IEC 62056-8-8

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Electricity metering data exchange – The DLMS/COSEM suite – Part 8-8: Communication profile for ISO/IEC 14908 series networks

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Échange des données de comptage de l'électricité – La suite DLMS/COSEM – Partie 8-8: Profil de communication pour réseaux de la série ISO/IEC 14908

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ELECTRICITY METERING DATA EXCHANGE –
THE DLMS/COSEM SUITE –

Part 8-8: Communication profile for ISO/IEC 14908 series networks

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

CDV	Report on voting
13/1783/CDV	13/1792/RVC

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

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

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

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INTRODUCTION

The IEC 62056 DLMS/COSEM suite provides specific communication profile standards for communication media relevant for smart metering.

Such communication profile standards specify how the COSEM data model and the DLMS/COSEM application layer can be used on the lower communication media-specific protocol layers.

Communication profile standards refer to communication standards that are part of the IEC 62056 DLMS/COSEM suite or to any other open communication standard.

This International Standard specifies DLMS/COSEM communication profile using ISO/IEC 14908-1:2012, *Information technology – Control network protocol – Part 1: Protocol stack* and ISO/IEC 14908-3:2012, *Information technology – Control network protocol – Part 3: Power line channel specification.* It applies for devices installed on the neighbourhood area network.

It follows the rules defined in IEC 62056-5-3:2017, Annex A, and in IEC 62056-1-0, and IEC TS 62056-1-1 for its structure.

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ELECTRICITY METERING DATA EXCHANGE – THE DLMS/COSEM SUITE –

Part 8-8: Communication profile for ISO/IEC 14908 series networks

1 Scope

This part of IEC 62056 describes how the DLMS/COSEM Application layer and the COSEM object model as specified in IEC 62056-5-3:2017, IEC 62056-6-1:2017 and IEC 62056-6-2:2017 can be used over the lower layers specified in the IEC 14908 series, forming a DLMS/COSEM ISO/IEC 14908 communication profile.

This document is part of the IEC 62056 series. Its structure follows IEC 62056-1-0 and IEC TS 62056-1-1.

Annex A (informative) provides examples of representative instances of data exchange.

NOTE This Annex A is included and referenced for consistency with other parts of the IEC 62056 suite, but it is empty.

Annex B (normative) defines COSEM interface classes and related OBIS codes for setting up and managing the DLMS/COSEM communication profile for IEC 14908 networks. These interface classes and OBIS codes will be moved later to IEC 62056-6-2 and IEC 62056-6-1.

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Annex C (informative) provides an implementation guide and specifies a migration path from Utility Tables based applications to DLMS/COSEM based applications.

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Annex D (informative) specifies the OSGP-AES-128-PSK security suite for optional use on the adaptation layer level.

Annex E (normative) specifies the repeating mechanism over the ISO 14908-3 Power Line Channel network.

Annex F (informative) specifies ISO/IEC 14908-3 Registration and monitoring of LNAPs.

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 62056-5-3:2017, *Electricity metering data exchange – The DLMS/COSEM suite – Part 5-3: DLMS/COSEM application layer*

IEC 62056-6-1:2017, *Electricity metering data exchange – The DLMS/COSEM suite – Part 6-1: Object Identification System (OBIS)*

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

ISO/IEC 14908-1:2012, *Information technology – Control network protocol – Part 1: Protocol stack*

ISO/IEC 14908-3:2012, *Information technology – Control network protocol – Part 3: Power line channel specification*

EN 50065-1, *Signalling on low-voltage electrical installations in the frequency range 3 kHz to 148,5 kHz – Part 1: General requirements, frequency bands and electromagnetic disturbances*

3 Terms, definitions and abbreviated terms

For the purposes of this document, the following terms and definitions apply.

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- IEC Electropedia: available at http://www.electropedia.org/
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NOTE All the messages in this document use the big endian format

3.1 Terms and definitions

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3.1.1
domain
logical network that is a unit for addressing

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Note 1 to entry: Subnet (see below) and node addresses are assigned by the administrator responsible for the domain, and they have meaning only in the context of that domain.

Note 2 to entry: All nodes belongs to the same domain to be able to address each other.

3.1.2
node
abstraction for a physical node that represents the highest degree of address resolvability on a network

Note 1 to entry: A node is identified (addressed) within a subnet by its (logical) node identifier called Node_ID. A physical node may belong to more than one subnet; when it does, it is assigned one (logical) node number for each subnet to which it belongs. A physical node may belong to at most two subnets; these subnets are parts of different domains. A node may also be identified (absolutely) within a network by its Unique_Node_ID which is immutable.

3.1.3
subnet
set of nodes accessible through the same link layer protocol

Note 1 to entry: In a logical address, a subnet is identified by a Subnet_ID.

3.1.4
transaction
sequence of messages that are correlated

Note 1 to entry: For example, a request and the response to the request are all part of a single transaction. A transaction succeeds when all the expected messages from every node involved in the transaction are received at least once. A transaction fails if any of the expected messages within the transaction are not received.

3.2 Abbreviated terms

Abbreviated term	Meaning
AA	Application Association
AARE	Application Association Response
AARQ	Application Association Request
ACSE	Association Control Service Element
ADD	Automated Device Discovery
AdpPDU	Adaptation layer PDU
AL	Application layer
AP	Application Process
APDU	Application Protocol Data Unit
ASE	Application Service Element
ATM	Automated Topology Management
BPSK	Binary Phase Shift Keyed
COSEM	Companion Specification of Energy Metering
CRC	Cyclic Redundancy Code
CSMA	Carrier Sense Medium Access
DC	Data Concentrator
DLPDU	Data Link Protocol Data Unit
DLMS	Device Language Message Specification
FCM	Fast Commission Message
KMS	Key Management System
HES	Head End System
LNAP	Local Network Access Points
MAC	Medium Access Control (sublayer)
MAC	Message Authentication Code (cryptography)
MEP	Multipurpose Expansion Port
NMS	Network Management System
NN	Neighbourhood Network
NNAP	Neighbourhood Network Access Points
OBIS	Object Identification System
OSGP	Open Smart Grid Protocol [a)]
OSI	Open System Information
PID	Program Identifier
PLC	Power Line Carrier
PSK	Pre-Shared Key
SAP	Service Access Point
SDU	Service Data Unit
SICB	Service Interface Control Block
UNID	Unique Node Identifier
xDLMS	Extended DLMS

[a)] OSGP is a business model that defines one method for how smart metering should be implemented, and comprises a variety of items and parameters including security design and implementation, data formats, data model, device functionalities.

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4 Targeted communication environments

The DLMS/COSEM communication profile over IEC 14908 series networks is intended for remote data exchange on Neighbourhood Networks (NN) between Neighbourhood Network Access Points (NNAP) and Local Network Access Points (LNAPs) or metering devices, using BPSK narrowband PLC technology over the low voltage electricity distribution network as a communication medium. The functional reference architecture is shown in Figure 1.

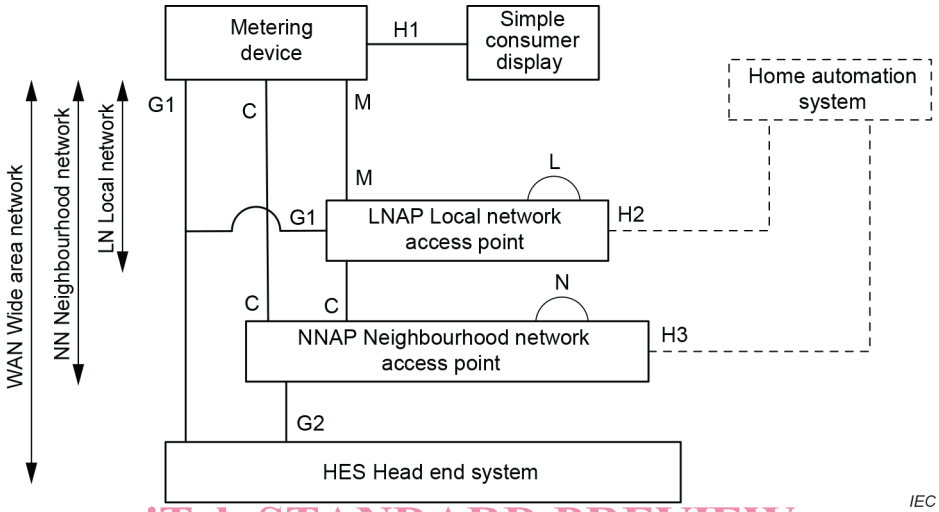

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Figure 1 – Functional reference architecture

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Metering Devices – typically electricity meters – comprise application functions and communication functions. They may be connected directly to the NNAP via the C interface, or to an LNAP via an M interface, while the LNAP is connected to the NNAP via the C interface. The LNAP function may be co-located with the metering functions.

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A NNAP comprises gateway functions and it may comprise concentrator functions. Upstream, it is connected to the Metering Head End System (HES) using suitable communication media and protocols.

Metering Devices and LNAPs may communicate to different NNAPs, but to only one NNAP at a time. From the PLC communication point of view, the NNAP acts as a gateway while metering devices and LNAPs act as endpoints.

NNAPs and similarly LNAPs may communicate with each other, but this is out of the scope of this document, which covers the C interface only.

When the NNAP has concentrator functions, it acts as a DLMS/COSEM client. When the NNAP has gateway functionality only, then the HES plays the role of a DLMS/COSEM client. The metering devices or the LNAPs play the role of DLMS/COSEM servers. In this specification, the NNAP is considered as playing the role of a DLMS/COSEM client, meaning having concentrator functions, therefore, it is also named Data Concentrator (DC).

5 Use of the communication layers for this profile

5.1 Information related to the use of the standard specifying the lower layers

The DLMS/COSEM communication profile over ISO/IEC14908 series networks uses the services of the lower layers specified in ISO/IEC 14908-1:2012 and in ISO/IEC 14908-3:2012.