



SLOVENSKI STANDARD oSIST prEN 13757-8:2022

01-marec-2022

Komunikacijski sistemi za merilnike - 8. del: Prilagodilna plast

Communication systems for meters - Part 8: Adaptation layer

Kommunikationssysteme für Zähler - Teil 8: Anpassungsschicht

Systèmes de communication pour compteurs - Partie 8 : Couche adaptation

Ta slovenski standard je istoveten z: prEN 13757-8

iTeh STANDARD
PREVIEW
(standards.iteh.ai)

ICS:

	https://standards.iteh.ai/catalog/standards/sist/7e38e2ff-3320-430c-b00d-000000000000
33.200	Daljinsko krmiljenje, daljinske meritve (telemetrija) Telecontrol. Telemetry
35.100.01	Medsebojno povezovanje odprtih sistemov na splošno Open systems interconnection in general

oSIST prEN 13757-8:2022

en,fr,de

**iTeh STANDARD
PREVIEW
(standards.iteh.ai)**

[oSIST prEN 13757-8:2022](https://standards.iteh.ai/catalog/standards/sist/7e38e2ff-3d3d-45f0-be2d-bdcf6f6a1ec8/osist-pren-13757-8-2022)

<https://standards.iteh.ai/catalog/standards/sist/7e38e2ff-3d3d-45f0-be2d-bdcf6f6a1ec8/osist-pren-13757-8-2022>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 13757-8

December 2021

ICS 33.200; 35.100.01

English Version

Communication systems for meters - Part 8: Adaptation layer

Systèmes de communication pour compteurs - Partie 8
: Couche adaptation

Kommunikationssysteme für Zähler - Teil 8:
Anpassungsschicht

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 294.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents

Page

European foreword.....	7
Introduction	8
1 Scope.....	9
2 Normative references.....	9
3 Terms and definitions	9
4 Abbreviations and symbols	10
4.1 Abbreviations	10
4.2 Symbols.....	11
5 Network architecture	12
5.1 Overview	12
5.2 General description of network entities.....	12
5.2.1 Head End System	12
5.2.2 Core Network.....	13
5.2.3 Gateway	13
5.2.4 End Device	13
6 General layer structure.....	14
6.1 Overview	14
6.2 Encapsulation schemes.....	15
6.2.1 M-Bus over non-IP based communication technologies.....	15
6.2.2 M-Bus over IP based communication technologies.....	16
7 Adaptation layer description.....	16
7.1 Adaptation layer structure	16
7.2 Adaptation layer services.....	17
7.2.1 MBAL Control field (MBAL-CL).....	17
7.2.2 Other MBAL fields	21
Annex A (informative)	22
A.1 LPWAN features for metering.....	22
A.2 Segregation Matrix.....	22
Annex B (informative) MBAL implementation examples.....	24
B.1 MBAL for alarm data pulling scenario.....	24
B.2 MBAL for user data push and pull.....	24
B.3 Confirmed User Data transmission.....	25
Annex C (informative) Adaptation mechanism for Cat. NB1 (NB-IoT) and Cat. M1 (LTE-M)	27
C.1 Cat. M1 and Cat. NB1 brief description	27
C.2 Cat. M1 and Cat. NB1 Characteristics.....	27
C.3 Cat. M1 and Cat. NB1 Network architecture	28
C.3.1 Architecture Overview	28
C.3.2 CIoT main features and Access methods	28

C.3.2.1	CloT EPS optimizations.....	28
C.3.2.2	Power Saving Mode.....	29
C.3.2.3	Extended Discontinuous Reception.....	29
C.4	M-Bus over CloT.....	30
C.4.1	Overview.....	30
C.4.2	Basic M-Bus over CloT mechanism.....	30
C.4.2.1	Overview.....	30
C.4.2.2	Basic M-Bus over CloT.....	31
C.4.3	Advanced M-Bus over CloT.....	31
C.4.3.1	M-Bus over CloT model using transfer level security.....	31
C.4.3.2	Connection establishment.....	32
C.4.3.3	CoAP.....	34
C.4.3.3.1	..... Introduction	34
C.4.3.3.2	..... Port number	35
C.4.3.3.3	..... Datagram format	35
C.4.3.3.4	..... Header	35
C.4.3.3.5	..... Payload	36
C.4.3.3.5.1	..... General	36
C.4.3.3.5.2	..... COSE/CBOR	37
C.4.3.3.5.3	..... Payload organization	37
C.4.3.3.5.4	..... Protected and unprotected header	37
C.4.3.3.5.5	..... Protected header parameters	37
C.4.3.3.5.6	..... Unprotected header parameters	38
C.4.3.4	CBOR defined MBAL and payload content.....	39
C.4.3.4.1	..... General	39
C.4.3.4.2	..... Message content	39
C.4.3.4.3	..... CBOR payload content	39

prEN 13757-8:2021 (E)

C.4.3.4.3.1	General	39
C.4.3.4.3.2	MBAL field.....	40
C.4.3.5 Examples of implementation		41
C.4.3.5.1	Security - COSE Content encryption/authentication	41
C.4.3.5.2	Services and parameters	42
C.4.3.5.3	Communication sequences / scenarios	43
C.4.3.5.3.1	General	43
C.4.3.5.3.2	Uni-directional end-to-end examples.....	43
C.4.3.5.3.3	Two-way examples.....	46
Annex D (informative) Adaptation mechanism for LoRaWAN.....		50
D.1 LoRaWAN Brief Description		50
D.2 LoRaWAN Network Architecture.....		50
D.2.1 Overview		50
D.2.2 Application Server		50
D.2.3 End-devices		50
D.2.4 Gateways		51
D.2.5 Core Network.....		51
D.2.5.1 Network Server		51
D.2.5.2 Join Server		51
D.3 LoRaWAN Security services description.....		52
D.4 LoRaWAN Main Features		53
D.5 LoRaWAN Frame Structure Overview		53
D.6 M-Bus over LoRaWAN.....		54
D.6.1 M-Bus upper layers encapsulation in LoRaWAN		54
D.6.2 LoRaWAN and MBAL co-operation		55
D.6.2.1 End device Access and Operation Classes		55
D.6.2.2 Acknowledgement		56
D.6.2.3 Pending downlinks.....		56
D.6.3 Implementation examples.....		56
D.6.3.1 Overview		56
D.6.3.2 M-Bus over LoRaWAN Installation Procedure.....		56

D.6.3.3 M-Bus over LoRaWAN for Alarm data pulling	57
D.6.3.4 M-Bus over LoRaWAN for User data push and pull	58
Annex E (informative) Adaptation mechanism for TS-UNB	60
E.1 TS-UNB/MIOTY Brief Description.....	60
E.2 MIOTY Network Architecture.....	60
E.2.1 Overview	60
E.2.2 Service Center	60
E.2.3 End-point	61
E.2.4 Base station.....	61
E.3 MIOTY principles	61
E.3.1 Device Classes	61
E.3.2 Scheduling and Acknowledgement	61
E.4 MIOTY Frame Structure Overview	62
E.5 M-Bus over MIOTY.....	63
E.5.1 Encapsulation of M-Bus.....	63
E.5.2 MIOTY and MBAL co-operation	64
E.5.2.1 End-Point Access and Device Classes	64
E.5.2.2 End-Point Latency.....	65
E.5.2.3 Acknowledgement.....	65
E.5.3 Implementation example.....	65
E.5.3.1 General	65
E.5.3.2 M-Bus over MIOTY command workflow.....	66
Annex F (informative) Adaptation mechanism for Wize	67
F.1 Wize brief description	67
F.2 Wize services.....	67
F.3 Wize Network architecture.....	68
F.3.1 Overview	68
F.3.2 Uplink broadcast.....	68
F.3.3 Moreover, the messages transmitted by an End Device can also be retransmitted a number of times (time redundancy), each gateway filters out identical messages received several times in succession (time duplication).Downlink unicast.....	69
F.3.4 Downlink broadcast.....	69
F.3.5 Wize message types and message flow	69
F.3.6 Wize security services and management.....	72
F.3.7 Wize Data Link Layer (DLL)	73
F.4 M-Bus over Wize	73
F.4.1 Overview	73

prEN 13757-8:2021 (E)

F.4.2 MBAL with CI-Field	74
Bibliography	76

**iTeh STANDARD
PREVIEW
(standards.iteh.ai)**

[oSIST prEN 13757-8:2022](https://standards.iteh.ai/catalog/standards/sist/7e38e2ff-3d3d-45f0-be2d-bdcf6f6a1ec8/osist-pren-13757-8-2022)

<https://standards.iteh.ai/catalog/standards/sist/7e38e2ff-3d3d-45f0-be2d-bdcf6f6a1ec8/osist-pren-13757-8-2022>

European foreword

This document (prEN 13757-8:2021) has been prepared by Technical Committee CEN/TC 294 “Communication systems for meters”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

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

iTeh STANDARD PREVIEW (standards.iteh.ai)

[oSIST prEN 13757-8:2022](https://standards.iteh.ai/catalog/standards/sist/7e38e2ff-3d3d-45f0-be2d-bdcf6f6a1ec8/osist-pren-13757-8-2022)

<https://standards.iteh.ai/catalog/standards/sist/7e38e2ff-3d3d-45f0-be2d-bdcf6f6a1ec8/osist-pren-13757-8-2022>

Introduction

This document 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.

The M-Bus protocol upper layers (Transport and Application) can be used with various lower layers (Network, Data Link and Physical) as described in EN 13757-1. Systems based on the M-Bus protocol stack are well established in the metering market in Europe. In parallel, other wireless communication networks so called LPWAN (Low Power Wide Area Networks) have been widely deployed and targeting metering applications as well. The OSI reference model enables the transport of M-Bus upper layers on top of LPWANs lower layers. To ensure a seamless transition of the legacy systems based on Wireless M-Bus to LPWAN, an M-Bus Adaptation Layer (MBAL), needs to provide the necessary services and information, via an adequate interface, to the upper layers to minimize the impact on their existing implementations.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[oSIST prEN 13757-8:2022](https://standards.iteh.ai/catalog/standards/sist/7e38e2ff-3d3d-45f0-be2d-bdcf6f6a1ec8/osist-pren-13757-8-2022)

<https://standards.iteh.ai/catalog/standards/sist/7e38e2ff-3d3d-45f0-be2d-bdcf6f6a1ec8/osist-pren-13757-8-2022>

1 Scope

This document describes the functionalities and specifies the requirements of an Adaptation Layer to be applied when transporting M-Bus upper layers using a wireless communication protocol other than Wireless M-Bus. These alternative radio technologies developed outside CEN/TC 294 could be based on Internet Protocol or not and operate either in licensed or unlicensed frequency bands.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definition apply:

3.1

end device

communication end node like a radio adapter or a meter or other similar device

3.2

gateway

intermediate node in a data communication network, connected to two or more logical networks, where the protocols or modes used on the logical networks are different

3.3

head end system

system responsible for the management, reading and data collection of end devices applications

3.4

downlink

transmission in the direction from a gateway or a head end system to the end device

3.5

core network

a set of logical and physical entities providing the communication services between the HES and the end devices

3.6

uplink

transmission in the direction from an end device to the gateway or head end system

3.7

frame

unit of transmission at the Data Link Layer

3.8

low power wide area network

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

3.9

L(n)

refers to layer level (n) in the OSI model

prEN 13757-8:2021 (E)**4 Abbreviations and symbols****4.1 Abbreviations**

AES – Advanced Encryption System

AFL – Authentication and Fragmentation Layer

APL – Application Layer

CI – Control Information (field)

CIoT – Cellular IoT

CN – Core Network

CSGN – CIoT Serving Gateway Node

DLL – Data Link Layer

DMZ – Demilitarized Zone

DoNAS – Data over NAS

ECM – EPS Connectivity Management

ED – End Device

eDRX – extended Discontinuous Reception

ELL – Extended Link Layer

eDRX – (LTE) Extended Discontinuous Reception

eNB – Evolved Node B

EPC – Evolved Packet Core

EPS – Evolved packet System

E-UTRAN – Evolved UMTS Terrestrial Radio Access Network

FUOTA – Firmware Update Over The Air

GPRS – General Packet Radio Service

GTP-U – GPRS Tunnelling Protocol – User Plane

HARQ – Hybrid Automatic Repeat Request

HES – Head End System

HTTP – Hyper Text Transfer Protocol

IoT – Internet of Things

IP – Internet Protocol

LLC – Logical Link Control

LPWAN – Low Power Wide Area Network

LTE – Long Term Evolution

MAC – Medium Access Control

MBAL – M-Bus Adaptation Layer

MCL – Maximum Coupling Loss

MME – Mobility Management Entity

**ITeH STANDARD
PREVIEW
(standards.iteh.ai)**

[oSIST prEN 13757-8:2022](https://standards.iteh.ai/catalog/standards/sist/7e38e2ff-3d3d-4510-be2d-bdc1b16a1ec8/osist-pren-13757-8-2022)

<https://standards.iteh.ai/catalog/standards/sist/7e38e2ff-3d3d-4510-be2d-bdc1b16a1ec8/osist-pren-13757-8-2022>

MNO – Mobile Network Operator
 NAS – Non-Access Stratum
 NIDD – Non-IP Data Delivery
 NWL – Network Layer
 PCI – Protocol Control Information
 PDCP – Packet Data Convergence Protocol
 PDN – Packet Data Network
 PGW – PDN Gateway
 PDU – Protocol Data Unit
 PHY – Physical Layer
 PSM – Power Saving Mode
 PTW – Paging Transmission Window
 RAN – Radio Access Network
 REST - Representational State Transfer
 RLC – Radio Link Control
 RRC – Radio Resources Control
 S1AP – S1 Application Protocol
 SCTP – Stream Control Transmission Protocol
 SDU – Service Data Unit
 SGW – Serving Gateway
 RF – Radio Frequency
 RFU – Reserved for Future Use
 TAU – Tracking Area Update
 TCP – Transmission Control Protocol
 TPL – Transport Layer
 UE – User Equipment
 UDP – User Datagram Protocol

iTeh STANDARD
 PREVIEW
 (standards.iteh.ai)

[oSIST prEN 13757-8:2022](https://standards.iteh.ai/catalog/standards/sist/7e38e2ff-518-417b-be2d-bdcf6f6a1ec8/osist-pren-13757-8-2022)

<https://standards.iteh.ai/catalog/standards/sist/7e38e2ff-518-417b-be2d-bdcf6f6a1ec8/osist-pren-13757-8-2022>

4.2 Symbols

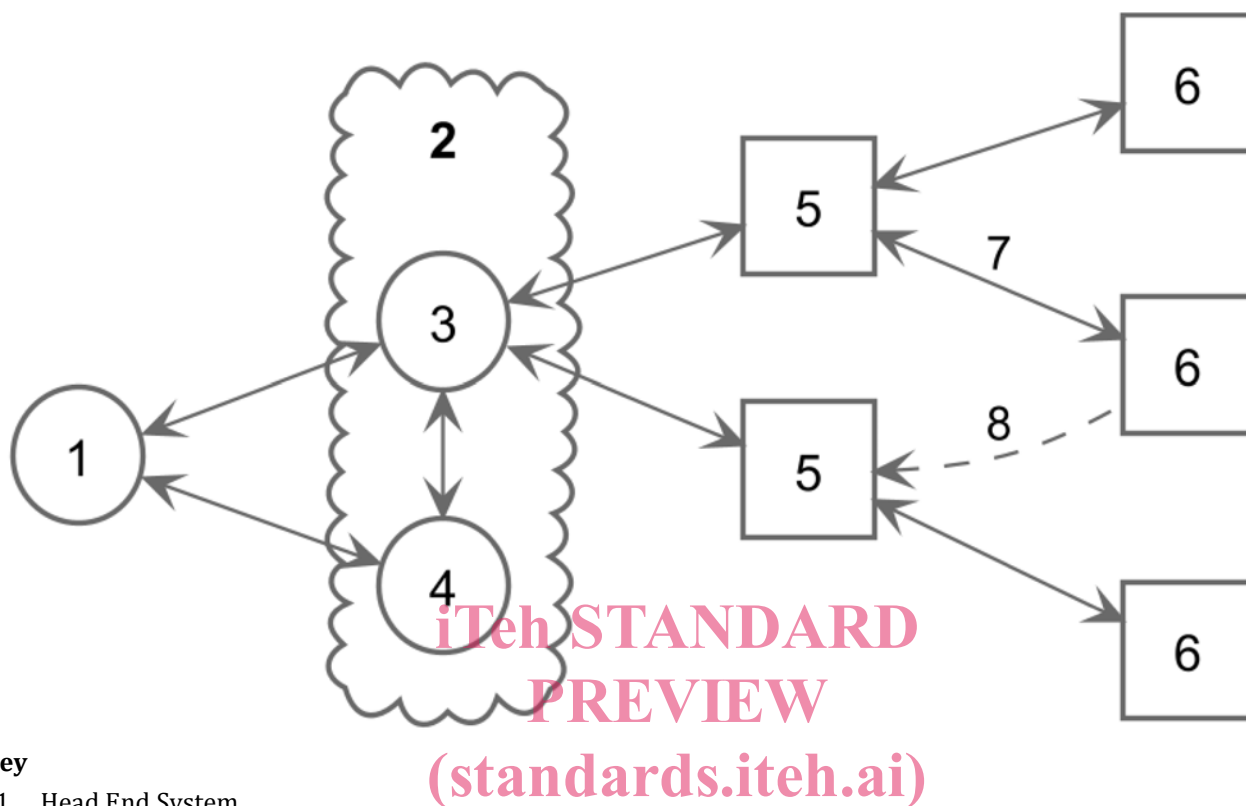
Hexadecimal numbers are designated by a following “h”.

Binary numbers are designated by a following “b”.

Decimal numbers have no suffix.

5 Network architecture

5.1 Overview



Key

- 1 Head End System
- 2 Core Network
- 3 Network Manager
- 4 Security Server
- 5 Gateway
- 6 End Device
- 7 Active Link
- 8 Spare Link

[oSIST prEN 13757-8:2022](https://standards.itech.ai/catalog/standards/sist/7e38e2ff-3d3d-45f0-be2d-bdcf6f6a1ec8/osist-pren-13757-8-2022)
<https://standards.itech.ai/catalog/standards/sist/7e38e2ff-3d3d-45f0-be2d-bdcf6f6a1ec8/osist-pren-13757-8-2022>

Figure 1 — LPWAN Network Architecture Overview

5.2 General description of network entities

5.2.1 Head End System

The HES is deployed and managed by the metering service or application provider. HES, and its related components are responsible for handling TPL/AFL / APL layers. It could be built of several components each of them is dealing with a given set or subset of functionalities or services typically fragmentation.

The HES is connected to the Core Network via dedicated interfaces and protocols and uses its services to exchange data messages with the end devices. It could also be connected to security server to manage the communication security requirements.

5.2.2 Core Network

5.2.2.1 Network Manager

The Network Manager is responsible for managing communication links and infrastructure using Network, DLL, and MAC services according to the protocol specifications. It allocates the necessary resources to establish a communication between the HES and the end device. These services enable the configuration and setting of different communication parameters to optimize network and end devices resources usage and enforce wireless communication rules.

The network manager communicates with the end devices through the gateways. Both elements are under the control of the network manager. In order to secure the communication link, the network manager could be connected to the security server to retrieve the adequate security material.

5.2.2.2 Security Server

The security server is responsible for managing the security services. It holds the necessary cryptographic keys and credentials of the end devices and distribute them to the network and the HES, via dedicated and secure interfaces, to achieve the required level of data confidentiality, integrity and authentication. These security materials are conveyed and stored in the security server in a way compliant with standard security policies.

5.2.3 Gateway

The gateway is a network element responsible for the transfer of RF frames between the network manager and the end device. Any frame transmitted by the network manager to the end device via the gateway is called downlink frame. Reciprocally, any frame transmitted by the end device to network manager via the gateway is called uplink frame. One uplink frame could be received on several gateways while a downlink is transmitted by a single gateway (see element 7 and 8 in Figure 1).

A gateway is potentially capable of operating on different frequency bands and/or channels and transmitting or receiving multiple frames at the same time.

5.2.4 End Device [https://standards.iteh.ai/catalog/standards/sist/7e38e2ff-](https://standards.iteh.ai/catalog/standards/sist/7e38e2ff-3d3d-45f0-be2d-bdcf6f6a1ec8/osist-pren-13757-8-2022)

[3d3d-45f0-be2d-bdcf6f6a1ec8/osist-pren-13757-8-2022](https://standards.iteh.ai/catalog/standards/sist/7e38e2ff-3d3d-45f0-be2d-bdcf6f6a1ec8/osist-pren-13757-8-2022)

The end device is responsible for managing all layers. It communicates with the gateway on the LPWAN layers and with the HES on the upper layers (APL/TPL/AFL). An end device is potentially capable of running several applications using one or multiple LPWAN. The necessary security material is either stored in the end device's memory or conveyed from the security server by the network manager.

Each end device has an LPWAN unique identifier equivalent to MAC address. The upper layers use the application address, contained in the TPL, to identify the end device when communicating with the HES.

Attention should be paid to the cases where multiple meters or sensors are served by a single end device acting as a radio adapter. In that case, the long header format of the TPL shall be used in each application message in both directions (ED <-> HES) while the end device uses its unique LPWAN ID at the lower layers.

To announce the relationship between the unique LPWAN ID and the application address, the latter shall be transmitted at least during the initialisation phase.

If there is a 1:1 relation between the unique LPWAN ID and application address, then the transmission of the application address may be skipped in any later message transfers. Otherwise, the application address needs to be provided at any time.