SLOVENSKI STANDARD
SIST EN 13757-7:2018

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SIST EN 13757-3:2013

Komunikacijski sistemi za merilnike - 7. del: Prevoz in varnostne službe

Communication systems for meters - Part 7: Transport and security services

Kommunikationssysteme für Zähler - Teil 7: Transport- und Sicherheitsdienste

Systèmes de communication pour compteurs - Partie 7 : Services de transport et de sécurité

Ta slovenski standard je istoveten z: EN 13757-7:2018

ICS:

33.200	Daljinsko krmiljenje, daljinske meritve (telemetrija)	Telecontrol. Telemetering
35.100.10	Fizični sloj	Physical layer
35.100.20	Podatkovni povezovalni sloj	Data link layer

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English Version

Communication systems for meters - Part 7: Transport and security services

Systèmes de communication pour compteurs - Partie 7 : Services de transport et de sécurité

Kommunikationssysteme für Zähler - Teil 7: Transport- und Sicherheitsdienste

This European Standard was approved by CEN on 8 February 2018.

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Contents

Page

European foreword

This document (EN 13757-7:2018) has been prepared by Technical Committee CEN/TC 294 "Communication systems for meters", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2018, and conflicting national standards shall be withdrawn at the latest by October 2018.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document together with EN 13757-3:2018 and CEN/TR 17167:2018 supersedes EN 13757-3:2013.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

The following significant technical changes have been incorporated in the new edition of this European Standard:

— new security modes (formerly "encryption mode") 7, 8, 9 and 10 supporting encrypted and authenticated messages have been added;

— support of Key Derivation Function for the generation of ephemeral keys;

— new Authentication and Fragmentation Layer has been introduced.

EN 13757 is currently composed with the following parts:

— *Communication systems for meters — Part 1: Data exchange;*

— *Communication systems for meters — Part 2: Wired M-Bus communication;*

— *Communication systems for meters — Part 3: Application protocols;*

— *Communication systems for meters and remote reading of meters — Part 4: Wireless meter readout (Radio meter reading for operation in SRD bands);*

— *Communication systems for meters — Part 5: Wireless M-Bus relaying;*

— *Communication systems for meters — Part 6: Local Bus;*

— *Communication systems for meters — Part 7: Transport and security services*;

— CEN/TR 17167:2018, *Communication systems for meters — Accompanying TR to* EN 13757-2, *–3 and –7, Examples and supplementary information.*

This document falls under the Mandate EU M/441 "Standardisation mandate to CEN, CENELEC and ETSI in the field of measuring instruments for the development of an open architecture for utility meters involving communication protocols enabling interoperability" by providing the relevant definitions and

methods for meter data transmission on application layer level. The M/441 Mandate is driving significant development of standards in smart metering.

This document is in accordance with CEN/CLC/ETSI/TR 50572 [4].

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This European Standard belongs to the EN 13757 series, which covers communication systems for meters. EN 13757-1 contains generic descriptions and a communication protocol. EN 13757-2 contains a physical and a Link Layer for twisted pair based Meter-Bus (M-Bus). EN 13757-3 contains detailed description of the application protocols especially the M-Bus Protocol. EN 13757-4 describes wireless communication (often called wireless M-Bus or wM-Bus). EN 13757-5 describes the wireless network used for repeating, relaying and routing for the different modes of EN 13757-4. EN 13757-6 describes a twisted pair local bus for short distance (Lo-Bus). EN 13757-7 describes transport mechanism and security methods for data. The Technical Report CEN/TR 17167 contains informative annexes from EN 13757-2, EN 13757-3 and EN 13757-7.

These upper M-Bus protocol layers can be used with various Physical Layers and with Data Link Layers and Network Layers, which support the transmission of variable length binary transparent messages. Frequently, the Physical and Link Layers of EN 13757-2 (twisted pair) and EN 13757-4 (wireless) as well as EN 13757-5 (wireless with routing function) or the alternatives described in EN 13757-1 are used. These upper M-Bus protocol layers have been optimized for minimum battery consumption of meters, especially for the case of wireless communication, to ensure long battery lifetimes of the meters. Secondly, it is optimized for minimum message length to minimize the wireless channel occupancy and hence the collision rate. Thirdly, it is optimized for minimum requirements towards the meter processor regarding requirements of RAM size, code length and computational power.

An overview of communication systems for meters is given in EN 13757-1, which also contains further definitions.

This standard concentrates on the meter communication. The meter communicates with one (or occasionally several) fixed or mobile communication partners which again might be part of a private or public network. These further communication systems might use the same or other application layer protocols, security, privacy, authentication, and management methods.

To facilitate common communication systems for CEN-meters (e.g. gas, water, thermal energy and heat cost allocators) and for electricity meters, in this standard occasionally electricity meters are mentioned. All these references are for information only and are not standard requirements. The definition of communication standards for electricity meters (possibly by a reference to CEN standards) remains solely in the responsibility of CENELEC.

NOTE 1 CEN/TR 17167:2018, Annex C specifies how parts of this standard and of EN 13757–2 and EN 13757–4 can be used to implement smart meter functionalities. Similar functionalities could also be implemented using other Physical and Link Layers.

NOTE 2 For information on installation procedures and their integration in meter management systems, see CEN/TR 17167:2018, Annex D.

The operator of a smart metering network needs to secure the network to ensure the data protection and data privacy of the consumer (see EC-Recommendation C1342 (2012)). Securing a system requires a security policy, which should address in general all constraints on functions, information flow between functions, access by external systems and threats, including software and access to data by third persons from an organizational viewpoint.

The security policy is under the responsibility of organizations according to their business processes. The major elements of a security policy, in combination with rules, will determine the overall security that is achieved. The security policy defines goals and elements of the system to be supported by organizational policy and technical implementations of security services. Establishing and executing security policies are outside the scope of this standard; however the standard provides security services supporting those policies when implemented.

A security concept refers mainly to an *architectural* model, which represents data flows between role-based data processing functions. Requirements for the security concept result from the overall security objectives in combination with the derived security services and best practice. This standard provides a set of security services allowing the design of a secure system, which is likely to resist attacks within the lifetime of the meter.

The limitation to symmetrical cipher methods for data transmission allow energy and memory efficient solutions. This is advantageous for long-term battery operated meters. It enables as well integration of unidirectional meter communication. Services like key derivation and key distribution solves the conflict between short key lifetime and long lifetime of a meter.

1 Scope

This European Standard specifies Transport and Security Services for communication systems for meters.

This European Standard specifies secure communication capabilities by design and supports the building of a secure system architecture.

This European standard is applicable to the protection of consumer data to ensure privacy.

This draft European Standard is intended to be used with the lower layer specifications determined in EN 13757-2, EN 13757-3, EN 13757-4, EN 13757-5 and EN 13757-6.

2 Normative references

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.

EN 13757-1, *Communication systems for meters - Part 1: Data exchange*

EN 13757-2, *Communication systems for meters - Part 2: Wired M-Bus communication*

EN 13757-3:2018, *Communication systems for meters — Part 3: Application protocols*

EN 13757-4:2013, *Communication systems for meters and remote reading of meters - Part 4: Wireless meter readout (Radio meter reading for operation in SRD bands)*

EN 13757-5, *Communication systems for meters - Part 5: Wireless M-Bus relaying*

EN 62056-5-3:2014, *Electricity metering data exchange - The DLMS/COSEM suite - Part 5-3: DLMS/COSEM application layer*

EN 62056-21, *Electricity metering - Data exchange for meter reading, tariff and load control - Part 21: Direct local data exchange*

ISO/IEC 18033-3, *Information technology — Security techniques — Encryption algorithms — Part 3: Block ciphers*

NIST/SP 800-38A:*2001-12,* Recommendation for Block Cipher Modes of Operation: Methods and Techniques

NIST/SP 800-38B:2005-05, *Recommendation for Block Cipher Modes of Operation: CMAC Mode for Authentication*

NIST/SP 800-38C:2004-05, *Recommendation for Block Cipher Modes of Operation: The CCM Mode for Authentication and Confidentiality*

NIST/SP 800-38D:*2007-11,* Recommendation for Block Cipher Modes of Operation: Galois/Counter Mode (GCM) and GMAC

NIST/SP 800-38F:*2012-12,* Recommendation for Block Cipher Modes of Operation: Methods for Key Wrapping

3 Terms and definitions

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

3.1
application data
data used and/or generated by the metering process such as register values, tariffs, conversion factors or data used to control the metering process respectively the output or additional information

3.2
application protocol
protocol for the coding of application data

Note 1 to entry: Application protocols are specified in EN 13757–3.

3.3
authenticity
property that data originated from its purported source

[SOURCE: NIST/SP 800-38F:2012-12, NIST/SP 800-38C:2004-05]

3.4
byte
octet of bits

3.5
confidentiality
property that information is not made available or disclosed to unauthorized individuals, entities, or processes

[SOURCE: ISO 7498-2:1989]

3.6
integrity
data integrity
property that data has not been altered or destroyed in an unauthorized manner

[SOURCE: ISO 7498-2:1989]

3.7
datagram
unit of data transferred from source to destination

Note 1 to entry: In previous versions of prEN 13757–3 datagram was called telegram.

3.8
ephemeral key
key used to encrypt or decrypt a single message or for a limited time or a limited amount of data

3.9
fragment
datagram of a fragmented message

3.10
hex-ASCII
base-16 numbers encoded as ASCII characters ('0'–'9', 'A'–'F')

[SOURCE: ANSI X9 TR-31:2010]

3.11
initialization vector
number used as starting point for the encryption of data sequences in order to increase the security by introducing additional cryptographic variance and to synchronize cryptographic equipment

3.12
key counter
unique counter used in the Security Information Transfer Protocol to identify a secured end to end transferred command and response

3.13
key derivation
technique by which a (potentially large) number of keys are generated ("derived") from a single initial key and non-secret variable data with each resulting key using a non-reversible process

3.14
message
functional set of data transferred from source to destination

Note 1 to entry: A message may consist of one or more datagrams.

3.15
message counter
unique counter used in AFL or TPL to identify a secured message

3.16
persistent key
cryptographic key which,needs to be kept a prolonged period

3.17
security mechanism
mode of operation of a (symmetric) cryptographic algorithm

Note 1 to entry: The Security mechanism is identified by the Security mode.

3.18
security mode
mode number in configuration field identifying a set of applied security mechanisms

3.19
security service
authenticity, confidentiality and data integrity

Note 1 to entry: Security services are provided by security mechanisms.

3.20
sublayer
subdivision of a layer

[SOURCE: EN ISO/IEC 7498-1:1995]

3.21
TPL-padding
fill bytes added in TPL to fill up application data to the requested size for a block cipher

3.22
wrapper key
(symmetric) key that determines the wrapping and unwrapping functions of a wrapping mechanism

3.23
wrapping mechanism
(symmetric) key authenticated encryption mechanism that is intended for the protection of cryptographic keys and other specialized data

4 Abbreviations and symbols

4.1 Abbreviations

ACC-DMD	Access Demand
ACC-NR	Access – No Reply
ACK	Acknowledge [EN 13757–2/EN 13757–4]
AES	Advanced Encryption Standard
AFL	Authentication and Fragmentation Sublayer
APDU	Application Protocol Data Unit
APL	Application Layer
ASCII	American Standard Code for Information Interchange
BCD	Binary Coded Decimal numbers
BCF	Block control field of SITP structure, coding the usage of command or response
BID	Block identification number of SITP structure
BL	Block length of SITP structure
CBC	Cipher Block Chaining; (AES mode of operation)
CCM	Counter mode encryption algorithm with CBC-MAC (AES mode of operation)
CF	Configuration Field
CFE	Configuration Field Extension
CI	Control Information field
CMAC	Cipher-based MAC [NIST/SP 800–38B]
CNF-IR	Confirm Installation Request
CTR	Counter Mode encryption algorithm (AES mode of operation)

DES	Data Encryption Standard
DIF	Data Information Field
DLL	Data Link Layer
DLMS	Device Language Message Specification
DSI	Data structure identifier, part of block parameter structure inside SITP
DSH	Data structure header, part of block parameter structure inside SITP
DSH1	Byte one of DSH
DSH2	Byte two of DSH
ELL	Extended Link Layer
GCM	Galois/Counter Mode, an algorithm for authenticated encryption with associated data (AES mode of operation)
GMAC	a specialization of GCM for generating a message authentication code (MAC) on data that is not encrypted
ICV	Integrity check value, part of a wrapped data structure in SITP
IV	Initialization Vector
LSB	Least Significant Byte
LSBit	Least Significant Bit
MAC	Message Authentication Code NOTE MAC is in other standards also used as an acronym for Media Access Control for data communication at the Physical Layer.
MK	Message Key (persistent)
MLI	Message Length Indicator, part of a wrapped data structure in SITP
MSB	Most Significant Byte
MSBit	Most Significant Bit
NWL	Network Layer
OBIS	Object Identification System (EN 62056–61)
PID	Protocol identifier field, part of wrapped data structure in SITP
REQ-UD	Request User Data (class 1 or 2) [EN 13757–2/EN 13757–4]
RSP-UD	Respond User Data [EN 13757–2/EN 13757–4]
RSSI	Received Signal Strength Indicator
SITP	Security Information Transfer Protocol
SND-IR	Send Installation Request [EN 13757–4]
SND-NKE	Send Link Reset [EN 13757–2/EN 13757–4]
SND-NR	Send – No Reply [EN 13757–4]
SND-UD	Send User Data [EN 13757–2/EN 13757–4]
SND-UD2	Send User Data 2 [EN 13757–2/EN 13757–4]
SND-UD3	Send User Data 3 [EN 13757–4]