

STN	Integrácia aplikácií v energetických spoločnostiach Systém rozhrania na riadenie dodávky elektrickej energie Časť 9: Rozhranie odčítania a ovládania elektromerov	STN EN IEC 61968-9 33 4620
------------	--	--

Enterprise business function interfaces for utility operations - Part 9: Interfaces for meter reading and control

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 11/24

Obsahuje: EN IEC 61968-9:2024, IEC 61968-9:2024

Oznámením tejto normy sa od 22.08.2027 ruší
STN EN 61968-9 (33 4620) zo septembra 2014

139574



EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN IEC 61968-9

September 2024

ICS 33.200

Supersedes EN 61968-9:2014

English Version

**Enterprise business function interfaces for utility operations -
Part 9: Interfaces for meter reading and control
(IEC 61968-9:2024)**

Interfaces de fonctions métier d'entreprise pour
l'exploitation des services - Partie 9: Interfaces pour le
relevé et la commande des compteurs
(IEC 61968-9:2024)

Integration von Anwendungen in Anlagen der
Elektrizitätsversorgung - Systemschnittstellen für
Netzführung - Teil 9: Zählerfernauslesung und -steuerung
(IEC 61968-9:2024)

This European Standard was approved by CENELEC on 2024-08-22. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.



European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

EN IEC 61968-9:2024 (E)**European foreword**

The text of document 57/2670/FDIS, future edition 3 of IEC 61968-9, prepared by TC 57 "Power systems management and associated information exchange" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61968-9:2024.

The following dates are fixed:

- latest date by which the document has to be implemented at national (dop) 2025-05-22 level by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with the (dow) 2027-08-22 document have to be withdrawn

This document supersedes EN 61968-9:2014 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a standardization request addressed to CENELEC by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 61968-9:2024 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standard indicated:

IEC 61968-5:2020	NOTE	Approved as EN IEC 61968-5:2020 (not modified)
IEC 61970-552	NOTE	Approved as EN 61970-552
IEC 62056 series	NOTE	Approved as EN 62056 series
IEC 62325-451-10	NOTE	Approved as EN IEC 62325-451-10

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cencenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-112	-	International Electrotechnical Vocabulary - Part 112: Quantities and units	-	-
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 61968-1	-	Application integration at electric utilities - System interfaces for distribution management - Part 1: Interface architecture and general recommendations	EN IEC 61968-1	-
IEC/TS 61968-2	-	Application integration at electric utilities - System interfaces for distribution management -- Part 2: Glossary	-	-
IEC 61968-8	2015	Application integration at electric utilities - System interfaces for distribution management - Part 8: Interfaces for customer operations	EN 61968-8	2016
IEC 61968-11	-	Application integration at electric utilities - System interfaces for distribution management - Part 11: Common information model (CIM) extensions for distribution	EN 61968-11	-
IEC 61968-100	2022	Application integration at electric utilities - System interfaces for distribution management - Part 100: Implementation profiles	EN IEC 61968-100	2022
IEC 61970-301	-	Energy management system application program interface (EMS-API) - Part 301: Common information model (CIM) base	EN IEC 61970-301	-

EN IEC 61968-9:2024 (E)

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
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	-	-
ISO 4217	2015	Codes for the representation of currencies	-	-
ISO 8601	2004	Data elements and interchange formats - Information interchange - Representation of dates and times	-	-
CIM	-	Meter Reading and Control Profile Messages	-	-



IEC 61968-9

Edition 3.0 2024-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Enterprise business function interfaces for utility operations –
Part 9: Interfaces for meter reading and control**

**Interfaces de fonctions métier d'entreprise pour l'exploitation des services –
Partie 9: Interfaces pour le relevé et la commande des compteurs**

**THIS PUBLICATION IS COPYRIGHT PROTECTED****Copyright © 2024 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.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Secretariat
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 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.

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.

IEC Products & Services Portal - products.iec.ch

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

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC -**webstore.iec.ch/advsearchform**

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études, ...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications, symboles graphiques et le glossaire. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

Electropedia - www.electropedia.org

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 500 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 25 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.



IEC 61968-9

Edition 3.0 2024-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Enterprise business function interfaces for utility operations –
Part 9: Interfaces for meter reading and control**

**Interfaces de fonctions métier d'entreprise pour l'exploitation des services –
Partie 9: Interfaces pour le relevé et la commande des compteurs**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 33.200

ISBN 978-2-8322-9296-9

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD.....	13
INTRODUCTION.....	16
1 Scope.....	17
2 Normative references	18
3 Terms, definitions and abbreviated terms	19
3.1 Terms and definitions.....	19
3.2 Abbreviated terms.....	21
4 Reference and information models	21
4.1 General approach to messaging.....	21
4.2 General approach to metering systems	22
4.3 Meter reading and control functions and components.....	22
4.4 Static information model	23
4.4.1 General	23
4.4.2 Classes for meter reading and control	24
4.4.3 Classes related to meter reading and control.....	26
5 Meter reading and control message types.....	27
5.1 General.....	27
5.2 End device event messages.....	28
5.2.1 General	28
5.2.2 Applications.....	28
5.2.3 Message format.....	33
5.3 Meter reading messages.....	35
5.3.1 General	35
5.3.2 Applications.....	36
5.3.3 Message formats	41
5.4 End device control messages.....	54
5.4.1 General	54
5.4.2 Applications.....	54
5.4.3 Message format.....	61
5.5 Meter service requests.....	65
5.5.1 General	65
5.6 Metering system events	66
5.6.1 General	66
5.6.2 Applications – Firmware upgrade.....	67
5.6.3 Message formats	67
5.7 Premises area networks.....	67
5.7.1 General	67
5.7.2 Applications.....	68
5.7.3 Message formats	70
5.8 Master data management messages.....	70
5.8.1 General	70
5.8.2 Applications.....	71
5.8.3 Message formats	74
Annex A (informative) Recommended use of message type verbs.....	84
Annex B (informative) Reply error codes.....	88
Annex C (normative) Procedure for the generation of a ReadingType name.....	89

C.1	General.....	89
C.2	Understanding the important attributes of a data element name	89
C.2.1	General	89
C.2.2	Attribute #1, macroPeriod	89
C.2.3	Attribute #2, aggregate	90
C.2.4	Attribute #3, measuringPeriod	91
C.2.5	Attribute #4, accumulation	94
C.2.6	Attribute #5, flowDirection.....	97
C.2.7	Attribute #6, commodity	104
C.2.8	Attribute #7, measurementKind.....	106
C.2.9	Attribute #8, interharmonicNumerator	113
C.2.10	Attribute #9, interharmonicDenominator	113
C.2.11	Attribute #10, argumentNumerator	114
C.2.12	Attribute #11, argumentDenominator	114
C.2.13	Attribute #12, tou	116
C.2.14	Attribute #13, cpp	116
C.2.15	Attribute #14, consumptionTier	117
C.2.16	Attribute #15, phases.....	118
C.2.17	Attribute #16, multiplier.....	122
C.2.18	Attribute #17, unit	123
C.2.19	Attribute #18, currency	140
C.3	Using data element attributes to define the ReadingType name – Construction formula with example ReadingType codes	140
Annex D	(normative) Quality code enumerations.....	146
D.1	General.....	146
D.2	Identification of the system offering commentary on the data	146
D.3	Construction	146
D.4	Quality code system identifier	146
D.5	Quality code categorization.....	147
D.6	Quality code index	148
D.7	Example quality codes	158
Annex E	(normative) EndDeviceEventType enumerations	160
E.1	General.....	160
E.2	Alarm conditions	160
E.2.1	General	160
E.2.2	Clearing alarm conditions and communicating state/condition changes.....	160
E.3	Event data	161
E.4	The 4-Part ID: EndDeviceEventType.....	163
E.5	EndDeviceType.....	163
E.6	EndDeviceDomain	165
E.7	EndDeviceSubDomain	166
E.8	EndDeviceEventOrAction.....	172
E.9	Normative EndDeviceEventTypes	180
Annex F	(normative) EndDeviceControlType enumerations.....	201
F.1	General.....	201
F.2	Normative EndDeviceControlType Enumerations	201
Annex G	(normative) XML schemas for message payloads	204
G.1	General.....	204
G.2	ComModuleConfig	204

G.3	EndDeviceConfig	204
G.4	EndDeviceControls	204
G.5	EndDeviceEvents.....	204
G.6	GetComModuleConfig.....	205
G.7	GetEndDeviceConfig.....	205
G.8	GetEndDeviceControls.....	205
G.9	GetEndDeviceEvents	205
G.10	GetEndDeviceGroups	205
G.11	GetMeterConfig	205
G.12	GetMeterReadings.....	205
G.13	GetMeterReadSchedules	205
G.14	GetUsagePointConfig	206
G.15	GetUsagePointGroups	206
G.16	GetUsagePointLocationConfig	206
G.17	MasterDataLinkageConfig.....	206
G.18	MeterConfig	206
G.19	MeterReadings	206
G.20	MeterReadSchedules.....	206
G.21	UsagePointConfig	206
G.22	UsagePointGroups.....	207
G.23	UsagePointLocationConfig.....	207
Annex H (normative)	Querying data using Get profiles	208
H.1	General.....	208
H.2	GetMeterReadings.....	208
H.3	GetEndDeviceConfig.....	209
Annex I (informative)	Master data management transaction processing	211
Annex J (informative)	Master data management use cases	212
J.1	General.....	212
J.2	Sample XML for Exemplary Master Data Management use cases	228
J.2.1	General	228
J.2.2	Create MeterConfig – Two Meters – Step 1	229
J.2.3	Create MeterConfig – Two Meters – Step 2	231
J.2.4	Create MeterConfig – Two Meters – Step 3	231
J.2.5	Create MeterConfig – Two Meters – Step 4	232
J.2.6	Update MeterConfig (add MeterMultipliers, modify formNumber and ConfigurationEvent) – Step 1.....	233
J.2.7	Update MeterConfig (add MeterMultipliers, modify formNumber and ConfigurationEvent) – Step 2.....	235
J.2.8	Update MeterConfig (add MeterMultipliers, modify formNumber and ConfigurationEvent) – Step 3.....	236
J.2.9	UpdateMeterConfig (add MeterMultipliers, modify formNumber and ConfigurationEvent) – Step 4.....	237
J.2.10	Update MeterConfig (delete details) – Step 1.....	238
J.2.11	Update MeterConfig (delete details) – Step 2.....	239
J.2.12	Update MeterConfig (delete details) – Step 3.....	240
J.2.13	Update MeterConfig (delete details) – Step 4.....	241
J.2.14	Delete MeterConfig – Step 1.....	242
J.2.15	Delete MeterConfig – Step 2.....	243
J.2.16	Delete MeterConfig – Step 3.....	244

J.2.17	Delete MeterConfig – Step 4.....	245
J.2.18	Create UsagePointConfig – Step 1	246
J.2.19	Create UsagePointConfig – Step 2	247
J.2.20	Create UsagePointConfig – Step 3	247
J.2.21	Create UsagePointConfig – Step 4	248
J.2.22	Create MasterDataLinkageConfig – Step 1	249
J.2.23	Create MasterDataLinkageConfig – Step 1	250
J.2.24	Create MasterDataLinkageConfig – Step 3	251
J.2.25	Create MasterDataLinkageConfig – Step 4	252
J.2.26	Delete MasterDataLinkageConfig – Step 1.....	253
J.2.27	Delete MasterDataLinkageConfig – Step 2.....	254
J.2.28	Delete MasterDataLinkageConfig – Step 3.....	255
J.2.29	Delete MasterDataLinkageConfig – Step 4.....	256
J.2.30	Execute OperationSet – Step 1.....	256
J.2.31	Execute OperationSet – Step 2.....	258
J.2.32	Execute OperationSet – Step 3.....	259
J.2.33	Execute OperationSet – Step 4.....	259
J.2.34	Change ObjectNamesConfig.....	260
Annex K	(normative) EUMED Metering UML Model.....	261
K.1	EUMED Metering profile and associated European regulation.....	261
K.1.1	The EUMED Metering profile	261
K.1.2	The Associated European regulation	261
K.2	EUMED Metering global view	262
K.3	EUMED Metering Entities.....	265
K.3.1	General	265
K.3.2	MeterReadingSet Entity	265
K.3.3	MeterReading Entity	265
K.3.4	Meter Entity	266
K.3.5	Customer Entity	266
K.3.6	IntervalBlock Entity	267
K.3.7	IntervalReading Entity	267
K.3.8	ReadingQuality Entity	268
K.3.9	UsagePoint Entity	269
K.3.10	UsagePointLocation Entity.....	269
K.3.11	ReadingType Entity	270
K.3.12	Name Entity.....	273
K.3.13	NameType Entity	273
K.3.14	NameTypeAuthority Entity	274
K.4	EUMED Metering Datatypes.....	275
K.4.1	General	275
K.4.2	AccumulationKind enumeration Datatype.....	276
K.4.3	AggregateKind enumeration Datatype.....	277
K.4.4	CommodityKind enumeration Datatype	278
K.4.5	Currency enumeration Datatype	279
K.4.6	CustomerKind enumeration Datatype.....	282
K.4.7	DateTimeInterval compound Datatype	283
K.4.8	FlowDirectionKind enumeration Datatype	283
K.4.9	MacroPeriodKind enumeration Datatype	285
K.4.10	MeasurementKind enumeration Datatype.....	285

K.4.11	MeasuringPeriodKind enumeration Datatype	288
K.4.12	PhaseCode enumeration Datatype.....	290
K.4.13	RationalNumber compound Datatype.....	291
K.4.14	ReadingInterharmonic compound Datatype.....	291
K.4.15	UnitMultiplier enumeration Datatype	291
K.4.16	UnitSymbol enumeration Datatype.....	292
Annex L (normative)	EUMED Metering XSD schema.....	298
L.1	EUMED Metering Entities global view	298
L.1.1	General	298
L.1.2	MeterReadingSet Entity	298
L.1.3	MeterReading Entity	298
L.1.4	Meter Entity	299
L.1.5	Customer Entity	299
L.1.6	IntervalBlock Entity	300
L.1.7	IntervalReading Entity	300
L.1.8	ReadingQuality Entity	301
L.1.9	UsagePoint Entity	302
L.1.10	UsagePointLocation Entity.....	302
L.1.11	ReadingType Entity	302
L.1.12	Name Entity.....	303
L.1.13	NameType Entity	304
L.1.14	NameTypeAuthority Entity	304
L.2	EUMED Metering Entities description.....	305
L.3	EUMED Metering Datatypes Description	311
Annex M (informative)	Contextualization and examples of EUMED metering messages	351
M.1	Overview	351
M.2	EUMED Metering Load Curve message payload	351
M.3	EUMED Metering Max Power message payload.....	352
M.4	EUMED Metering Index message payload.....	352
Bibliography		355
Figure 1	– IEC 61968-9 scope	18
Figure 2	– Outage Detection, request/reply message exchange, Example 1.....	29
Figure 3	– Outage Detection, request / reply message exchange, Example 2.....	29
Figure 4	– Outage Detection, publish/subscribe exchange, Example 1.....	30
Figure 5	– Outage Detection, publish/subscribe exchange, Example 2.....	31
Figure 6	– Meter Health Event exchange, Example 1	32
Figure 7	– Meter Health Event exchange, Example 2	32
Figure 8	– Power quality event exchange, Example 1	33
Figure 9	– Power quality event exchange, Example 2	33
Figure 10	– End device event message format.....	34
Figure 11	– EndDeviceEvents example.....	35
Figure 12	– Example use of meter read schedule to create subscription	36
Figure 13	– Example manual meter reading exchange	37
Figure 14	– Example On-Request meter read	39
Figure 15	– Historical MeterData exchange.....	40

Figure 16 – Example billing inquiry message exchange	40
Figure 17 – Meter readings message format	41
Figure 18 – Reading structure	44
Figure 19 – Timestamps assigned between systems	45
Figure 20 – Conventions for timeStamp and timePeriod	45
Figure 21 – IntervalBlock structure	46
Figure 22 – Interval data timestamp generation	47
Figure 23 – Time interval conventions	47
Figure 24 – ReadingType structure	48
Figure 25 – MeterReadings Example 1	49
Figure 26 – MeterReadings Example 2	50
Figure 27 – Coincident readings example	51
Figure 28 – Final meter reading coincident with disconnect example	51
Figure 29 – GetMeterReadings example	52
Figure 30 – Meter read schedules message format	53
Figure 31 – Example load control message exchange	55
Figure 32 – Example message exchange for LC unit installation	56
Figure 33 – Example message exchange for change of customer program	57
Figure 34 – Example message exchange for change of customer program w/o MDM	57
Figure 35 – Example for change of customer program with meter change out	58
Figure 36 – Example message exchange for meter connect/disconnect	59
Figure 37 – Example of remote connect/disconnect directly between CIS and MS	60
Figure 38 – Example message exchange for real-time price signal	61
Figure 39 – End device controls message format	62
Figure 40 – EndDevice example	63
Figure 41 – EndDeviceControl example	64
Figure 42 – EndDeviceControls disconnect by group example	64
Figure 43 – EndDeviceControls meter connection example	65
Figure 44 – Example end device event message exchange due to meter changeout	66
Figure 45 – Example firmware upgrade message exchange	67
Figure 46 – Pairing of a PAN device	68
Figure 47 – PAN device events	69
Figure 48 – PAN device controls	70
Figure 49 – Master data linkages	72
Figure 50 – Message exchange for transferring usage point information	73
Figure 51 – Message exchange for transferring meter information	74
Figure 52 – Message exchange for transferring end device information	74
Figure 53 – MasterDataLinkageConfig message format	75
Figure 54 – MaterDataLinkageConfig example	76
Figure 55 – UsagePointConfig message format	77
Figure 56 – UsagePointConfig example	78
Figure 57 – UsagePointLocationConfig message format	79
Figure 58 – UsagePointLocationConfig example	80

Figure 59 – End device config message format	81
Figure 60 – Meter configuration message	82
Figure 61 – MeterConfig example	83
Figure 62 – ComModuleConfig message format	83
Figure C.1 – Typical enumerations for accumulation behaviour	97
Figure C.2 – Typical enumerations for direction of flow	104
Figure C.3 – Voltage measurements	113
Figure E.1 – Event data	162
Figure E.2 – Multiple EndDeviceEventDetails Example 1	162
Figure E.3 – EndDeviceEventDetails example 2	163
Figure E.4 – EndDeviceEvent Example 3	163
Figure H.1 – GetMeterReadings	209
Figure H.2 – GetMeterConfig	210
Figure J.1 – Create MeterConfig – Two Meters – Step 1	230
Figure J.2 – Create MeterConfig – Two Meters – Step 2	231
Figure J.3 – Create MeterConfig – Two Meters – Step 3	232
Figure J.4 – Create MeterConfig – Two Meters – Step 4	233
Figure J.5 – Create MeterConfig – Update MeterConfig (add MeterMultiplies, modify formNumber and ConfigurationEvent) Step 1	234
Figure J.6 – Update MeterConfig (add MeterMultiplies, modify formNumber and ConfigurationEvent) Step 2	235
Figure J.7 – Update MeterConfig (add MeterMultiplies, modify formNumber and ConfigurationEvent) Step 3	236
Figure J.8 – Update MeterConfig (add MeterMultiplies, modify formNumber and ConfigurationEvent) Step 4	237
Figure J.9 – Update MeterConfig (delete details) – Step 1	238
Figure J.10 – Update MeterConfig (delete details) – Step 2	239
Figure J.11 – Update MeterConfig (delete details) – Step 3	240
Figure J.12 – Update MeterConfig (delete details) – Step 4	241
Figure J.13 – Delete MeterConfig – Step 1	242
Figure J.14 – Delete MeterConfig – Step 2	243
Figure J.15 – Delete MeterConfig – Step 3	244
Figure J.16 – Delete MeterConfig – Step 4	245
Figure J.17 – Create UsagePointConfig – Step 1	246
Figure J.18 – Create UsagePointConfig – Step 2	247
Figure J.19 – Create UsagePointConfig – Step 3	247
Figure J.20 – Create UsagePointConfig – Step 4	248
Figure J.21 – Create MasterDataLinkageConfig – Step 1	249
Figure J.22 – Create MasterDataLinkageConfig – Step 2	250
Figure J.23 – Create MasterDataLinkageConfig – Step 3	251
Figure J.24 – Create MasterDataLinkageConfig – Step 4	252
Figure J.25 – Delete MasterDataLinkageConfig – Step 1	253
Figure J.26 – Delete MasterDataLinkageConfig – Step 2	254
Figure J.27 – Delete MasterDataLinkageConfig – Step 3	255

Figure J.28 – Delete MasterDataLinkageConfig – Step 4	256
Figure J.29 – Execute OperationSet – Step 1	258
Figure J.30 – Execute OperationSet – Step 2	258
Figure J.31 – Execute OperationSet – Step 3	259
Figure J.32 – Execute OperationSet – Step 4	260
Figure K.1 – EUMED Metering Class diagram	264
Figure L.1 – MeterReadingSet schema for EUMED Metering	298
Figure L.2 – The MeterReading schema used for EUMED Metering	299
Figure L.3 – Meter Entity	299
Figure L.4 – Customer Schema used for EUMED Metering	300
Figure L.5 – IntervalBlock Schema used for EUMED Metering	300
Figure L.6 – IntervalReading schema used for EUMED metering	301
Figure L.7 – ReadingQuality element for EUMED Metering	301
Figure L.8 – UsagePoint element used in EUMED Metering	302
Figure L.9 – UsagePointLocation element used in EUMED Metering	302
Figure L.10 – ReadingType element used in EUMED Metering	303
Figure L.11 – Name element used in EUMED Metering	304
Figure L.12 – NameType element used in EUMED Metering	304
Figure L.13 – NameTypeAuthority element used in EUMED Metering	304
Figure M.1 – Load curve XML message payload	351
Figure M.2 – Max power XML message payload	352
Figure M.3 – Index XML message payload (extract 1)	353
Figure M.4 – Index XML message payload (extract 2)	354
Table 1 – Business functions and abstract components	23
Table 2 – Classes for meter reading and control	24
Table 3 – Classes related to meter reading and control	27
Table 4 – IEC 61968-9 configuration profiles	71
Table A.1 – Recommended verb usage with related profiles	85
Table C.1 – Time-period of interest enumerations	90
Table C.2 – Data qualifier enumerations	91
Table C.3 – measuringPeriod enumerations	92
Table C.4 – Demand normalization scalars	93
Table C.5 – Accumulation behaviour enumerations	95
Table C.6 – Customary accumulation behaviour enumerations	97
Table C.7 – Direction of flow enumeration	98
Table C.8 – DirectionOfFlow enumeration equivalencies	103
Table C.9 – Commodity	104
Table C.10 – measurementKind Index	106
Table C.11 – Harmonic and Interharmonic enumerations	114
Table C.12 – Argument enumerations	115
Table C.13 – Time Of Use Enumerations	116
Table C.14 – Critical Peak Period Enumerations	116

Table C.15 – Consumption Tier Enumerations	117
Table C.16 – Example Combinations of TOU and Consumption Tier Enumerations	117
Table C.17 – Phase enumerations	119
Table C.18 – Power of ten enumerations	122
Table C.19 – Historical concentration multiplier enumerations	123
Table C.20 – Base SI units of measure	125
Table C.21 – Derived SI units of measure with special names	125
Table C.22 – Derived SI Units of Measure without Special Names	127
Table C.23 – Non-SI Units of Measure accepted for use with the International System of Units	131
Table C.24 – Dimensionless and Concentration Units of Measure	132
Table C.25 – Non-SI units whose values in SI units shall be obtained experimentally	134
Table C.26 – Other Non-SI Units of Measure	135
Table C.27 – Non-SI Units Associated with the CGS and the CGS-Gaussian System of Units	139
Table C.28 – Currency units of measure (from ISO 4217)	140
Table C.29 – ReadingType Examples	142
Table D.1 – System identifier	147
Table D.2 – Example quality code categories	147
Table D.3 – Validity related codes	148
Table D.4 – Diagnostics related codes	149
Table D.5 – Power quality related codes	150
Table D.6 – Tamper / revenue protection related codes	150
Table D.7 – Data collection related codes	151
Table D.8 – Failed reasonability testing related codes	152
Table D.9 – Failed validation testing related codes	152
Table D.10 – Edit related codes	154
Table D.11 – Estimation related codes	155
Table D.12 – Questionable related codes	156
Table D.13 – Derived related codes	157
Table D.14 – Projected related codes	158
Table D.15 – Example Quality Codes	159
Table E.1 – Example pairings between meter events and EndDeviceEvent enumerated mnemonics	161
Table E.2 – EndDeviceType codes	164
Table E.3 – EndDeviceDomain Codes	165
Table E.4 – EndDeviceSubdomain codes	167
Table E.5 – EndDeviceEventOrAction codes	173
Table E.6 – Battery events	180
Table E.7 – Billing events	181
Table E.8 – Cartridge events	181
Table E.9 – Clock events	182
Table E.10 – Communication events	183
Table E.11 – Configuration events	184

Table E.12 – Demand events	185
Table E.13 – Firmware events	185
Table E.14 – GasSupply events	187
Table E.15 – Installation events	187
Table E.16 – LoadControl events	187
Table E.17 – LoadProfile events	188
Table E.18 – Logs events	188
Table E.19 – Memory events	189
Table E.20 – Metrology events.....	189
Table E.21 – MobileSecurity events	191
Table E.22 – Modem events.....	192
Table E.23 – ModuleFirmware events	192
Table E.24 – Network events	192
Table E.25 – PAN / HAN events.....	193
Table E.26 – Power events	194
Table E.27 – Pressure events	197
Table E.28 – RCDSwitch events	197
Table E.29 – Security events	198
Table E.30 – Temperature events	200
Table E.31 – VideoDisplay events.....	200
Table E.32 – WaterSupply events	200
Table F.1 – Demand Controls	201
Table F.2 – LoadControl Controls	202
Table F.3 – PAN / HAN Controls	202
Table F.4 – RCDSwitch Controls.....	202
Table J.1 – Exemplary master data management / data synchronization use cases	213
Table K.1 – Entities of the EUMED Metering Model	263
Table K.2 – Association ends of EUMED Metering ENTITIES:: MeterReadingSet with other classes	265
Table K.3 – Attributes of EUMED Metering ENTITIES::MeterReading	265
Table K.4 – Association ends of EUMED Metering ENTITIES:: MeterReading with other classes	266
Table K.5 – Attributes of EUMED Metering ENTITIES::Meter	266
Table K.6 – Association ends of EUMED Metering ENTITIES::Meter with other classes	266
Table K.7 – Attributes of EUMED Metering ENTITIES::Customer	267
Table K.8 – Association ends of EUMED Metering ENTITIES:: Customer with other classes	267
Table K.9 – Association ends of Metering::IntervalBlock with other classes	267
Table K.10 – Attributes of EUMED Metering ENTITIES::IntervalReading.....	268
Table K.11 – Association ends of EUMED Metering ENTITIES:: IntervalReading with other classes	268
Table K.12 – Attributes of EUMED Metering ENTITIES::ReadingQuality	268
Table K.13 – Association ends of EUMED Metering ENTITIES:: ReadingQuality with other classes	269
Table K.14 – Attributes of EUMED Metering ENTITIES::UsagePoint	269

Table K.15 – Association ends of EUMED Metering ENTITIES:: UsagePoint with other classes	269
Table K.16 – Attributes of EUMED Metering ENTITIES::UsagePointLocation	270
Table K.17 – Association ends of EUMED Metering ENTITIES:: UsagePointLocation with other classes	270
Table K.18 – Attributes of EUMED Metering ENTITIES::ReadingType.....	270
Table K.19 – Association ends of EUMED Metering ENTITIES:: ReadingType with other classes	273
Table K.20 – Attributes of EUMED Metering ENTITIES::Name	273
Table K.21 – Association ends of EUMED Metering ENTITIES::Name with other classes	273
Table K.22 – Attributes of EUMED Metering ENTITIES::NameType	274
Table K.23 – Association ends of EUMED Metering ENTITIES:: NameType with other classes	274
Table K.24 – Attributes of EUMED Metering ENTITIES::NameTypeAuthority	274
Table K.25 – Association ends of EUMED Metering ENTITIES:: NameTypeAuthority with other classes	274
Table K.26 – Association ends of EUMED Metering ENTITIES:: MeterReadingSet with other classes	275
Table K.27 – Datatypes of EUMED Metering Model	275
Table K.28 – Literals of EUMED Metering DATA TYPES::AccumulationKind	276
Table K.29 – Literals of EUMED Metering DATA TYPES::AggregateKind	277
Table K.30 – Literals of EUMED Metering DATA TYPES::CommodityKind	278
Table K.31 – Literals of EUMED Metering DATA TYPES::Currency.....	279
Table K.32 – Literals of EUMED Metering DATA TYPES::CustomerKind.....	283
Table K.33 – Attributes of EUMED Metering DATA TYPES::DateTimeInterval.....	283
Table K.34 – Literals of EUMED Metering DATA TYPES::FlowDirectionKind.....	284
Table K.35 – Literals of EUMED Metering DATA TYPES::MacroPeriodKind	285
Table K.36 – Literals of EUMED Metering DATA TYPES::MeasurementKind.....	286
Table K.37 – Literals of EUMED Metering DATA TYPES::MeasuringPeriodKind.....	289
Table K.38 – Literals of EUMED Metering DATA TYPES::PhaseCode.....	290
Table K.39 – Attributes of EUMED Metering DATA TYPES::RationalNumber	291
Table K.40 – Attributes of EUMED Metering DATA TYPES::ReadingInterharmonic	291
Table K.41 – Literals of EUMED Metering DATA TYPES::UnitMultiplier	292
Table K.42 – Literals of EUMED Metering DATA TYPES::UnitSymbol	293
Table L.1 – Association ends of EUMED Metering ENTITIES:: IntervalBlock with other classes	300

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ENTERPRISE BUSINESS FUNCTION INTERFACES
FOR UTILITY OPERATIONS –****Part 9: Interfaces for meter reading and control****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) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 61968-9 has been prepared by IEC technical committee 57: Power systems management and associated information exchange. It is an International Standard.

This third edition cancels and replaces the second edition published in 2013. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) IEC 61968-100:2022 has superseded IEC 61968-100:2013 that was used in many of the examples in IEC 61968-9:2013. Applicable portions of the current version of IEC 61968-9 have been updated to reflect message envelope and message exchange patterns specified in IEC 61968-100:2022. Although the use of IEC 61968-100 is highly recommended, it is possible to utilize IEC 61968-9 without using IEC 61968-100 message envelopes or exchange patterns. This was true for IEC 61968-9:2013 and remains true for this IEC 61968-9:2024.
- b) Unless noted otherwise, the IEC 61968-9:2013 XSDs that remain in IEC 61968-9:2024 are unchanged except for changes that have been made for compatibility with IEC 61968-100:2022 as described in 61968-100:2022. This supports the abstract payload construct in the Message.xsd defined in IEC 61968-100:2022. As a result, these modified profiles have a new namespace. One notable exception is that the MeterReadSchedule.xsd has been replaced with a new MeterReadSchedules.xsd. It has structural changes to support improved functionality as described in 5.3.3. Another exception is that the GetMeterReadSchedule.xsd has been replaced with GetMeterReadSchedules.xsd. Also note that IEC 61968-8:2015 profiles listed in the table in Annex A will require edits in order to be compatible with IEC 61968-100:2022.
- c) The "Verbs" listed in IEC 61968-9:2013, Annex A have been moved to IEC 61968-100:2022. Annex A now (in this third edition) instead provides a table which recommends the use of certain verbs to accompany profiles related to 61968-9;
- d) The "Reply Error Codes" listed in IEC 61968:2013, Annex B have been moved to IEC 61968-100:2022. Annex B now (in this third edition) instead provides a few recommendations on how to handle certain error situations which might originate in 61968-9;
- e) Customer profiles CustomerAccountConfig, CustomerAgreementConfig, CustomerConfig, GetAuxiliaryAgreementConfig, GetCustomerAccountConfig, GetCustomerAgreementConfig, GetServiceCategoryConfig, GetCustomerConfig, GetMeterServiceRequests, GetPricingStructureConfig, GetServiceLocationConfig, GetServiceSupplierConfig, MeterServiceRequests, PricingStructureConfig, ServiceCategoryConfig, ServiceLocationConfig, and ServiceSupplierConfig have been deleted from this document and moved to IEC 61968-8. However, certain references to these profiles have been retained for the sake of usability. A "MeterServiceRequest" which might be issued by a function within IEC 61968-9:2013, is now shared with 61968-8 which also could just as well have a need to issue such a request. Users of one part may have to refer to another part within the 61968 series in order to obtain a shared schema. Furthermore, certain names may change when they are moved from one part to another. For example, a "MeterServiceRequest" is now referred to as a (more generic) "ServiceRequest".;
- f) Additional enumerations have been provided in the annexes for ReadingTypes (Annex C), EndDeviceEventTypes (Annex E) and EndDeviceControlTypes (Annex F);
- g) Statements have been added to certain figures, tables, schemas, and enumerations throughout the document that indicate that they are reproduced with the permission of the UCA International User Group (UCAIug). These items are derived from the Common Information Model (CIM);
- h) The "Conventions for naming and identifying objects" provided in IEC 61968:2013, Annex G has been deleted. The user should instead consider IEC 61968-11, *Common information model (CIM) extensions for Operation Support* or IEC 61970-301, *Energy management system application program interface (EMS-API) – Part 301: Common information model (CIM) base*. This deletion causes subsequent Annexes in IEC 61968:2013, to be renumbered in this third edition; The "Notes on extended use of IEC 61968-100" provided in Annex M of IEC 61968:2013, have been deleted. It is recommended that the reader instead obtain a copy of the most recent version of 61968-100.
- i) The profiles in IEC 61968-9:2013, Annex H "(Normative) XML Schemas for Message Payloads" and IEC 61968-9:2013, Annex I "(Informative) XML Schemas for Message Payloads" have been removed from the document. Instead, there is now (in this third edition) an Annex G which provides links to the profiles at the UCAIug website,

- j) Small changes have been made to the document for better comprehension and usability;
- k) Added normative and informative annexes (K, L, and M) to describe how IEC 61968-9 can be used to support European regulation regarding access to data and interoperability. In particular, these annexes describe the EUMED Metering profile, and serve to draft requirements to address provisions laid down in Articles 20, 23, and 24 of the Electricity Directive (EU) 2019/944. For more information refer to IEC 62325-451-10.

The text of this International Standard is based on the following documents:

Draft	Report on voting
57/2670/FDIS	57/2679/RVD

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/publications.

A list of all parts in the IEC 61968 series, published under the general title *Enterprise business function interfaces for utility operations*, can be found on the IEC website.

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

This IEC standard includes Code Components i.e. components that are intended to be directly processed by a computer. Such content is any text found between the markers <CODE BEGINS> and <CODE ENDS>, or otherwise is clearly labelled in this standard as a Code Component.

The purchase of this IEC standard carries a copyright license for the purchaser to sell software containing Code Components from this standard to end users either directly or via distributors, subject to IEC software licensing conditions, which can be found at: <https://www.iec.ch/webstore/custserv/pdf/CC-EULA.pdf>.

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, or
- revised.

IMPORTANT – The "colour inside" logo on the cover page of this document 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

The purpose of this part of IEC 61968 is to define a standard for the integration of Metering Systems (MS), which would include traditional (one or two-way) Automated Meter Reading (AMR) Systems, with other systems and business functions within the scope of IEC 61968. The scope of this document is the exchange of meter reading, transactions, event and control information between systems within the utility enterprise and between enterprises. The specific details of communication protocols those systems employ are outside the scope of this document. Instead, this document will recognize and model the general capabilities that can be potentially provided by advanced and/or legacy meter infrastructures, including two-way communication capabilities such as load control, dynamic pricing, outage detection, distributed energy resource (DER) control signals and on-request read.

ENTERPRISE BUSINESS FUNCTION INTERFACES FOR UTILITY OPERATIONS –

Part 9: Interfaces for meter reading and control

1 Scope

This part of IEC 61968 specifies the information content of a set of message types that can be used to support many of the business functions related to meter reading and control. Typical uses of the message types include meter reading, controls, events, customer data synchronization and customer switching. Although intended primarily for electrical distribution networks, IEC 61968-9 can be used for other metering applications, including non-electrical metered quantities necessary to support gas and water networks.

The purpose of this document is to define a standard for the integration of metering systems (MS), which includes traditional manual systems, and (one or two-way) automated meter reading (AMR) systems, and meter data management (MDM) systems with other enterprise systems and business functions within the scope of IEC 61968. The scope of this document is the exchange of information between metering systems, MDM systems and other systems within the utility enterprise. The specific details of communication protocols those systems employ are outside the scope of this document. Instead, this document will recognize and model the general capabilities that can be potentially provided by advanced and/or legacy meter infrastructures, including two-way communication capabilities such as load control, dynamic pricing, outage detection, distributed energy resource (DER) control signals and on-request read. In this way, this document will not be impacted by the specification, development and/or deployment of next generation meter infrastructures either through the use of standards or proprietary means.

Figure 1 describes the scope of this document from the perspective of direct and causal or indirect impacts of IEC 61968-9 messages. Where the focus of IEC 61968-9 is to define standard messages for the integration of enterprise applications, these messages may be directly or indirectly related to information flows within a broader scope. Examples would include messaging between head end systems and meters or PAN devices. The various components described later in this document will typically fall into either the category of a metering system (MS) head end, an MDM or other enterprise application (e.g. OMS, DRMS, CIS).

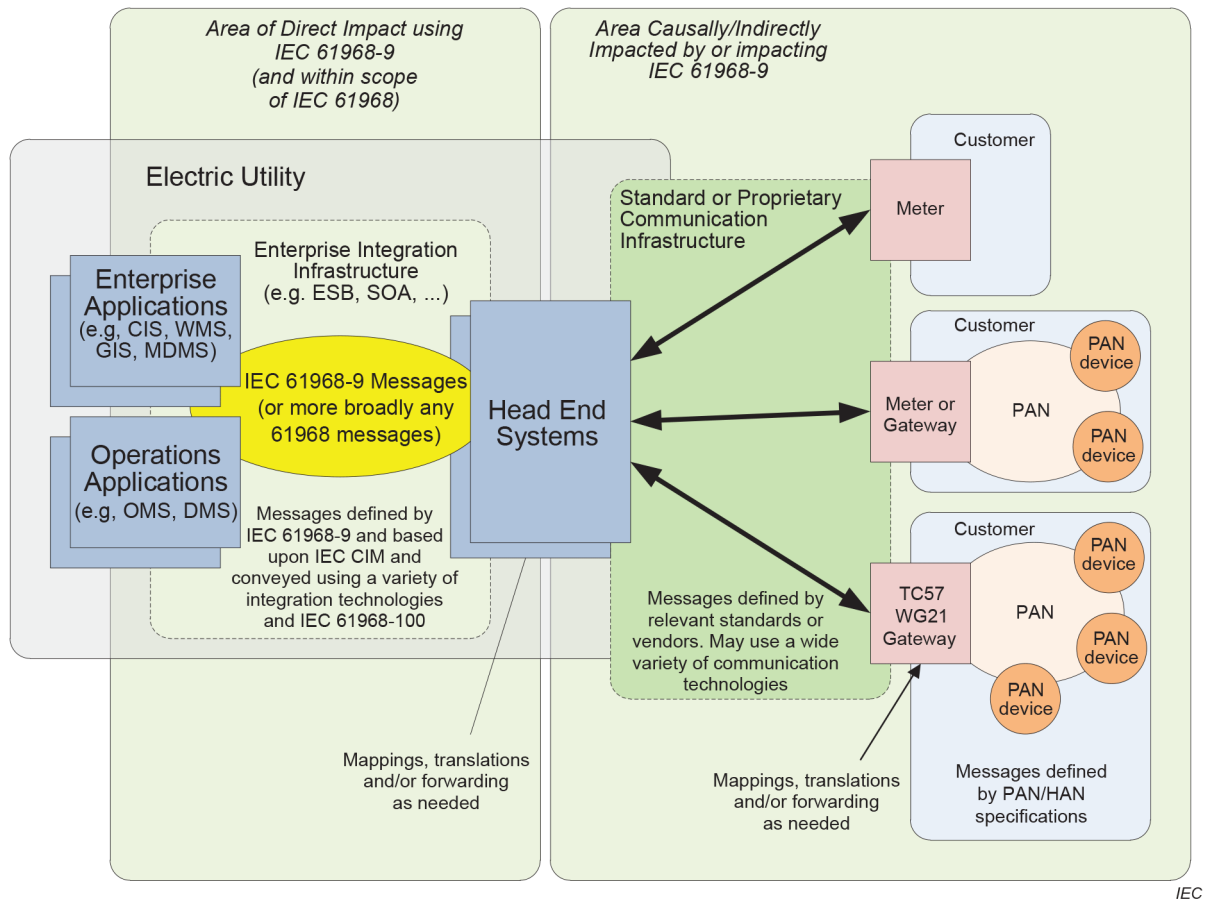


Figure 1 reproduced with the permission of UCAIug.

Figure 1 – IEC 61968-9 scope

The capabilities and information provided by a meter reading and meter data management systems are important for a variety of purposes, including (but not limited to) interval data, time-based demand data, time-based energy data (usage and production), outage management, service interruption, service restoration, quality of service monitoring, distribution network analysis, distribution planning, demand response, customer billing and work management. This standard also extends the CIM (Common Information Model) to support the exchange of meter data.

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 60050-112, *International Electrotechnical Vocabulary (IEV) – Part 112: Quantities and units*

IEC 60050-300, *International Electrotechnical Vocabulary (IEV) – Part 300: 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 61968-1, *Application integration at electric utilities – System interfaces for distribution management – Part 1: Interface architecture and general recommendations*

IEC TS 61968-2, *Application integration at electric utilities – System interfaces for distribution management – Part 2: Glossary*

IEC 61968-8:2015, *Application integration at electric utilities – System interfaces for distribution management – Part 8: Interfaces for customer operations*

IEC 61968-11, *Application integration at electric utilities – System interfaces for distribution management – Part 11: Common information model (CIM) extensions for distribution*

IEC 61968-100:2022, *Application integration at electric utilities – System interfaces for distribution management – Part 100: IEC implementation profiles for application integration*

IEC 61970-301, *Energy management system application program interface (EMS-API) – Part 301: Common information model (CIM) base*

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*

ISO 4217:2015, *Codes for the representation of currencies*

ISO 8601:2004, *Data Elements and Interchange Formats – Information Interchange – Representation of Dates and Times*

CIM Meter Reading and Control Profile Messages, Edition 3, available at <https://cimug.ucaiug.org>

koniec náhľadu – text ďalej pokračuje v platenej verzii STN