

INTERNATIONAL STANDARD



**Electricity metering data exchange –The DLMS/COSEM suite –
Part 8-5: Narrow-band OFDM G3-PLC communication profile
for neighbourhood networks**

IEC 62056-8-5:2017

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTRICITY METERING DATA EXCHANGE –
THE DLMS/COSEM SUITE –****Part 8-5: Narrow-band OFDM G3-PLC communication profile
for neighbourhood networks**

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The IEC takes no position concerning the evidence, validity and scope of this maintenance service.

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G3-PLC Alliance
<Tour ENEDIS
34 Place des Corolles
92079 Paris La Défense Cedex>
www.g3-plc.com

International Standard IEC 62056-8-5 has been prepared by IEC technical committee 13: Electrical energy measurement and control.

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

CDV	Report on voting
13/1708/CDV	13/1740/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.

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

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

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
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A bilingual version of this publication may be issued at a later date.

The contents of the corrigendum of December 2017 have been included in this copy.

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INTRODUCTION

As defined in IEC 62056-1-0, the IEC 62056 DLMS/COSEM suite provides specific communication profile standards for communication media relevant for smart metering.

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

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

This International Standard specifies the DLMS/COSEM communication profile for ITU-T G.9903:2014 PLC communication based on OFDM technology.

ITU-T G.9903 PLC is designed to meet the following aims:

- Robustness: the communication profile shall be suited to severe powerline environments (see 5.3.2);
- Performance and scalability: it embeds adaptive modulation to use the proper modulation according to the quality of the link (see 5.3.2) within dense environments (up to 2 000 nodes in the same PAN);
- Security: it shall offer a secure environment (see 7.4);
- Openness: it shall be based on open standards in order to support multi-supplier solutions (see Clause 5);
- Flexibility and future proof: it shall be able to support future applications through using IPv6 networking capabilities (see 5.3.4).

This standard follows the rules defined in IEC 62056-5-3:2017, Annex A.

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ELECTRICITY METERING DATA EXCHANGE – THE DLMS/COSEM SUITE –

Part 8-5: Narrow-band OFDM G3-PLC communication profile for neighbourhood networks

1 Scope

This part of IEC 62056 specifies the IEC 62056 DLMS/COSEM communication profile for metering purposes based on the Recommendations ITU-T G.9901: *Narrowband orthogonal frequency division multiplexing power line communication transceivers – Power spectral density specification* and ITU-T G.9903:2014, *Narrowband orthogonal frequency division multiplexing power line communication transceivers for G3-PLC networks*, an Orthogonal Frequency Division Multiplexing (OFDM) Power Line Communications (PLC) protocol.

The physical layer provides a modulation technique that efficiently utilizes the allowed bandwidth within the CENELEC A (3 kHz – 95 kHz), CENELEC B (95 kHz – 125 kHz), ARIB (10 kHz – 450 kHz) and FCC (no specific frequency band limitations) bands, thereby allowing the use of advanced channel coding techniques. This enables a robust communication in the presence of narrowband interference, impulsive noise, and frequency selective attenuation.

The medium access control (MAC) layer allows the transmission of MAC frames through the use of the power line physical channel. It provides data services, frame validation control, node association and secure services.

The 6LoWPAN adaptation sublayer enables an efficient interaction between the MAC and the IPv6 network layer. The use of the IPv6 network protocol – the latest generation of IP protocols – opens a wide range of potential applications and services for metering purposes (but the applications are not limited to metering).

The transport layer, the application layer and the data model are as specified in the IEC 62056 DLMS/COSEM suite.

The scope of this communication profile standard is restricted to aspects concerning the use of communication protocols in conjunction with the COSEM data model and the DLMS/COSEM application layer. Data structures specific to a communication protocol are out of the scope of this communication profile standard.

NOTE They are specified in the specific protocol standards.

Any project specific definitions of data structures and data contents may be provided in project specific companion specifications.

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 60050-300, *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 TR 62051, *Electricity metering – Glossary of terms*

IEC TR 62051-1, *Electricity metering – Data exchange for meter reading, tariff and load control – Glossary of terms – Part 1: Terms related to data exchange with metering equipment using DLMS/COSEM*

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

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

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

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

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

IEC 62056-9-7:2013, *Electricity metering data exchange – The DLMS/COSEM suite – Part 9-7: Communication profile for TCP-UDP/IP networks*

Recommendation ITU-T G.9903:2014, *Narrowband Orthogonal Frequency Division Multiplexing Power Line Communication Transceivers for G3-PLC Networks* available at <http://www.itu.int/rec/T-REC-G.9903/en>

IEC 62056-8-5:2017
https://www.ietf.org/rfc/rfc768.txt IETF RFC 768, *User Datagram Protocol*. Edited by J. Postel. August 1980. Available from <http://www.ietf.org/rfc/rfc768.txt>

IEC 62056-8-5:2017
https://www.ietf.org/rfc/rfc2460.txt IETF RFC 2460, *Internet Protocol, Version 6 (IPv6) Specification*. Edited by S. Deering, R. Hinden. December 1998. Available from <http://www.ietf.org/rfc/rfc2460.txt>

IEC 62056-8-5:2017
https://www.ietf.org/rfc/rfc4193.txt IETF RFC 4193, *Unique Local IPv6 Unicast Addresses*. Edited by R. Hinden, B. Haberman. October 2005. Available from <http://www.ietf.org/rfc/rfc4193.txt>

IEC 62056-8-5:2017
https://www.ietf.org/rfc/rfc4291.txt IETF RFC 4291, *IP Version 6 Addressing Architecture*. Edited by R. Hinden, S. Deering. February 2006. Available from <http://www.ietf.org/rfc/rfc4291.txt>

IEC 62056-8-5:2017
https://www.ietf.org/rfc/rfc4944.txt IETF RFC 4944, *Transmission of IPv6 Packets over IEEE 802.15.4 Networks*. Available from <http://www.ietf.org/rfc/rfc4944.txt>

IEC 62056-8-5:2017
https://www.ietf.org/rfc/rfc6282.txt IETF RFC 6282, *Compression Format for IPv6 Datagrams over IEEE 802.15.4-Based Networks*. Available from <http://www.ietf.org/rfc/rfc6282.txt>

IEC 62056-8-5:2017
https://www.ietf.org/rfc/rfc4861.txt IETF RFC 4861, *Neighbor Discovery for IP version 6 (IPv6)*. Available from <http://www.ietf.org/rfc/rfc4861.txt>

IEC 62056-8-5:2017
https://www.ietf.org/rfc/rfc4862.txt IETF RFC 4862, *IPv6 Stateless Address Autoconfiguration*. Available from <http://www.ietf.org/rfc/rfc4862.txt>

IEEE 802.15.4: *IEEE Standard for Low-Rate Wireless Networks*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

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

NOTE Where there is a difference between the definitions in the glossaries and those contained in communication profile standards established by TC 13, then the latter take precedence in applications of the relevant standard.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1.1

PAN coordinator

entity implementing the G3-PLC protocol capable of controlling the network

3.1.2

PAN device

entity implementing the G3-PLC protocol which does not embed coordinator functionalities

3.2 Abbreviated terms

AA	Application Association
APDU	Application Layer Protocol Data Unit
ARIB	Association of Radio Industries and Businesses (Japan)
6LoWPAN	IPv6 over Low power Wireless Personal Area Networks
CENELEC	European Committee for Electrotechnical Standardization
COSEM	Companion Specification for Energy Metering
DLMS	Device Language Message Specification
FCC	Federal Communications Commission (US)
IEC	International Electrotechnical Commission
IP	Internet Protocol
ITU-T	International Telecommunication Union – Telecommunication
LBA	LoWPAN Bootstrapping Agent
LBP	LoWPAN Bootstrapping Protocol
MAC	Media Access Control
NNAP	Neighbourhood Network Access Point
OFDM	Orthogonal Frequency Division Multiplexing
OSI	Open System Interconnection
PAN	Personal Area Network
PLC	Power Line Communication
PSK	Pre-Shared Key
TCP	Transmission Control Protocol
UDP	User Datagram Protocol

Furthermore, the abbreviations given in ITU-T G.9903:2014, Clause 4 also apply.