

STN	Výmena údajov pri meraní elektrickej energie. Súbor DLMS/COSEM. Časť 8: Komunikačný profil SMITP B-PSK PLC pre susedné siete. Zahŕňa: Komunikačný profil Original-SMITP PLC B-PSK, profil na miestnu výmenu údajov Original-SMITP a komunikačný profil Original-SMITP IP.	STN P CLC/TS 50568-8 35 6131
------------	--	---

Electricity metering data exchange - The DLMS/COSEM suite - Part 8: SMITP B-PSK PLC communication profile for neighbourhood networks - Including: The Original-SMITP PLC B-PSK communication profile, The Original-SMITP Local data exchange profile and The Original-SMITP IP communication profile

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 07/15

Obsahuje: CLC/TS 50568-8:2015

121059

Úrad pre normalizáciu, metrológiu a skúšobníctvo SR, 2015

Podľa zákona č. 264/1999 Z. z. v znení neskorších predpisov sa môžu slovenské technické normy rozmnožovať a rozširovať iba so súhlasom Úradu pre normalizáciu, metrológiu a skúšobníctvo SR.

TECHNICAL SPECIFICATION
SPÉCIFICATION TECHNIQUE
TECHNISCHE SPEZIFIKATION

CLC/TS 50568-8

April 2015

ICS 35.240.60; 91.140.50

English Version

**Electricity metering data exchange - The DLMS/COSEM suite -
 Part 8: SMITP B-PSK PLC communication profile for
 neighbourhood networks - Including: The Original-SMITP PLC B-
 PSK communication profile, The Original-SMITP Local data
 exchange profile and The Original-SMITP IP communication
 profile**

This Technical Specification was approved by CENELEC on 2014-11-11.

CENELEC members are required to announce the existence of this TS in the same way as for an EN and to make the TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force.

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



European Committee for Electrotechnical Standardization
 Comité Européen de Normalisation Electrotechnique
 Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

CONTENTS

Foreword	9
Introduction.....	10
1 Scope	11
2 Normative references	12
3 Acronyms and abbreviations, terms, definitions and notations	13
3.1 Acronyms and abbreviations	13
3.2 Terms and definitions	14
3.3 Notations	15
4 The DLMS/COSEM SMITP B-PSK PLC profile.....	16
4.1 Structure of the profile	16
4.2 Physical layer	17
4.3 Data link layer	17
4.4 Application to data link convergence layer	17
4.5 Application layer.....	27
4.6 Application process	27
4.7 PLC network management.....	28
4.8 Addressing	31
4.9 System variables	32
5 The Original-SMITP B-PSK PLC profile	33
5.1 Overview	33
5.2 Structure of the profile	33
5.3 Physical layer	34
5.4 Data Link layer	35
5.5 Application layer.....	35
5.6 SMITP Data model	35
5.7 Application process	35
6 The Original-SMITP IP profile	43
6.1 Overview	43
6.2 Structure of profile	43
6.3 Physical and data link layers	44
6.4 Transport and network layers	44
6.5 Application layer.....	48
6.6 SMITP Data model	48
7 Original-SMITP Local Optical interface profile	49
7.1 Overview	49
7.2 Physical layer	49
7.3 Data transmission protocol	50
7.4 Packet's protocol format	51
7.5 Data Link Layer	53
8 Discovery and registration services	55
8.1 DLMS/COSEM over B-PSK discovery and registration services	55
8.2 Original-SMITP over B-PSK discovery and registration services	68

9	The Original-SMTP AL Services	75
9.1	Application messages exchanged in distribution line networks.....	75
9.2	Application messages exchanged in telecommunication public networks	107
9.3	Encryption, Authentication and Playback Attacks Protection	131
9.4	Enconding examples	136
9.5	TCP/IP encapsulation example of SMTP TB Application layer message.....	141
10	The Original-SMTP Data model	144
10.1	Introduction	144
10.2	Internal parameters	145
10.3	Total energies	148
10.4	Daily energies	149
10.5	Load profiles and setting parameters	150
10.6	Communication address and keys of authentication.....	153
10.7	Meter identification information	156
10.8	Temporal information.....	157
10.9	Billing period information	160
10.10	Software, Hardware and Security information	162
10.11	Supply contract information	165
10.12	Weekly tariff information	169
10.13	Annual tariff information	179
10.14	Public holidays programming	181
10.15	Load modulation parameters	182
10.16	Voltage interruption information	185
10.17	Voltage variation information	191
10.18	Control information	197
10.19	Normal Status Word	200
10.20	Extended Status Word.....	202
10.21	Cut-off device control information	204
10.22	Display management	206
10.23	Download parameters.....	208
10.24	Measurand profiles and parameters.....	211
10.25	Synchronized measurand registers	215
10.26	Event log management.....	219
10.27	Billing data information	221
10.28	Virtual billing data registers	237
10.29	Time stamp of maximum power demand	246
10.30	Measurand information	252
10.31	Reading mode management	255
10.32	Management of log's events	256
Annex A (informative)	Node discovery procedure example using the DLMS/COSEM	
	SMITP B-PSK PLC profile	261
A.1	Node Discovery	261
A.1.1	Discover nodes directly accessible from the Concentrator.....	261
A.1.2	Enable L1 meters to discover nodes not directly accessible from the Concentrator	263
A.1.3	Gathering discovered nodes from L1 meters	263

A.1.4	Repeating the process with L1 meters until no new meters are discovered	265
A.2	Registration and routing management	268
Annex B (informative)	Node discovery procedure example using the Original-SMTP over B-PSK PLC profile	270
B.1	Node Discovery	270
B.1.1	Discover nodes directly accessible from the Concentrator.....	272
B.1.2	Enable L1 meters to discover nodes not directly accessible from the Concentrator.....	272
B.1.3	Gathering discovered nodes from L1 meters	272
B.1.4	Repeating the process with L1 meters until no new meters are discovered	274
B.2	Registration and routing management	278
Annex C (informative)	SMITP specific definitions	280
C.1	Management of reserved elements	280
C.2	ECTL structure	280
Annex D (normative)	MIB and COSEM Set-up class interface	281
D.1	General	281
D.2	Types definition	281
D.3	SMITP configuration attributes.....	281
D.4	SMITP statistical attributes	284
Annex E (informative)	Specification of communication mode F for direct local data exchange.....	285
E.1	Introduction	285
E.2	Mode F for direct local data exchange	285
E.2.1	General.....	285
E.2.2	Sign-on flow	285
E.2.3	Physical layer primitives.....	286
E.2.4	Timers	287
E.3	Sign on example	287
E.3.1	Identifier request -300 baud- (TP)	287
E.3.2	Meter identifier response from meter -300 baud-.....	287
E.3.3	Work mode selection -300 baud- (HHU)	288

List of figures

Figure 1 – Document structure of CLC/TS 50568-8	11
Figure 2 – The DLMS/COSEM SMITP B-PSK PLC communication profile	16
Figure 3 – Services of the COSEM to B-PSK convergence layer	18
Figure 4 – Type 1 CLPDU format	20
Figure 5 – Type 2 CLPDU format	20
Figure 6 – Control field format	21
Figure 7 – Sequence chart of a CL transfer not requiring segmentation	22
Figure 8 – sequence chart of a CL transfer requiring segmentation at both sides	23
Figure 9 – sequence chart of a CL transfer requiring segmentation using the unconfirmed service	25

Figure 10 – Meter's state diagram.....	31
Figure 11 – Reference communication architecture.....	32
Figure 12 – Protocol stack for SMITP on PLC	33
Figure 13 – Meter's state diagram.....	36
Figure 14 – Synchronization without protection	37
Figure 15 – Synchronization with protection	37
Figure 16 – Individual registers reading	37
Figure 17 – Table registers reading	38
Figure 18 – Individual registers writing	38
Figure 19 – Table registers writing	38
Figure 20 – Download procedure	40
Figure 21 – Reference communication architecture.....	43
Figure 22 – Protocol stack for SMITP on IP	44
Figure 23 – Connection Opening.....	47
Figure 24 – Data exchange	47
Figure 25 – Connection Closing	48
Figure 26 – Optical interface protocol stack	49
Figure 27 – Messages sequence in connection procedure between meter and HHU	50
Figure 28 – Connection request message	52
Figure 29 – Identification response message	52
Figure 30 – Acknowledgement message	53
Figure 31 – MAC frame structure	53
Figure 32 – Discover messages exchange	58
Figure 33 – DiscoverReport messages exchange.....	59
Figure 34 – TCTset messages exchange	60
Figure 35 – DiscoverForward messages exchange	61
Figure 36 – DiscoverForwardReport messages exchange	63
Figure 37 – Status messages exchange.....	64
Figure 38 – Register messages exchange.....	65
Figure 39 – RegisterReport messages exchange	66
Figure 40 – Deregister messages exchange	67
Figure 41 – Ping.request messages exchange	68
Figure 42 – Ping.response messages exchange	68
Figure 43 – Subnets of the network.....	75
Figure 44 – Request A-Node to transmit data to B-Node	97
Figure 45 – Request A-Node to transmit data to B-Node: B-Node does not answer	98
Figure 46 – Structure of messages exchanged in telecommunication networks	108
Figure 47 – Structure of Message Header.....	109
Figure 48 – Structure of Message Data.....	109
Figure 49 – TB messages exchange in the On-Line transaction	113
Figure 50 – Error condition during the transaction.....	114

Figure 51 – TB messages exchange in the Off-Line transaction	115
Figure 52 – Messages to cancel a transaction required by AMM system	115

List of tables

Table 1 – Convergence layer error management scheme	26
Table 2 – Example of message structure to be displayed	42
Table 3 – Standard ASCII control characters	51
Table 4 – Baud Rate coded values.....	53
Table 5 – Discover service	58
Table 6 – Discover service arguments	58
Table 7 – DiscoverReport service	59
Table 8 – DiscoverReport service arguments	59
Table 9 – TCTset service	60
Table 10 – TCTSet service arguments	60
Table 11 – DiscoverForward service	61
Table 12 – DiscoverForward service arguments	61
Table 13 – DiscoverForwardReport service	62
Table 14 – DiscoverForwardReport service arguments	62
Table 15 – Status service	63
Table 16 – Status service arguments	63
Table 17 – Register service	64
Table 18 – Register service arguments	64
Table 19 – RegisterReport service	65
Table 20 – RegisterReport service arguments.....	65
Table 21 – Deregister service	66
Table 22 – Dereigister service arguments	66
Table 23 – Ping service	67
Table 24 – Ping service arguments	67
Table 25 – Chl.Req 112 message	69
Table 26 – Chl.Resp 113 message.....	69
Table 27 – Address.Req 090 message.....	70
Table 28 – TCT_Set.Req 092 message.....	71
Table 29 – ReqAddr.Req 094 message.....	71
Table 30 – Address.Resp 091 message	72
Table 31 – ReqAddr.Resp 095 message	73
Table 32 – Structure of Struct Address.Resp	73
Table 33 – NACK.RESP 247 message	74
Table 34 – Application messages in distribution line network	77
Table 35 – Write.Req 004 message for clock synchronization	79
Table 36 - Write.Req 004 message for general parameter writing	79
Table 38 – WriteTab.Req 010 message	81

Table 39 – WriteTab.Req 110 message	82
Table 40 – SetTab.Req 014 message	83
Table 41 – SetTab.Req 114 message	84
Table 42 – Example of a table set command.....	85
Table 43 – ResetTab.Req 016 message	85
Table 44 – ResetTab.Req 116 message	86
Table 45 – Read.Req 002 message	87
Table 46 – Read.Resp 003 message	87
Table 47 – ReadTab.Req 006 message	88
Table 48 – ReadTab.Resp 007 message.....	88
Table 49 – ReadTab.Req 008 message (block read).....	89
Table 50 – ReadTab.Resp 009 message (block read)	89
Table 51 – GetTab.Req 030 message	90
Table 52 – GetTab.Resp 031 message	91
Table 53 – Authenticated Read.Req 102 message	91
Table 54 – Authenticated Read.Resp 103 message	92
Table 55 – Authenticated ReadTab.Req 106 message	93
Table 56 – Authenticated ReadTab.Resp 107 message	93
Table 57 – Authenticated ReadTab.Req 108 message (block read).....	94
Table 58 – Authenticated ReadTab.Resp 109 message (block read).....	95
Table 59 – Authenticated GetTab.Req 130 message.....	95
Table 60 – Authenticated GetTab.Resp 131 message	96
Table 61 – SetIC.Req 040 message.....	97
Table 62 – Authenticated SetIc.Req 140 message	98
Table 63 – WriteTabIC.Req 042 message	99
Table 64 – Authenticated WriteTabIc.Req 142 message	100
Table 65 – Reprog 100 message (local programming)	101
Table 66 – Reprog 101 message (broadcast programming)	101
Table 67 – Command 018 message	102
Table 68 – Authenticated Command 118 message.....	102
Table 69 – A-Node ACK 253 message	103
Table 70 – Authenticated A-Node ACK 243 message.....	104
Table 71 – A-Node NACK 255 message.....	104
Table 72 – Authenticated A-Node NACK 245 message	104
Table 73 – Coding of field Value in A-Node Nack messages	105
Table 74 – Coding of sub field SSAP in LLC frame	105
Table 75 – B-Node ACK 251 message	106
Table 76 – Authenticated B-Node ACK 241 message.....	106
Table 77 – B-Node NACK 249 message.....	106
Table 78 – Authenticated B-Node NACK 239 message	107
Table 79 – Coding of field Value in B-Node Nack messages	107

Table 80 – Relationship between Message Code, Prot and Action fields	110
Table 81 – General description of a message using SMITP references	110
Table 82 – TB Message example 1	111
Table 83 – PLC translation of previous TB message	111
Table 84 – TB Message example 2	111
Table 85 – PLC translation of previous TB message	111
Table 86 – TB application messages in telecommunication public network.....	111
Table 87 – TB Write.Req 004 message (single programming of one parameter).....	116
Table 88 – TB Write.Req 004 message (single programming of more parameters).....	116
Table 89 – TB Sinc.Req 034 message	117
Table 90 – TB WriteTab.Req 010 message	118
Table 91 – TB SetTab.Req 014 message	119
Table 92 – TB ResetTab 016 message	119
Table 93 – TB GetTab.Req 030 message.....	120
Table 94 – TB GetTab.Resp 031 message	121
Table 95 – TB Read.Req 002 message	121
Table 96 – TB Read.Resp 003 message	122
Table 97 – TB ReadTab.Req 006 message	123
Table 98 – TB ReadTab.Resp 007 message	123
Table 99 – TB ReadTab.Req 008 message (entire table)	124
Table 100 – TB ReadTab.Resp 009 message (entire table).....	124
Table 101 – TB Command 018 message	125

Foreword

This document (CLC/TS 50568-8:2015) has been prepared by CLC/TC 13, "Electrical energy measurement and control".

The following date is fixed:

- latest date by which the existence of this document has to be announced at national level (doa) 2015-07-24

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

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

The European Committee for Electrotechnical Standardization (CENELEC) 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 Technical Specification CLC/TS 50568 is based.

The CENELEC takes no position concerning the evidence, validity and scope of this maintenance service.

The provider of the maintenance service has assured the CENELEC 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 CENELEC. Information may be obtained from:

Meters and More Open Technologies
Brussels/Belgium
www.metersandmore.eu

Introduction

This Technical Specification is based on the results of the European OPEN Meter project, Topic Energy 2008.7.1.1, Project no.: 226369, www.openmeter.com.

1 Scope

This Technical Specification contains 4 profile specifications

- the DLMS/COSEM SMITP B-PSK PLC Profile (clause 4)
- the Original-SMITP B-PSK PLC Profile (clause 5)
- the Original-SMITP IP Profile (clause 6)
- the Original-SMITP Local data exchange profile (clause 7)

The **DLMS/COSEM SMITP B-PSK profile** (see Clause 4) defines the use of the CLC/TS 50568-4 communication protocol and methods to access and exchange data modelled by the COSEM objects of EN 62056-6-2 via the EN 62056-5-3 application layer. This clause is in line with the DLMS/COSEM suite as described in EN 62056-1-0.

The **Original-SMITP Profiles** (Clauses 5, 6 and 7) define the use of the CLC/TS 50568-4 communication protocol and methods to access and exchange data modelled by the Original-SMITP Data Model (clause 10) via the Original-SMITP Application Layer (Clause 9). These clauses are not part of the DLMS/COSEM suite as described EN 62056-1-0.

NOTE The expression Original-SMITP refers to the open Smart Metering Information and Telecommunication Protocol originally developed and maintained by the Meters and More Association (see Foreword). The Original SMITP specifications were developed prior to the availability of the DLMS/COSEM SMITP B-PSK profile.

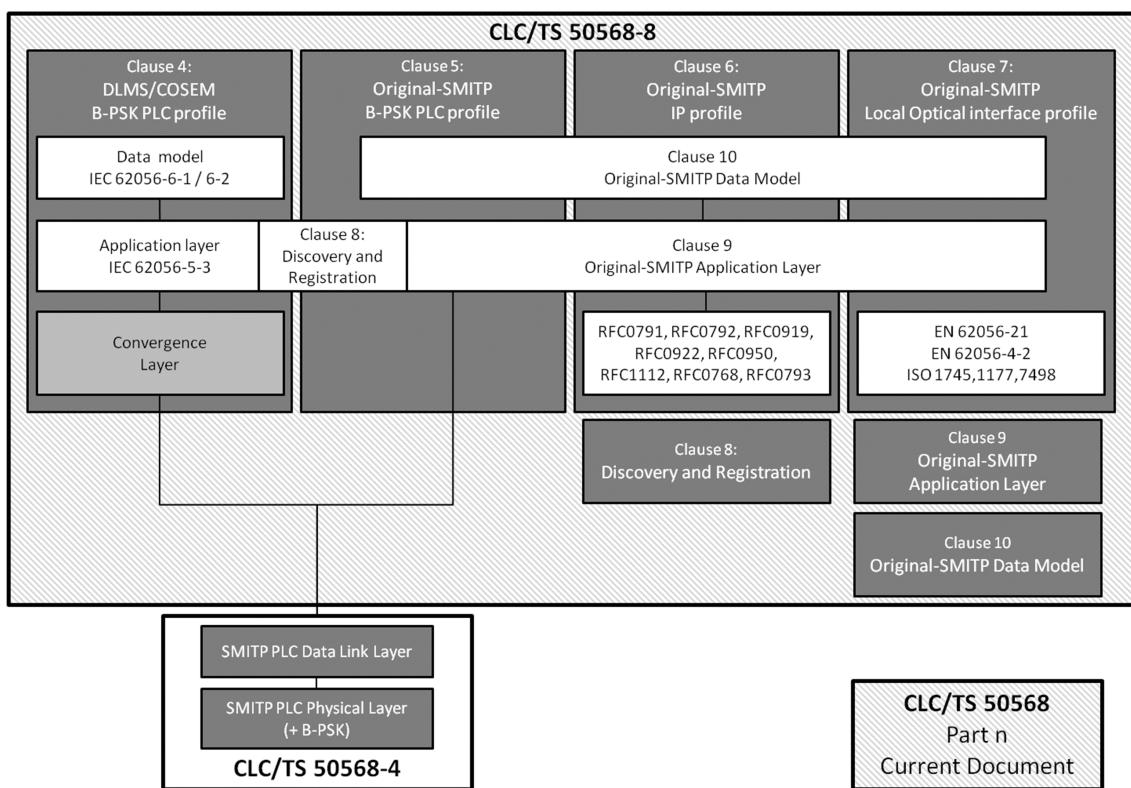


Figure 1 – Document structure of CLC/TS 50568-8

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.

CLC/TS 50568-4:2015, *Electricity metering data exchange — The Smart Metering Information and Telecommunication Protocols (SMITP) suite — Part 4: Physical layer based on B-PSK modulation + Data Link Layer*

EN 62056-21, *Electricity metering — Data exchange for meter reading, tariff and load control — Direct local data exchange (IEC 62056-21)*

EN 62056-42, *Electricity metering — Data exchange for meter reading, tariff and load control — Part 42: Physical layer services and procedures for connection-oriented asynchronous data exchange (IEC 62056-42)*

EN 62056-5-3, *Electricity metering data exchange – The DLMS/COSEM Suite - Part 5-3: DLMS/COSEM application layer (IEC 62056-5-3)*

EN 62056-6-2, *Electricity metering data exchange – The DLMS/COSEM Suite - Part 6-2: COSEM Interface classes (IEC 62056-6-2)*

SP 800-38A, Morris Dworkin, *Recommendation for Block Cipher Modes of Operation - Methods and Techniques, December 2001*

NIST SP 800-38B, Morris Dworkin, *Recommendation for Block Cipher Modes of Operation: The CMAC Mode for Authentication, May 2005*

ISO 1745, *Information processing — Basic mode control procedures for data communication systems*

ISO 1177, *Information processing — Character structure for start/stop and synchronous character oriented transmission*

ISO 7498, *Information processing systems — Open systems interconnection — Basic reference model*

koniec náhľadu – text d'alej pokračuje v platnej verzii STN