SLOVENSKI STANDARD
oSIST prEN IEC 62056-8-12:2023

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Electricity metering data exchange - The DLMS/COSEM suite - Part 8-12: Communication profile for Low Power Wide Area Networks (LPWAN)

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SECRETARIAT: Hungary	SECRETARY: Mr Bela Bodi
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FUNCTIONS CONCERNED: ☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY	
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Electricity metering data exchange – The DLMS/COSEM suite - Part 8-12: Communication profile for Low Power Wide Area Networks (LPWAN)

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NOTE FROM TC/SC OFFICERS:

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ELECTRICITY METERING DATA EXCHANGE – THE DLMS/COSEM SUITE – Part 8-12: Communication profile for Low Power Wide Area Networks (LPWAN)

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

Draft	Report on voting
XX/XX/FDIS	XX/XX/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 [change language if necessary].

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/standardsdev/publications.

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- withdrawn,
- replaced by a revised edition, or
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LPWAN[1] Transport and Application of DLMS

Abstract: The purpose of this document is to specify the DLMS/COSEM communication profile for Low-Power Wide Area Networks (LPWAN). It specifies how the COSEM data model and the DLMS/COSEM application layer can be used over various LPWAN technologies using an adaptation layer based on IETF RFC 8724 “SCHC: Generic Framework for Static Context Header Compression and Fragmentation”, and in particular over LoRaWAN.

[1] LPWAN is defined as in RFC 8376.

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1 Scope

This document describes the use of DLMS/COSEM for Low-Power Wide Area Networks (LPWAN). It specifies how the COSEM data model and the DLMS/COSEM application layer can be used over various LPWAN technologies using an adaptation layer based on IETF RFC 8724 “SCHC: Generic Framework for Static Context Header Compression and Fragmentation”, and in particular over LoRaWAN.

This profile is intended to be used with LPWANs as defined in IETF RFC 8376, in particular LoRaWAN. Low-Power Wide Area Networks (LPWANs) are wireless technologies with characteristics such as large coverage areas, low bandwidth, possibly very small packet and application-layer data sizes, and long battery life operation. This document does not provide functionality to manage the lower layers of the LPWANs.

This part of the DLMS/COSEM suite specifies the communication profile for Low-Power Wide Area Networks (LPWAN).

It specifies how the COSEM data model and the DLMS/COSEM application layer can be used over various LPWAN technologies using the IETF RFC 8724 “SCHC: Generic Framework for Static Context Header Compression and Fragmentation”, and in particular over LoRaWAN.

The DLMS/COSEM LPWAN communication profiles use connection-less transport layer based on the Internet Standard User Datagram Protocol (UDP) and Internet Protocol (IPv6).

The adaptation layer is based on IETF RFC 8724, “SCHC: Generic Framework for Static Context Header Compression and Fragmentation” which provides both a header compression/decompression mechanism and an optional fragmentation/reassembly mechanism. SCHC compression is based on static context with small context identifier to represent full IPv6 / UDP / COSEM wrapper headers. If required, SCHC fragmentation is used to support IPv6 MTU over the LPWAN technologies.

2 Normative references

2.1 Normative references (clause 2 of IEC 62056-1-1)

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

IEC 62056-5-3:2021*, Electricity metering data exchange – The DLMS/COSEM suite – Part 5-3: DLMS/COSEM application layer*

IEC 62056-6-1:2021, *Electricity metering data exchange – The DLMS/COSEM suite – Part 6-1: Object identification system (OBIS)*

IEC 62056-6-2:2021, *Electricity metering data exchange – The DLMS/COSEM suite – Part 6-2: COSEM interface classes.*

ISO/IEC 8802-2:1998, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 2: Logical Link Control*

IEC 62056-4-7, *Electricity metering – Data exchange for meter reading, tariff and load control: DLMS/COSEM transport layers for IP networks*

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

3 Terms, definitions and abbreviations

See IEC 62056-5-3:2021, clause 3, IETF RFC 8376 and IETF RFC 8724

3.1 Abbreviations

AA	Application Association
ABP	Activation by Personalisation
APDU	Application Layer Protocol Data Unit
COSEM	Companion Specification for Energy Metering
C/D	Compression and Decompression
CSAP	Client Service Access Point
DevAddr	A 32-bit non-unique identifier assigned to an end-device statically or dynamically after a Join Procedure (depending on the activation mode)
DEVEUI	An IEEE EUI-64 used to identify the device during the Join Procedure
DLMS	Device Language Message Specification
F/R	Fragmentation and Reassembly
HDLC	High-level Data Link Control
IP	Internet Protocol
LNAP	Local Network Access Point
NGW	Network Gateway
PAN	Personal area network
RG	Radio gateway
SAP	Service Access Point
SSAP	Server Service Access Point
SCHC	Static Context Header Compression and fragmentation, a generic framework
TCP	Transmission Control Protocol
UDP	User Datagram protocol

4 Targeted communication environments

4.1 General

The DLMS/COSEM communication profiles for LPWAN networks are intended for remote data exchange on WAN between the HES and the end devices. The functional smart metering reference architecture is shown in Figure 1.

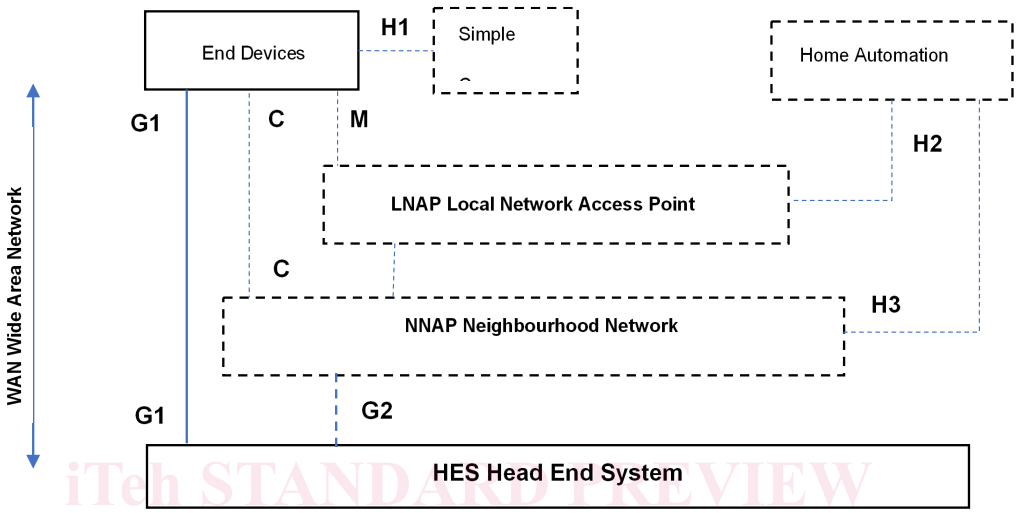

Figure 1 – Communication architecture

End devices comprise application functions and communication functions. They may be utility meters or any other kind of IoT Devices. They use UDP/IPv6, SCHC Compression / Decompression and Fragmentation / Reassembly features as specified in IETF RFC 8724 and communicate with their related Application Server via the Network Gateway.

From a DLMS point of view, they are connected directly to the HES via the G1 interface. All dotted elements are out of the scope for this profile.

This profile maps to Figure 2 below:

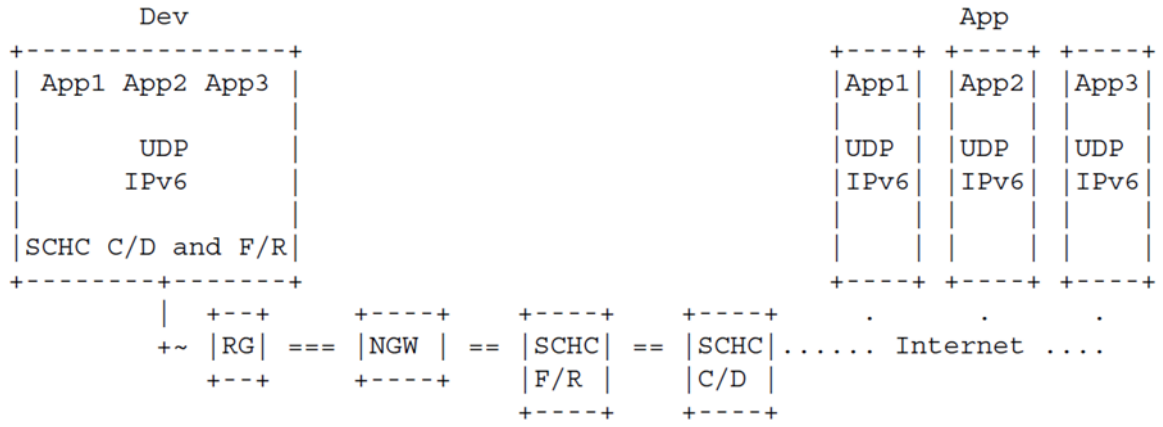

Figure 2 – LPWAN (SCHC) architecture outline

4.1.1 Security

LPWAN technologies provide various lower layer security features. The application security features provided by DLMS/COSEM can be used over any of them.

4.2 Use of the communications layers for this profile

4.2.1 Information related to the use of the standard specifying the lower layers (IEC 62056-1-1, 5.1)

IETF RFC 8724 can be considered as an adaptation layer between UDP/IPv6 and the underlying LPWAN technology. SCHC comprises two sublayers, compression and fragmentation that are independent of the specific LPWAN technology. IETF RFC 8724 supports UDP/IPv6 and as such supports the DLMS/COSEM UDP/IP Profile. No adaptations or limitations to IETF RFC 8724 or DLMS/COSEM are expected to be required when using SCHC to transport COSEM APDUs.

4.2.2 Structure of the communication profiles (IEC 62056-1-1, 5.2)

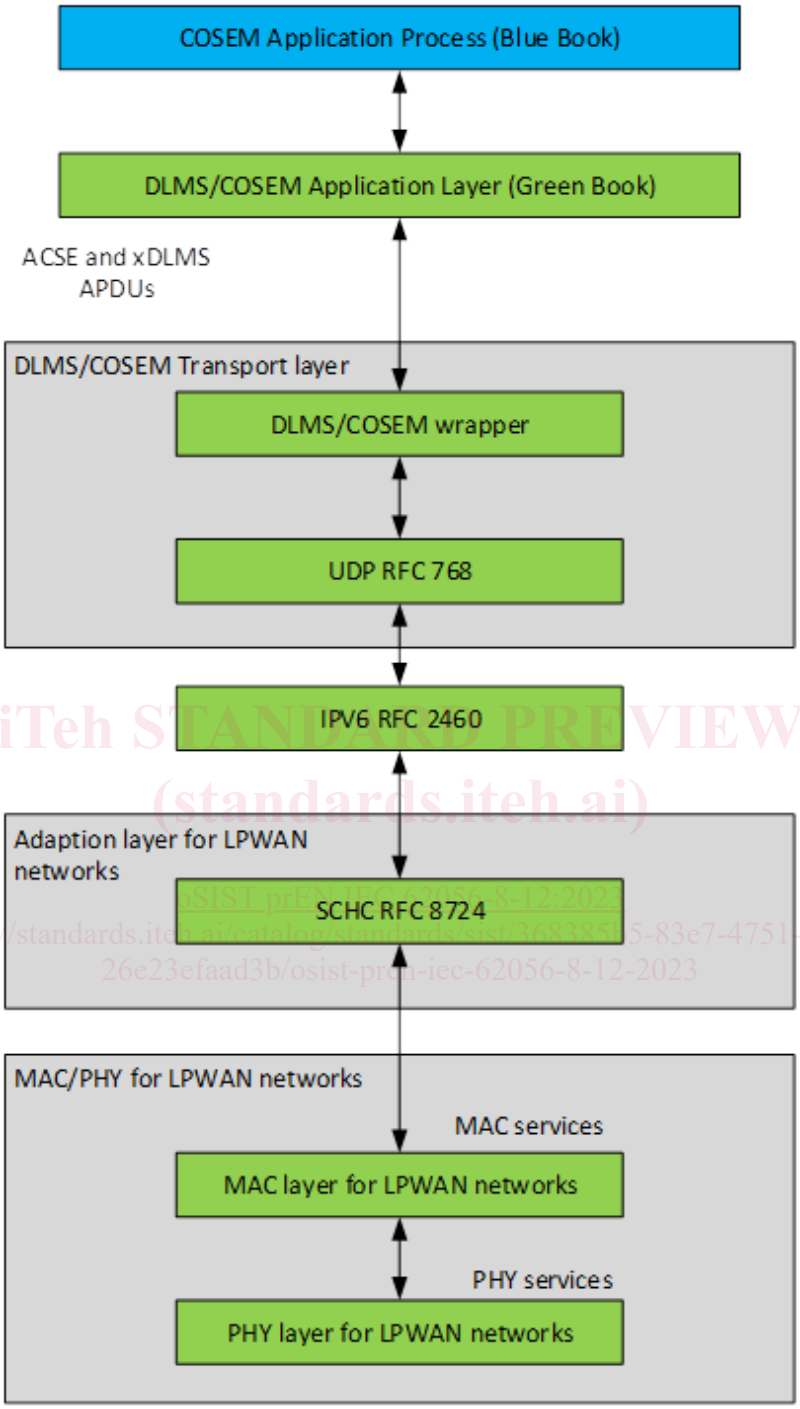

Figure 3 – The DLMS/COSEM LPWAN communication profile

4.2.3 Lower protocol layers and their use (IEC 62056-1-1, 5.3)

4.2.3.1 Overview (IEC 62056-1-1, 5.3.1)

Lower layers are any LPWAN lower layers that can transport SCHC packets as specified in RFC 8724.

NOTE RFC 8376 provides an overview of LPWAN technologies that can be used for running IP in LPWANs.

ABP is not permitted when LoRaWAN network is being applied. See also IEC 62056-6-2:2021, 4.16.

4.2.3.2 Physical layer (IEC 62056-1-1, 5.3.2)

Physical layer is out of scope of this documents, it is specific to the LPWAN technology used.

4.2.3.3 MAC layer (clause 5.3.3 of IEC 62056-1-1)

MAC layer is out of scope of this documents, it is specific to the LPWAN technology used.

4.2.3.4 Adaptation layer (clause 5.3.4 of IEC 62056-1-1)

The adaptation layer is compliant IETF RFC 8724. It interfaces at the upper layer IPv6 as specified in RFC 2460.

4.2.4 Service mapping and adaptation layers (IEC 62056-1-1, 5.4)

The DLMS/COSEM transport layer for IP networks performs the necessary binding of the COSEM object model and the DLMS/COSEM application layer in one part and the communication lower layers in the other part. The service mapping is fully specified in the UDP-DATA service, see IEC 62056-4-7:2016, 5.2.2.

4.2.5 Registration and connection management (IEC 62056-1-1, 5.4)

Registration and connection management are specific to each LPWAN technology and network. Details may be found in IEC 62056-6-2:2021, 4.16.

4.3 Identification and addressing schemes (IEC 62056-1-1, clause 6)

The identification and addressing of SAPs is as described in Table 1.

Table 1 – Client and server SAPs

Client SAPs	
Client Management Process	0x01
Public Client	0x10
Open for client SAP assignment	0x02 …0x0F
	0x11… 0xFF
Server SAPs	
Management Logical Device	0x01
Reserved for future use	0x02…0x0F
Open for server SAP assignment	0x10…0x7E
All-station (Broadcast)	0xFF

4.4 Specific considerations for the application layer service (IEC 62056-1-1, 7.1)

4.4.1 Overview (IEC 62056-1-1, 7.1)

The constraints and options available to AL services are those dictated by any UDP-based DLMS approach.