IEC TS 62056-8-20

Edition 1.0 2016-11

TECHNICAL SPECIFICATION

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Electricity metering data exchange – The DLMS/COSEM suite – Part 8-20: Mesh communication profile for neighbourhood networks

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ICS 17.220; 35.110; 91.140.50

ISBN 978-2-8322-3682-6

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FOREWORD

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The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this Technical Specification may involve the use of a maintenance service concerning the stack of protocols on which the present specification IEC 62056-8-20 is based.

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:

DLMS User Association
Zug/Switzerland
www.dlms.com

The main task of IEC technical committees is to prepare International Standards. In exceptional circumstances, a technical committee may propose the publication of a technical specification when

- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC TS 62056-8-20, which is a technical specification, has been prepared by technical committee 13: Electrical energy measurement and control.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
13/1673/DTS	13/1704/RVC

Full information on the voting for the approval of this technical specification 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 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

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

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

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 Technical Specification specifies a DLMS/COSEM IPv6 based communication profile that can be used in large scale AMI deployments where the Neighbourhood Networks are mesh networks.

The communication profile specified in this Technical Specification can be used over various suitable technologies providing a Neighbourhood Network with mesh topology, as long as they are capable to carry IPv6 traffic.

This specification follows the rules defined in IEC 62056-5-3:2016, Annex A.

The communication profile specified in this specification addresses the specificities resulting from the properties of the mesh network and the large quantity of devices to be managed.

ELECTRICITY METERING DATA EXCHANGE – THE DLMS/COSEM SUITE –

Part 8-20: Mesh communication profile for neighbourhood networks

1 Scope

This part of IEC 62056 specifies a DLMS/COSEM communication profile that can be used in a smart metering system in which the Neighbourhood Networks (NN) are mesh networks.

This profile may be considered as an adaptation and extension of the UDP/IP communication profile specified in IEC 62056-9-7:2013. As in that standard, the PHY and MAC layers are out of the Scope.

This Technical Specification specifies a number of features essential to the efficient operation of a large scale AMI using mesh NNs. These features include:

- identification of the DLMS/COSEM client and server participating in an application association (AA) with their system title, so that this identification does not change when the IP address of the server changes, see Clause 6;
- a mechanism to inform the client of the binding between the server's system title and its current IP address(es), see 5.5.3;
- the use of the DLMS/COSEM UDP based transport layer, that allows keeping DLMS/COSEM AAs open for long periods, while the device may leave and join the mesh NN and/or its IP address may change, see 7.2.2;
- DLMS/COSEM application layer and application process level security features that can be used in a mesh environment, see 7.4.2;
- a mechanism to organize servers to one or more groups based on various conditions, so that the requests can be broadcasted to all devices attached to the mesh network, but only those servers belonging to the group carry out the request and respond, see 8.2;
- a mechanism that allows to send the response to a request in designated time windows and with a randomized delay, see 8.3.
- the use of a specific UDP port that allows efficient UDP header compression, see 6.3.3.

The Scope of this communication profile specification is restricted to aspects concerning the use of communication protocols in conjunction with the COSEM data model and the DLMS/COSEM application layer. 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 (all parts), *International Electrotechnical Vocabulary (IEV)* (available at www.electropedia.org)

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

IEC 62056-5-3:2016, *Electricity metering data exchange – The DLMS/COSEM suite – Part 5-3: DLMS/COSEM application layer*

IEC 62056-6-1, *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*

RFC 768, User Datagram Protocol Edited by J. Postel. August 1980. Available from https://www.ietf.org/rfc/rfc768.txt

RFC 2460, Internet Protocol, Version 6 (Ipv6) Specification [online]. Edited by R. Hinden, S. Deering. December 1998. Available from http://tools.ietf.org/html/rfc2460

RFC 3315, Dynamic Host Configuration Protocol for IPv6 (DHCPv6) Edited by R. Droms, J. Bound, B. Volz, T. Lemon, C. Perkins, M. Carney. July 2003. Available from http://www.ietf.org/rfc/rfc3315.txt

RFC 4291, IP Version 6 Addressing Architecture [online]. Edited by R. Hinden, S. Deering. February 2006. Available from http://tools.ietf.org/html/rfc4291

RFC 4862, IPv6 Stateless Address Autoconfiguration. Edited by S. Thomson, T.Narten, T. Jinmei September 2007. Available from https://tools.ietf.org/html/rfc4862

RFC 4944, Transmission of IPv6 Packets over IEEE 802.15.4 Networks [online]. Edited by G. Montenegro, N. Kushalnagar, D. Culler. September 2007. Available from http://tools.ietf.org/html/rfc4944

RFC 6282, Compression Format for IPv6 Datagrams over IEEE 802.15.4-Based Networks. Available from http://tools.ietf.org/html/rfc6282

RFC 6550, IPv6 Routing Protocol for Low-Power and Lossy Networks, Edited by T. Winter, P. Thubert, A. Brandt, J. Hui, R. Kelsey, P. Lewis, K. Pister, R. Struik, JP. Vasseur, R. Alexander. March 2012. Available from https://tools.ietf.org/html/rfc6550