annex C (informative) AARQ and AARE encoding examples		145
C.1	General.....	145
C.2	Encoding of the xDLMS InitiateRequest / InitiateResponse APDUs.....	145
C.3	Specification of the AARQ and AARE APDUs	148

C.4	Data for the examples	149
C.5	Encoding of the AARQ APDU	150
C.6	Encoding of the AARE APDU.....	153
Annex D (informative) Encoding examples: AARQ and AARE APDUs using a ciphered application context.....		159
D.1	A-XDR encoding of the xDLMS InitiateRequest APDU, carrying a dedicated key	159
D.2	Authenticated encryption of the xDLMS InitiateRequest APDU	160
D.3	The AARQ APDU	161
D.4	A-XDR encoding of the xDLMS InitiateResponse APDU	162
D.5	Authenticated encryption of the xDLMS InitiateResponse APDU.....	163
D.6	The AARE APDU.....	164
D.7	The RLRQ APDU (carrying a ciphered xDLMS InitiateRequest APDU).....	165
D.8	The RLRE APDU (carrying a ciphered xDLMS InitiateResponse APDU).....	166
Annex E (informative) Data transfer service examples		167
Annex F (informative) Overview of cryptography		183
F.1	General.....	183
F.2	Hash functions	183
F.3	Symmetric key algorithms.....	184
F.3.1	General	184
F.3.2	Encryption and decryption	184
F.3.3	Advanced Encryption Standard (AES).....	185
F.3.4	Encryption Modes of Operation	185
F.3.5	Message Authentication Code	186
F.3.6	Key establishment.....	187
F.4	Asymmetric key algorithms	187
F.4.1	General	187
F.4.2	Digital signatures	188
F.4.3	Key establishment.....	188
Annex G (informative) Significant technical changes with respect to IEC 62056-5-3 Ed.1.0:2013		189
Bibliography		191
Index.....		194
Figure 1 – Structure of the COSEM Application layers		15
Figure 2 – Summary of DLMS/COSEM AL services.....		22
Figure 3 – Authentication mechanisms during AA establishment		27
Figure 4 – Structure of service specific global ciphering and dedicated ciphering APDUs		30
Figure 5 – Structure of general global ciphering and dedicated ciphering APDUs		30
Figure 6 – Cryptographic protection of xDLMS APDUs using GCM		37
Figure 7 – Service primitives		43
Figure 8 – Time sequence diagrams.....		44
Figure 9 – Additional service parameters to control cryptographic protection and general block transfer		54
Figure 10 – Partial state machine for the client side control function		80
Figure 11 – Partial state machine for the server side control function		81

Figure 12 – MSC for successful AA establishment preceded by a successful lower layer connection establishment	88
Figure 13 – Graceful AA release using the A-RELEASE service	93
Figure 14 – Graceful AA release by disconnecting the supporting layer	94
Figure 15 – Aborting an AA following a PH-ABORT.indication	95
Figure 16 – MSC of the GET service	98
Figure 17 – MSC of the GET service with block transfer.....	99
Figure 18 – MSC of the GET service with block transfer, long GET aborted.....	101
Figure 19 – MSC of the SET service.....	102
Figure 20 – MSC of the SET service with block transfer	102
Figure 21 – MSC of the ACTION service	104
Figure 22 – MSC of the ACTION service with block transfer.....	105
Figure 23 – MSC of the Read service used for reading an attribute	109
Figure 24 – MSC of the Read service used for invoking a method	109
Figure 25 – MSC of the Read Service used for reading an attribute, with block transfer.....	110
Figure 26 – MSC of the Write service used for writing an attribute.....	113
Figure 27 – MSC of the Write service used for invoking a method	113
Figure 28 – MSC of the Write service used for writing an attribute, with block transfer.....	114
Figure 29 – MSC of the Unconfirmed Write service used for writing an attribute	115
Figure 30 – Partial service invocations and GBT APDUs.....	118
Figure 31 – GET service with GBT, switching to streaming	120
Figure 32 – GET service with partial invocations, GBT and streaming, recovery of 4 th block sent in the 2nd stream	121
Figure 33 – GET service with partial invocations, GBT and streaming, recovery of 4 th and 5 th blocks	122
Figure 34 – GET service with partial invocations, GBT and streaming, recovery of last block	123
Figure 35 – SET service with GBT, with server not supporting streaming, recovery of 3rd block	124
Figure 36 – ACTION-WITH-LIST service with bi-directional GBT and block recovery	125
Figure 37 – DataNotification service with GBT with partial invocation	126
Figure B.1 – Short wrapper	144
Figure F.1 – Hash function	184
Figure F.2 – Encryption and decryption	185
Figure F.3 – Message Authentication Codes (MACs)	186
Table 1 – Clarification of the meaning of PDU Size for DLMS/COSEM	18
Table 2 – Security suites.....	29
Table 3 – Ciphered xDLMS APDUs	29
Table 4 – Use of the fields of the ciphered APDUs.....	31
Table 5 – Cryptographic keys and their management.....	34
Table 6 – Security control byte	38
Table 7 – Plaintext and additional authenticated data	38
Table 8 – Example for ciphered APDUs.....	40
Table 9 – HLS example with GMAC.....	42

Table 10 – Codes for AL service parameters	45
Table 11 – Service parameters of the COSEM-OPEN service primitives	46
Table 12 – Service parameters of the COSEM-RELEASE service primitives	50
Table 13 – Service parameters of the COSEM-ABORT service primitives	53
Table 14 – Additional service parameters	55
Table 15 – Security parameters	56
Table 16 – Service parameters of the GET service	57
Table 17 – GET service request and response types	58
Table 18 – Service parameters of the SET service	60
Table 19 – SET service request and response types	61
Table 20 – Service parameters of the ACTION service	63
Table 21 – ACTION service request and response types	64
Table 22 – Service parameters of the DataNotification service primitives	66
Table 23 – Service parameters of the EventNotification service primitives	67
Table 24 – Service parameters of the TriggerEventNotificationSending.request service primitive	68
Table 25 – Variable Access Specification	69
Table 26 – Service parameters of the Read service	70
Table 27 – Use of the Variable_Access_Specification variants and the Read.response choices	71
Table 28 – Service parameters of the Write service	74
Table 29 – Use of the Variable_Access_Specification variants and the Write.response choices	74
Table 30 – Service parameters of the UnconfirmedWrite service	76
Table 31 – Use of the Variable_Access_Specification variants	77
Table 32 – Service parameters of the InformationReport service	78
Table 33 – Service parameters of the SetMapperTable.request service primitives	78
Table 34 – Summary of ACSE services	79
Table 35 – Summary of xDLMS services for LN referencing	79
Table 36 – Summary of xDLMS services for SN referencing	79
Table 37 – ACSE functional units, services and service parameters	83
Table 38 – Use of ciphered / unciphered APDUs	86
Table 39 – xDLMS Conformance block	96
Table 40 – GET service types and APDUs	98
Table 41 – SET service types and APDUs	101
Table 42 – ACTION service types and APDUs	104
Table 43 – Mapping between the GET and the Read services	107
Table 44 – Mapping between the ACTION and the Read services	108
Table 45 – Mapping between the SET and the Write services	111
Table 46 – Mapping between the ACTION and the Write service	112
Table 47 – Mapping between the SET and the UnconfirmedWrite services	115
Table 48 – Mapping between the ACTION and the UnconfirmedWrite services	115
Table 49 – Mapping between the EventNotification and InformationReport services	116
Table B.1 – Reserved Application Processes	144

Table C.1 – Conformance block	146
Table C.2 – A-XDR encoding of the xDLMS InitiateRequest APDU	147
Table C.3 – A-XDR encoding of the xDLMS InitiateResponse APDU	148
Table C.4 – BER encoding of the AARQ APDU	151
Table C.5 – Complete AARQ APDU	153
Table C.6 – BER encoding of the AARE APDU	154
Table C.7 – The complete AARE APDU	158
Table D.1 – A-XDR encoding of the xDLMS InitiateRequest APDU	159
Table D.2 – Authenticated encryption of the xDLMS InitiateRequest APDU	160
Table D.3 – BER encoding of the AARQ APDU	161
Table D.4 – A-XDR encoding of the xDLMS InitiateResponse APDU	163
Table D.5 – Authenticated encryption of the xDLMS InitiateResponse APDU	163
Table D.6 – BER encoding of the AARE APDU	164
Table D.7 – BER encoding of the RLRQ APDU	166
Table D.8 – BER encoding of the RLRE APDU	166
Table E.1 – Objects used in the examples	167
Table E.2 – Example: Reading the value of a single attribute without block transfer	168
Table E.3 – Example: Reading the value of a list of attributes without block transfer	169
Table E.4 – Example: Reading the value of a single attribute with block transfer	171
Table E.5 – Example: Reading the value of a list of attributes with block transfer	173
Table E.6 – Example: Writing the value of a single attribute without block transfer	176
Table E.7 – Example: Writing the value of a list of attributes without block transfer	177
Table E.8 – Example: Writing the value of a single attribute with block transfer	178
Table E.9 – Example: Writing the value of a list of attributes with block transfer	180

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**ELECTRICITY METERING DATA EXCHANGE –
THE DLMS/COSEM SUITE –****Part 5-3: DLMS/COSEM application layer****FOREWORD**

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DLMS¹ User Association
Zug/Switzerland
www.dlms.com

¹ Device Language Message Specification.

International Standard IEC 62056-5-3 has been prepared by IEC technical committee 13: Electrical energy measurement and control.

This second edition cancels and replaces the first edition of IEC 62056-5-3 published in 2013. It constitutes a technical revision.

The significant technical changes with respect to the previous edition are listed in Annex G (informative).

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

FDIS	Report on voting
13/1648/FDIS	13/1657/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.

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

A list of all the 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.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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.

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.

INTRODUCTION

This second edition of IEC 62056-5-3 has been prepared by IEC TC13 WG14 with a significant contribution of the DLMS User Association, its D-type liaison partner.

This edition is in line with the DLMS UA Green Book Edition 7.0 Amendment 3. The main new features are the DataNotification service, the general protection and the general block transfer mechanisms and the SMS short wrapper.

In 2014, the DLMS UA has published Green Book Edition 8.0 adding several new features regarding functionality, efficiency and security while keeping full backwards compatibility.

The intention of the DLMS UA is to bring also these latest developments to international standardization. Therefore, IEC TC13 WG14 launched a project to bring these new elements also to the IEC 62056 series that will lead to Edition 3.0 of the standard.

Clause 5 and Annex F are based on parts of NIST documents. Reprinted courtesy of the National Institute of Standards and Technology, Technology Administration, U.S. Department of Commerce.

ELECTRICITY METERING DATA EXCHANGE – THE DLMS/COSEM SUITE –

Part 5-3: DLMS/COSEM application layer

1 Scope

This part of IEC 62056 specifies the DLMS/COSEM application layer in terms of structure, services and protocols for COSEM clients and servers, and defines how to use the DLMS/COSEM application layer in various communication profiles.

It defines services for establishing and releasing application associations, and data communication services for accessing the methods and attributes of COSEM interface objects, defined in IEC 62056-6-2:2016, using either logical name (LN) or short name (SN) referencing.

Annex A (normative) defines how to use the COSEM application layer in various communication profiles. It specifies how various communication profiles can be constructed for exchanging data with metering equipment using the COSEM interface model, and what are the necessary elements to specify in each communication profile. The actual, media-specific communication profiles are specified in separate parts of the IEC 62056 series.

Annex B (normative) specifies the SMS short wrapper.

Annex C, Annex D and Annex E (informative) include encoding examples for APDUs.

Annex F (informative) provides an overview of cryptography.

Annex G (informative) lists the main technical changes in this edition of the standard.

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 protocols – Section 41: Application protocols – Distribution line message specification*

IEC 61334-6:2000, *Distribution automation using distribution line carrier systems – Part 6: A-XDR encoding rule*

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

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

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 62056-8-3:2013, *Electricity metering data exchange – The DLMS/COSEM suite – Part 8-3: Communication profile for PLC S-FSK neighbourhood networks*

ISO/IEC 8824-1:2008, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation*

ISO/IEC 8825-1:2008, *Information technology – ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)*

ISO/IEC 15953:1999, *Information technology – Open Systems Interconnection – Service definition for the Application Service Object Association Control Service Element*

NOTE This standard cancels and replaces ISO/IEC 8649-1:1999 and its Amd. 1:1997 and Amd. 2:1998, of which it constitutes a technical revision.

ISO/IEC 15954:1999, *Information technology – Open Systems Interconnection – Connection-mode protocol for the Application Service Object Association Control Service Element*

NOTE This standard cancels and replaces ISO/IEC 8650-1:1999 and its Amd. 1:1997 and Amd. 2:1998, of which it constitutes a technical revision.

FIPS PUB 180-4:2012, *Secure hash standard*

FIPS PUB 197:2001, *Advanced Encryption Standard (AES)*

NIST SP 800-38D:2007, *Recommendation for Block Cipher Modes of Operation: Galois/Counter Mode (GCM) and GMAC*

NIST SP 800-57:2006, *Recommendation for Key Management – Part 1: General (Revised)*

The following RFCs are available online from the Internet Engineering Task Force (IETF):
<http://www.ietf.org/rfc/std-index.txt>, <http://www.ietf.org/rfc/>

RFC 1321, *The MD5 Message-Digest Algorithm*. Edited by R. Rivest (MIT Laboratory for Computer Science and RSA Data Security, Inc.) April 1992

RFC 3394, *Advanced Encryption Standard (AES) Key Wrap Algorithm*. Edited by J. Schaad (Soaring Hawk Consulting) and R. Housley (RSA Laboratories) September 2002

RFC 4106, *The Use of Galois/Counter Mode (GCM) in IPsec Encapsulating Security Payload (ESP)*

SOMMAIRE

AVANT-PROPOS.....	204
INTRODUCTION.....	206
1 Domaine d'application	207
2 Références normatives	207
3 Termes, définitions et abréviations.....	209
3.1 Termes et définitions.....	209
3.2 Abréviations.....	209
4 Vue d'ensemble.....	211
4.1 Structure de la couche application DLMS/COSEM.....	211
4.2 Services de la couche application DLMS/COSEM	213
4.2.1 Services ASO	213
4.2.2 Services fournis pour l'établissement et la libération d'associations d'applications.....	213
4.2.3 Services fournis pour le transfert de données	214
4.2.4 Services de gestion de couche	219
4.2.5 Récapitulatif des services de la couche application DLMS/COSEM	219
4.3 Protocoles de la couche application DLMS/COSEM	220
5 Sécurité des informations dans DLMS/COSEM.....	221
5.1 Définitions.....	221
5.2 Généralités	221
5.3 Sécurité de l'accès aux données.....	222
5.3.1 Vue d'ensemble	222
5.3.2 Authentification sans sécurité (niveau de sécurité le plus faible)	222
5.3.3 Authentification de niveau de sécurité faible (LLS).....	222
5.3.4 Authentification de niveau de sécurité élevé (HLS)	223
5.4 Sécurité de transport des données	226
5.4.1 Application, suppression ou vérification de la protection: chiffrement et déchiffrement.....	226
5.4.2 Contexte de sécurité	227
5.4.3 Politique de sécurité.....	227
5.4.4 Suite de sécurité	228
5.4.5 Matériel de sécurité.....	228
5.4.6 APDU xDLMS chiffrées	228
5.4.7 Clés cryptographiques.....	231
5.4.8 Mode de fonctionnement Galois/Counter (GCM)	235
6 Spécification de service de la couche application DLMS/COSEM.....	244
6.1 Primitives de service et paramètres	244
6.2 Service COSEM-OPEN	247
6.3 Service COSEM-RELEASE.....	252
6.4 Service COSEM-ABORT	255
6.5 Paramètres de protection et de transfert général de blocs.....	255
6.6 Service GET	260
6.7 Service SET.....	263
6.8 Service ACTION.....	266
6.9 Service DataNotification	269
6.10 Service EventNotification.....	270

6.11	Service TriggerEventNotificationSending	272
6.12	Spécification d'accès variable.....	272
6.13	Service Read	273
6.14	Service Write	277
6.15	Service UnconfirmedWrite	280
6.16	Service InformationReport.....	282
6.17	Services de gestion de couches côté client: Demande SetMapperTable.request	283
6.18	Récapitulatif des services et de la mise en correspondance de services de transfert de données LN/SN	283
7	Spécification du protocole de couche application DLMS/COSEM	284
7.1	Fonction de commande	284
7.1.1	Définitions des états de la fonction de commande côté client	284
7.1.2	Définitions des états de la fonction de commande côté serveur	286
7.2	Services ACSE et APDU	287
7.2.1	Unités fonctionnelles ACSE, services et paramètres de service.....	287
7.2.2	Noms COSEM enregistrés.....	290
7.2.3	Règles de codage d'APDU	292
7.2.4	Protocole d'établissement d'association d'applications	292
7.2.5	Protocole de libération d'association d'applications	298
7.3	Protocole des services de transfert de données	303
7.3.1	Négociation de services et d'options – Bloc de conformité.....	303
7.3.2	Appels de service confirmés et non confirmés.....	304
7.3.3	Protocole du service GET.....	305
7.3.4	Protocole du service SET	310
7.3.5	Protocole du service ACTION.....	314
7.3.6	Protocole du service DataNotification	317
7.3.7	Protocole du service EventNotification.....	317
7.3.8	Protocole du service Read	317
7.3.9	Protocole du service Write.....	322
7.3.10	Protocole du service UnconfirmedWrite	326
7.3.11	Protocole du service InformationReport	328
7.3.12	Protocole du mécanisme de transfert général de blocs.....	329
8	Syntaxe abstraite des APDU ACSE et COSEM.....	345
Annexe A (normative) Utilisation de la couche application COSEM dans différents profils de communication		360
A.1	Généralités	360
A.2	Environnements de communication ciblés	360
A.3	Structure du profil	360
A.4	Schéma d'identification et d'adressage	360
A.5	Services de couche de support et mise en correspondance de services	361
A.6	Paramètres spécifiques au profil de communication des services d'AL COSEM	361
A.7	Considérations / contraintes spécifiques à l'utilisation de certains services dans un profil donné.....	361
A.8	Profil de communication à 3 couches, orienté connexion et basé sur HDLC	361
A.9	Profils de communication basés sur TCP-UDP/IP (COSEM_on_IP)	361
A.10	Profil S-FSK PLC	361
Annexe B (normative) Emballage réduit pour SMS.....		362

Annexe C (informative) Exemples de codage AARQ et AARE	363
C.1 Généralités	363
C.2 Codage des APDU xDLMS InitiateRequest / InitiateResponse	363
C.3 Spécification des APDU AARQ et AARE	366
C.4 Données pour les exemples	367
C.5 Codage de l'APDU AARQ	368
C.6 Codage de l'APDU AARE	371
Annexe D (informative) Exemples de codage: APDU AARQ et AARE utilisant un contexte d'application chiffré	377
D.1 Codage A-XDR de l'APDU xDLMS InitiateRequest contenant une clé dédiée	377
D.2 Chiffrement authentifié de l'APDU xDLMS InitiateRequest	378
D.3 APDU AARQ	379
D.4 Codage A-XDR de l'APDU xDLMS InitiateResponse	380
D.5 Chiffrement authentifié de l'APDU xDLMS InitiateResponse	381
D.6 APDU AARQ	382
D.7 APDU RLRQ (contenant une APDU xDLMS InitiateRequest chiffrée)	383
D.8 APDU RLRE (contenant une APDU xDLMS InitiateResponse chiffrée)	384
Annexe E (informative) Exemples de services de transfert de données	385
Annexe F (informative) Présentation de la cryptographie	401
F.1 Généralités	401
F.2 Fonctions de hachage	401
F.3 Algorithmes de clé symétrique	402
F.3.1 Généralités	402
F.3.2 Chiffrement et déchiffrement	402
F.3.3 Advanced Encryption Standard (AES)	403
F.3.4 Mode de fonctionnement du chiffrement	404
F.3.5 Code d'authentification de message	404
F.3.6 Établissement de la clé	405
F.4 Algorithmes de clé asymétrique	405
F.4.1 Généralités	405
F.4.2 Signatures numériques	406
F.4.3 Établissement de la clé	407
Annexe G (informative) Modifications techniques majeures par rapport à l'IEC 62056- 5-3 Éd. 1.0:2013	408
Bibliographie	410
Index	413
Figure 1 – Structure des couches application COSEM	212
Figure 2 – Récapitulatif des services de l'AL DLMS/COSEM	220
Figure 3 – Mécanismes d'authentification pendant l'établissement de l'AA	226
Figure 4 – Structure d'APDU de chiffrement global et de chiffrement dédié spécifiques au service	229
Figure 5 – Structure d'APDU de chiffrement général global et de chiffrement général dédié	230
Figure 6 – Protection cryptographique des APDU xDLMS à l'aide de GCM	239
Figure 7 – Primitives de service	245
Figure 8 – Diagrammes de séquences temporelles	246

Figure 9 – Paramètres supplémentaires de service pour contrôler la protection cryptographique et le transfert général de blocs	257
Figure 10 – Diagramme d'états partiel pour la fonction de commande côté client.....	285
Figure 11 – Diagramme d'états partiel pour la fonction de commande côté serveur	286
Figure 12 – MSC pour l'établissement réussi d'une AA précédé de l'établissement réussi d'une connexion de couche inférieure de support	294
Figure 13 – Libération d'AA sans perte de données à l'aide du service A-RELEASE	299
Figure 14 – Libération d'AA sans perte de données par déconnexion de la couche de support.....	301
Figure 15 – Abandon d'une AA suite à la primitive PH-ABORT.indication	303
Figure 16 – MSC du service GET	306
Figure 17 – MSC du service GET avec transfert de bloc	307
Figure 18 – MSC du service GET avec transfert de bloc, GET long abandonné	310
Figure 19 – MSC du service SET	311
Figure 20 – MSC du service SET avec transfert de bloc.....	312
Figure 21 – MSC du service ACTION	315
Figure 22 – MSC du service ACTION avec transfert de bloc.....	316
Figure 23 – MSC du service Read utilisé pour lire un attribut	320
Figure 24 – MSC du service Read utilisé pour appeler une méthode	320
Figure 25 – MSC du service Read utilisé pour lire un attribut, avec transfert de blocs.....	321
Figure 26 – MSC du service Write utilisé pour écrire un attribut	325
Figure 27 – MSC du service Write utilisé pour appeler une méthode	325
Figure 28 – MSC du service Write utilisé pour écrire un attribut, avec transfert de blocs.....	326
Figure 29 – MSC du service Unconfirmed Write utilisé pour écrire un attribut	328
Figure 30 – Appels de service partiels et APDU GBT	331
Figure 31 – Service GET avec GBT, passage à la diffusion en flux	333
Figure 32 – Service GET avec appels partiels, GBT et diffusion en flux, récupération du 4 ^{ème} bloc envoyé dans le deuxième flux.....	335
Figure 33 – Service GET avec appels partiels, GBT et diffusion en flux, récupération des 4 ^{ème} et 5 ^{ème} blocs	337
Figure 34 – Service GET avec appels partiels, GBT et diffusion en flux, récupération du dernier bloc.....	339
Figure 35 – Service SET avec GBT, avec serveur ne prenant pas en charge la diffusion en flux, récupération du 3 ^{ème} bloc.....	340
Figure 36 – Service ACTION-WITH-LIST avec GBT bidirectionnel et récupération de blocs	342
Figure 37 – Service DataNotification avec GBT, avec appel partiel	344
Figure B.1 – Emballage réduit.....	362
Figure F.1 – Fonction de hachage	402
Figure F.2 – Chiffrement et déchiffrement.....	403
Figure F.3 – Codes d'authentification de message (MAC)	404
Tableau 1 – Explication de la signification des paramètres PDU Size pour DLMS/COSEM.....	215
Tableau 2 – Suites de sécurité	228
Tableau 3 – APDU xDLMS chiffrées	228

Tableau 4 – Utilisation des champs des APDU chiffrées	231
Tableau 5 – Clés cryptographiques et leur gestion.....	234
Tableau 6 – Octet de contrôle de sécurité	239
Tableau 7 – Texte brut et AAD	240
Tableau 8 – Exemple d'APDU chiffrées	242
Tableau 9 – Exemple HLS avec GMAC.....	244
Tableau 10 – Codes des paramètres de service de l'AL	247
Tableau 11 – Paramètres de service des primitives de service COSEM-OPEN	248
Tableau 12 – Paramètres de service des primitives de service COSEM-RELEASE	252
Tableau 13 – Paramètres de service des primitives de service COSEM-ABORT	255
Tableau 14 – Paramètres supplémentaires de service	257
Tableau 15 – Paramètres de sécurité	259
Tableau 16 – Paramètres de service du service GET	260
Tableau 17 – Types de demandes et de réponses du service GET	261
Tableau 18 – Paramètres du service SET	263
Tableau 19 – Types de demandes et de réponses du service SET	264
Tableau 20 – Paramètres du service ACTION.....	266
Tableau 21 – Types de demandes et de réponses du service ACTION	267
Tableau 22 – Paramètres de service des primitives de service DataNotification	270
Tableau 23 – Paramètres de service des primitives du service EventNotification	271
Tableau 24 – Paramètres de service de la primitive de service TriggerEventNotificationSending.request	272
Tableau 25 – Spécification d'accès variable	273
Tableau 26 – Paramètres du service Read	274
Tableau 27 – Utilisation des variantes du paramètre Variable_Access_Specification et des choix de Read.response	275
Tableau 28 – Paramètres du service Write	278
Tableau 29 – Utilisation des variantes de Variable_Access_Specification et des choix de Write.response.....	279
Tableau 30 – Paramètres du service UnconfirmedWrite	281
Tableau 31 – Utilisation des variantes de Variable_Access_Specification.....	281
Tableau 32 – Paramètres du service InformationReport	282
Tableau 33 – Paramètres de service des primitives de service SetMapperTable.request	283
Tableau 34 – Récapitulatif des services ACSE	283
Tableau 35 – Récapitulatif des services xDLMS pour le référencement LN.....	284
Tableau 36 – Récapitulatif des services xDLMS pour le référencement SN	284
Tableau 37 – Unités fonctionnelles ACSE, services et paramètres de service	288
Tableau 38 – Utilisation des APDU chiffrées et non chiffrées	291
Tableau 39 – Bloc de conformité xDLMS	304
Tableau 40 – Types et APDU de service GET.....	306
Tableau 41 – Types et APDU de service SET	311
Tableau 42 – Types et APDU de service ACTION	314
Tableau 43 – Mise en correspondance du service GET et du service Read	318
Tableau 44 – Mise en correspondance du service ACTION et du service Read	318

Tableau 45 – Mise en correspondance du service SET et du service Write.....	322
Tableau 46 – Mise en correspondance du service ACTION et du service Write.....	323
Tableau 47 – Mise en correspondance du service SET et du service UnconfirmedWrite	327
Tableau 48 – Mise en correspondance du service ACTION et du service UnconfirmedWrite	327
Tableau 49 – Mise en correspondance des services EventNotification et InformationReport.....	329
Tableau B.1 – Processus d'application réservés	362
Tableau C.1 – Bloc de conformité.....	364
Tableau C.2 – Codage A-XDR de l'APDU xDLMS InitiateRequest	365
Tableau C.3 – Codage A-XDR de l'APDU xDLMS InitiateResponse.....	366
Tableau C.4 – Codage BER de l'APDU AARQ	369
Tableau C.5 – APDU AARQ complète	371
Tableau C.6 – Codage BER de l'APDU AARE.....	372
Tableau C.7 – APDU AARE complète.....	376
Tableau D.1 – Codage A-XDR de l'APDU xDLMS InitiateRequest	377
Tableau D.2 – Chiffrement authentifié de l'APDU xDLMS InitiateRequest	378
Tableau D.3 – Codage BER de l'APDU AARQ	379
Tableau D.4 – Codage A-XDR de l'APDU xDLMS InitiateResponse.....	381
Tableau D.5 – Chiffrement authentifié de l'APDU xDLMS InitiateResponse	381
Tableau D.6 – Codage BER de l'APDU AARE.....	382
Tableau D.7 – Codage BER de l'APDU RLRQ	384
Tableau D.8 – Codage BER de l'APDU RLRE.....	384
Tableau E.1 – Objets utilisés dans les exemples	385
Tableau E.2 – Exemple: Lecture de la valeur d'un attribut unique sans transfert de bloc.....	386
Tableau E.3 – Exemple: Lecture de la valeur d'une liste d'attributs sans transfert de bloc	387
Tableau E.4 – Exemple: Lecture de la valeur d'un attribut unique avec transfert de bloc.....	389
Tableau E.5 – Exemple: Lecture de la valeur d'une liste d'attributs avec transfert de bloc	391
Tableau E.6 – Exemple: Écriture de la valeur d'un attribut unique sans transfert de bloc	394
Tableau E.7 – Exemple: Écriture de la valeur d'une liste d'attributs sans transfert de bloc	395
Tableau E.8 – Exemple: Écriture de la valeur d'un attribut unique avec transfert de bloc	396
Tableau E.9 – Exemple: Écriture de la valeur d'une liste d'attributs avec transfert de bloc	398

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

ÉCHANGE DES DONNÉES DE COMPTAGE DE L'ÉLECTRICITÉ – LA SUITE DLMS/COSEM –

Partie 5-3: Couche application DLMS/COSEM

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La Commission Électrotechnique Internationale (IEC) attire l'attention sur le fait qu'il est déclaré que la conformité avec les dispositions de la présente Norme internationale peut impliquer l'utilisation d'un service de maintenance concernant la pile de protocoles sur laquelle est basée la présente norme IEC 62056-5-3.

L'IEC ne prend pas position quant à la preuve, à la validité et à la portée de ce service de maintenance.

Le fournisseur du service de maintenance a donné l'assurance à l'IEC qu'il consent à fournir des services avec des demandeurs du monde entier, à des termes et conditions raisonnables et non discriminatoires. À ce propos, la déclaration du fournisseur du service de maintenance est enregistrée à l'IEC. Des informations peuvent être demandées à:

DLMS¹ User Association
Zug/Switzerland
www.dlms.com

La Norme internationale IEC 62056-5-3 a été établie par le comité d'études 13 de l'IEC: Comptage et pilotage de l'énergie électrique.

Cette deuxième édition annule et remplace la première édition de l'IEC 62056-5-3 parue en 2013. Cette édition constitue une révision technique.

Les modifications techniques majeures par rapport à l'édition précédente sont énumérées à l'Annexe G (informative).

Le texte de cette norme est issu des documents suivants:

FDIS	Rapport de vote
13/1648/FDIS	13/1657/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette norme.

Cette publication a été rédigée selon les Directives ISO/IEC, Partie 2.

Une liste de toutes les parties de la série IEC 62056, publiées sous le titre général *Échange des données de comptage de l'électricité – La suite DLMS/COSEM*, peut être consultée sur le site web de l'IEC.

Le comité a décidé que le contenu de cette publication ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous "<http://webstore.iec.ch>" dans les données relatives à la publication recherchée. A cette date, la publication sera

- reconduite,
- supprimée,
- remplacée par une édition révisée, ou
- amendée.

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¹ Spécification de message de langage de dispositif.

INTRODUCTION

Cette deuxième édition de l'IEC 62056-5-3 a été établie par le groupe de travail 14 du comité d'études 13 de l'IEC avec la contribution significative de la DLMS User Association, son partenaire de liaison de type D.

Cette édition est conforme à l'Amendement 3 de l'édition 7.0 du Livre Vert de la DLMS UA. Les principales nouvelles fonctions sont le service DataNotification, la protection générale et les mécanismes de transfert général de blocs ainsi que l'emballage réduit pour SMS.

En 2014, la DLMS UA a publié l'édition 8.0 du Livre Vert, qui prévoit de nouvelles caractéristiques en matière de fonctionnalité, d'efficacité et de sécurité tout en maintenant une rétrocompatibilité totale.

En outre, l'intention de la DLMS UA est de mettre ces derniers développements en conformité avec la normalisation internationale. Par conséquent, le groupe de travail 14 du comité d'études 13 de l'IEC a lancé un projet visant à rendre conformes ces nouveaux éléments également à la série IEC 62056 en vue de présenter l'Édition 3.0 de la norme.

L'Article 5 et l'Annexe F sont basés sur des parties de documents du NIST. Réimprimé avec l'aimable autorisation du NIST (National Institute of Standards and Technology), Technology Administration, U.S. Department of Commerce.

ÉCHANGE DES DONNÉES DE COMPTAGE DE L'ÉLECTRICITÉ – LA SUITE DLMS/COSEM –

Partie 5-3: Couche application DLMS/COSEM

1 Domaine d'application

La présente partie de l'IEC 62056 indique la couche application DLMS/COSEM en termes de structure, de services et de protocoles pour les clients et serveurs COSEM, et définit comment utiliser la couche application DLMS/COSEM dans différents profils de communication.

Elle définit les services permettant d'établir et de libérer des associations d'applications, ainsi que les services de communication de données permettant d'accéder aux méthodes et aux attributs des objets d'interface COSEM, définis dans l'IEC 62056-6-2, à l'aide du référencement par nom logique (LN) ou par nom abrégé (SN).

L'Annexe A (normative) définit comment utiliser la couche application COSEM dans différents profils de communication. Elle indique comment différents profils de communication peuvent être construits de sorte à échanger des données avec les équipements de mesure à l'aide du modèle d'interface COSEM, ainsi que les éléments nécessaires à indiquer dans chaque profil de communication. Les profils de communication réels, spécifiques au support, sont spécifiés dans des parties distinctes de la série IEC 62056.

L'Annexe B (normative) spécifie l'emballage réduit pour SMS.

L'Annexe C, l'Annexe D et l'Annexe E (informatives) incluent des exemples de codage d'APDU.

L'Annexe F (informative) présente la cryptographie.

L'Annexe G (informative) énumère les modifications techniques majeures contenues dans cette édition de la norme.

2 Références normatives

Les documents suivants sont cités en référence de manière normative, en intégralité ou en partie, dans le présent document et sont indispensables pour son application. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 61334-4-41:1996, *Automatisation de la distribution à l'aide de systèmes de communication à courants porteurs – Partie 4: Protocoles de communication de données – Section 41: Protocoles d'application – Spécification des messages de ligne de distribution*

IEC 61334-6:2000, *Automatisation de la distribution à l'aide de systèmes de communication à courants porteurs – Partie 6: Règles d'encodage A-XDR*

IEC TR 62051:1999, *Electricity metering – Glossary of terms* (disponible en anglais seulement)

IEC TR 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* (disponible en anglais seulement)

IEC 62056-1-0, *Échange des données de comptage de l'électricité – La suite DLMS/COSEM – Partie 1-0: Cadre de normalisation du comptage intelligent*

IEC 62056-6-1:2015, *Échange des données de comptage de l'électricité – La suite DLMS/COSEM – Partie 6-1: Système d'identification des objets (OBIS)*

IEC 62056-6-2:2016, *Échange des données de comptage de l'électricité – La suite DLMS/COSEM – Partie 6-2: Classes d'interface COSEM*

IEC 62056-8-3:2013, *Échange des données de comptage de l'électricité – La suite DLMS/COSEM – Partie 8-3: Profil de communication pour réseaux de voisinage CPL S-FSK*

ISO/IEC 15953:1999, *Technologies de l'information – Interconnexion des systèmes ouverts – Définition du service pour l'élément de service de contrôle d'association des objets de service d'application*

ISO/IEC 15954:1999, *Technologies de l'information – Interconnexion des systèmes ouverts – Protocole en mode connexion pour l'élément de service de contrôle d'association des objets de service d'application*

ISO/IEC 8824-1:2008, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation* (disponible en anglais seulement)

ISO/IEC 8825-1:2008, *Information technology – ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)* (disponible en anglais seulement)

FIPS PUB 180-4:2012, *Secure hash standard*

FIPS PUB 197:2001, *Advanced Encryption Standard (AES)*

NIST SP 800-38D:2007, *Recommendation for Block Cipher Modes of Operation: Galois/Counter Mode (GCM) and GMAC*

NIST SP 800-57:2006, *Recommendation for Key Management – Part 1: General* (Révisé)

Les références suivantes sont disponibles en ligne à partir du Internet Engineering Task Force (IETF, Groupe de travail d'ingénierie Internet): <http://www.ietf.org/rfc/std-index.txt>, <http://www.ietf.org/rfc/>

RFC 1321, *The MD5 Message-Digest Algorithm*. Édité par R. Rivest (MIT Laboratory for Computer Science and RSA Data Security, Inc.) avril 1992

RFC 3394, *Advanced Encryption Standard (AES) Key Wrap Algorithm*. Éditée par J. Schaad (Soaring Hawk Consulting) et R. Housley (RSA Laboratories) septembre 2002

RFC 4106:2005, *The Use of Galois/Counter Mode (GCM) in IPsec Encapsulating Security Payload (ESP)*