ANSI C12-IEC 62056-9-7 ED1.0

American National Standard
for Electricity Metering Data Exchange – THE DLMS/COSEM SUITE- Communication Profile for TCP-UDP/IP Networks

© 2019 National Electrical Manufacturers Association
ANSI C12-IEC 62056-9-7 ED 1.0

American National Standard
for Electricity Metering Data Exchange – THE DLMS/COSEM SUITE- Communication Profile for
TCP-UDP/IP Networks
NOTICE AND DISCLAIMER

The information in this publication was considered technically sound by the consensus of persons engaged in the development and approval of the document at the time it was developed. Consensus does not necessarily mean that there is unanimous agreement among every person participating in the development of this document.

ANSI standards and guideline publications, of which the document contained herein is one, are developed through a voluntary consensus standards development process. This process brings together volunteers and/or seeks out the views of persons who have an interest in the topic covered by this publication. While NEMA administers the process to promote fairness in the development of consensus, it does not write the document and it does not independently test, evaluate, or verify the accuracy or completeness of any information or the soundness of any judgments contained in its standards and guideline publications.

NEMA disclaims liability for any personal injury, property, or other damages of any nature whatsoever, whether special, indirect, consequential, or compensatory, directly or indirectly resulting from the publication, use of, application, or reliance on this document. NEMA disclaims and makes no guaranty or warranty, express or implied, as to the accuracy or completeness of any information published herein, and disclaims and makes no warranty that the information in this document will fulfill any of your particular purposes or needs. NEMA does not undertake to guarantee the performance of any individual manufacturer or seller’s products or services by virtue of this standard or guide.

In publishing and making this document available, NEMA is not undertaking to render professional or other services for or on behalf of any person or entity, nor is NEMA undertaking to perform any duty owed by any person or entity to someone else. Anyone using this document should rely on his or her own independent judgment or, as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstances. Information and other standards on the topic covered by this publication may be available from other sources, which the user may wish to consult for additional views or information not covered by this publication.

NEMA has no power, nor does it undertake to police or enforce compliance with the contents of this document. NEMA does not certify, test, or inspect products, designs, or installations for safety or health purposes. Any certification or other statement of compliance with any health- or safety-related information in this document shall not be attributable to NEMA and is solely the responsibility of the certifier or maker of the statement.

© 2019 National Electrical Manufacturers Association
Approval of an American National Standard requires verification by ANSI that the requirements for due process, consensus, and other criteria for approval have been met by the standards developer.

Consensus is established when, in the judgment of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made toward their resolution.

The use of American National Standards is completely voluntary; their existence does not in any respect preclude anyone, whether he has approved the standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards.

The American National Standards Institute does not develop standards and will in no circumstances give an interpretation of any American National Standard. Moreover, no person shall have the right or authority to issue an interpretation of an American National Standard in the name of the American National Standards Institute. Requests for interpretations should be addressed to the secretariat or sponsor whose name appears on the title page of this standard.

Caution Notice: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken periodically to reaffirm, revise, or withdraw this standard. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute.

Published by

National Electrical Manufacturers Association
1300 North 17th Street, Suite 900, Rosslyn, Virginia 22209

© 201x National Electrical Manufacturers Association
All rights, including translation into other languages, reserved under the Universal Copyright Convention, the Berne Convention for the Protection of Literary and Artistic Works, and the International and Pan American copyright conventions.

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without prior written permission of the publisher.

Printed in the United States of America
FOREWORD FOR U.S. ADOPTION

This American National Standard is an adoption of IEC 62056-9-7 Ed.1.0 Electricity Metering Data Exchange – THE DLMS/COSEM SUITE- Communication Profile for TCP-UDP/IP Networks. Any reference in this standard to an IEC 62056 part is understood to mean a reference to the equivalent ANSI/IEC 62056 part, where it exists.

This standard contains all the original text from IEC 62056-9-7 Ed.1.0 without change.

Suggestions for the improvement of this standard are welcome and should be submitted to:

Vice President, Technical Services
National Electrical Manufacturers Association
1300 North 17th Street, Suite 900
Rosslyn, VA 22209

This standard was processed and approved by committee of interested stakeholders as required by ANSI for adoption. In this particular situation, all committee members voted for its approval. At the time this standard was approved, the committee consisted of the following members:

<table>
<thead>
<tr>
<th>Organization Represented</th>
<th>Name of Representative</th>
<th>Organization Represented</th>
<th>Name of Representative</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Interest</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elevate Energy</td>
<td>L. Kotewa</td>
<td>NIST</td>
<td>T. Nelson</td>
</tr>
<tr>
<td>ERCOT</td>
<td>D. Tucker</td>
<td>Power Measurements, LLC</td>
<td>W. Hardy</td>
</tr>
<tr>
<td>EnerNex LLC</td>
<td>A. Snyder</td>
<td>UL, LLC</td>
<td>S. Hunter</td>
</tr>
<tr>
<td>Future DOS R&amp;D Inc.</td>
<td>A. Moise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MET Laboratories, Inc.</td>
<td>J. Reed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Producer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aclara</td>
<td>C. Crittenden</td>
<td>Schweitzer Engineering</td>
<td>S. Nalla</td>
</tr>
<tr>
<td>Honeywell</td>
<td>M. Yarbrough</td>
<td>Laboratories</td>
<td></td>
</tr>
<tr>
<td>Itron Inc.</td>
<td>B. Cain</td>
<td>Sensus, A Xylem Brand</td>
<td>K. O’Dell</td>
</tr>
<tr>
<td>Landis+Gyr Inc.</td>
<td>J. Voisine</td>
<td>Technology for Energy Corp</td>
<td>S. Hudson</td>
</tr>
<tr>
<td>Milbank Manufacturing Co.</td>
<td>S. Glasgow</td>
<td>TESCO</td>
<td>T. Lawton</td>
</tr>
<tr>
<td>Radian Research, Inc.</td>
<td>J. Canine</td>
<td>Watthour Engineering Co.</td>
<td>L. Wren</td>
</tr>
<tr>
<td>Schneider Electric</td>
<td>S. Pedro</td>
<td></td>
<td></td>
</tr>
<tr>
<td>User</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alabama Power Co.</td>
<td>D. Rhoades</td>
<td>Florida Power &amp; Light</td>
<td>J. DeMars</td>
</tr>
<tr>
<td>Baltimore Gas &amp; Electric</td>
<td>J. Thurber</td>
<td>Oncor Electric Delivery Co. LLC</td>
<td>M. DeVillers</td>
</tr>
<tr>
<td>Consumers Energy</td>
<td>D. Jirkovic</td>
<td>Pacific Gas &amp; Electric</td>
<td>D. Y. Nguyen</td>
</tr>
<tr>
<td>DTE Energy</td>
<td>K. Tolios</td>
<td>Public Service Electric &amp; Gas</td>
<td>D. Ellis</td>
</tr>
<tr>
<td>Duke Energy</td>
<td>K. Barnette</td>
<td>SASK Power</td>
<td>C. Kasian</td>
</tr>
<tr>
<td>Eversource Energy</td>
<td>G. Belcher</td>
<td>Xcel Energy</td>
<td>D. Nordell</td>
</tr>
<tr>
<td>Hydro Quebec</td>
<td>J. Sabourino</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CONTENTS

FOREWORD ................................ ................................ ................................ ......................... 6
1 Scope .......................................................................................................................... 8
2 Normative references ................................................................................................. 8
3 Terms, definitions and abbreviations .......................................................................... 8
   3.1 Terms and definitions ......................................................................................... 8
   3.2 Abbreviations ................................................................................................. 8
4 Targeted communication environments .................................................................... 9
5 Structure of the profile(s) ....................................................................................... 10
6 Identification and addressing scheme ...................................................................... 11
7 Supporting layer services and service mapping .................................................... 13
8 Communication profile specific service parameters of the COSEM AL services ....... 14
9 Specific considerations / constraints ........................................................................ 15
   9.1 Confirmed and unconfirmed AAs and service invocations, packet types used .... 15
   9.2 Releasing application associations: using RLRQ/RLRE is mandatory ............. 16
   9.3 Service parameters of the COSEM-OPEN / -RELEASE / -ABORT services .... 16
   9.4 xDLMS client/server type services ................................................................... 16
   9.5 EventNotification Service and TriggerEventNotificationSending service ....... 16
   9.6 Transporting long messages ............................................................................. 17
   9.7 Allowing COSEM servers to establish the TCP connection .............................. 17
   9.8 The COSEM TCP-UDP/IP profile and real-world IP networks ......................... 17
Bibliography ......................................................................................................................... 18
Index ................................................................................................................................. 20

Figure 1 – Communication architecture ........................................................................ 10
Figure 2 – Examples for lower-layer protocols in the TCP-UDP/IP based profile(s) .... 11
Figure 3 – Identification / addressing scheme in the TCP-UDP/IP based profile(s) ..... 13
Figure 4 – Summary of TCP / UDP layer services ....................................................... 14

Table 1 – Application associations and data exchange in the TCP-UDP/IP based profile ......................................................................................................................................................... 15
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) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this International Standard may involve the use of a maintenance service concerning the stack of protocols on which the present standard IEC 62056-9-7 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.ch

1 Device Language Message Specification.
International Standard IEC 62056-9-7 has been prepared by IEC technical committee 13: Electrical energy measurement, tariff- and load control.

It is based on IEC 62056-53 Ed.2:2006, *Electricity metering – Data exchange for meter reading, tariff and load control – Part 53: COSEM application layer*, Annex B.3, *The TCP-UDP/IP based communication profiles (COSEM_on_IP)* and introduces the following significant technical changes:

NOTE Whereas IEC 62056-53 Ed. 2.0 contains the specification of the DLMS/COSEM communication profiles, IEC 62056-5-3 Ed.1.0 replacing the earlier edition does not.

- The title of the standard has been aligned with the title of other parts of the revised IEC 62056 series;
- Clause 4, *Targeted communication environments* has been extended, a functional reference architecture figure has been added;
- Clause 5, *The structure of the profile(s)* has been extended, the Figure has been generalized and simplified;
- In clause 6, *Identification and addressing scheme*, the port number assigned by the IANA for DLMS/COSEM has been added;
- In subclause 9.1, two paragraphs specifying how confirmed and unconfirmed COSEM-OPEN and xDLMS service invocations have been added;
- Subclause 9.6, *Transporting long messages*, has been amended. It specifies now that for transporting long messages, application layer block transfer can be used (also available now with SN referencing);
- The clause on Multi-drop configurations has been removed.

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

<table>
<thead>
<tr>
<th>FDIS</th>
<th>Report on voting</th>
</tr>
</thead>
<tbody>
<tr>
<td>13/1520/FDIS</td>
<td>13/1537/RVD</td>
</tr>
</tbody>
</table>

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

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

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

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

This part of IEC 62056 specifies the DLMS/COSEM communication profile for TCP-UDP/IP networks.