
Komunikacijske naprave in sistemi elektroenergetskih vodov za nizkonapetostne inštalacije v frekvenčnem območju od 1,6 MHz do 30 MHz - 4. del: Nizkohitrostne širokopasovne storitve (LRWBS), ki delujejo v območju med 2 MHz in 4 MHz - Razporeditve kanalov

Power line communication apparatus and systems used in low-voltage installations in the frequency range 1,6 MHz to 30 MHz - Part 4: Low rate wide band services (LRWBS) operating between 2 MHz and 4 MHz - Channel allocations

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Kommunikationsgeräte und -systeme auf elektrischen Niederspannungsnetzen im Frequenzbereich 1,6 MHz bis 30 MHz - Teil 4: Breitbanddienste mit niedriger Übertragungsrate (LRWBS) im Frequenzbereich 2 MHz bis 4 MHz - Kanaluordnungen

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Equipements et systèmes de communication par courants porteurs utilisés dans les installations à basse tension dans la plage de fréquences de 1,6 MHz à 30 MHz - Partie 4: Services bas débits large bandes (LRWBS) - Allocation de canaux

Ta slovenski standard je istoveten z: prEN 50412-4:2012

ICS:

33.040.60	Telekomunikacije po elektroenergetskih vodih	Powerline telecommunications
91.140.50	Sistemi za oskrbo z elektriko	Electricity supply systems

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ICS 33.100.20

English version

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 Part 4: Low rate wide band services (LRWBS) operating between 2 MHz and 4 MHz -
 Channel allocations**

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This draft European Standard is submitted to CENELEC members for CENELEC enquiry.
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It has been drawn up by CLC/SC 205A. [oSIST prEN 50412-4:2014](https://standards.iteh.ai/catalog/standards/sist/0b1b8cbf-f60b-45f8-a1aa-091212000000/sist-50412-4-2012)
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CENELEC

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Contents

Foreword	3
Introduction	4
1 Scope and object	5
2 Normative references	5
3 Terms, definitions and abbreviations	5
3.1 Terms and definitions	5
3.2 Abbreviations	6
4 Frequency bands	7
4.1 Introduction	7
4.2 LRWBS channels	7
4.3 Channel Out of Band Emission	7
4.4 Channels allocation limitations	7
5 Access protocol	8
5.1 Overview	8
5.2 Energy Detection description.....	8
5.3 CSMA/CA algorithm	8
5.4 Non permanent transmission.....	9
6 EMC requirements	10
Annex A (informative) Inter System Protocol (ISP)	11
A.1 Why coexistence is necessary in Powerline technologies?	11
A.2 LRWBS coexistence mechanism	11
A.3 Bibliography for PLC.....	13
Bibliography	14
https://standards.iteh.ai/catalog/standards/sist/061b8c0f-1606-4518-a1aa-96545a0a6966/osist-pren-50412-4-2014	
Figures	
Figure 1 – OBE definition	7
Figure A.1 – CSMA/CA simulations – Synthetic view of results.....	13
Table	
Table 1 – Channels definition	7

32

Foreword

33 This document [prEN 50412-4:2012] has been prepared by CLC/SC 205A "Mains communicating
34 systems", of CLC/TC 205, "Home and Building Electronic Systems (HBES)".

35 During the CLC/SC 205A meeting, held on 2010-04-27 in London, it has been decided to set up an ad
36 hoc group to clarify and improve the draft proposal coming from the French Committee on Low Rate
37 Wide Band Services (LRWBS) and to prepare a Document for Comments (DC) by the end of
38 September 2010.

39 After the examination of the concerned document during the CLC/SC 205A meeting held on
40 2011-03-29, the project was accepted with the following main amendment: to add a Clause 6 on EMC
41 requirements, referring to FprEN 50561-1:2011, *Power line communication apparatus used in low
42 voltage installations – Radio disturbance characteristics – Limits and methods of measurement –
43 Part 1: Apparatus for in-home use.*

44 This document is currently submitted to the Enquiry.

45 This document has been prepared under a mandate given to CENELEC by the European Commission
46 and the European Free Trade Association, and supports essential requirements of EU Directive(s).

47 For the relationship with EU Directive EMC (2004/108/EC), see informative Annex ZZ 1), which is an
48 integral part of this document.

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1) To be provided at voting stage.

49 Introduction

50 Low rate powerline communications (PLC) in the [2 to 4 MHz] frequency band can be used for Home
51 automation applications. The coexistence between low rate and high rate powerline communication
52 systems in this band is covered by the general coexistence mechanism called "Inter System Protocol
53 (ISP)" described in the IEEE 1901 [4] and ITU-T G.9972 [9] standards. More details are given in
54 Annex A.

55 However, when using the same [2 – 4 MHz] frequency band, different in-house PLC technologies
56 might potentially create disturbances and interferences, as power lines are a shared medium.

57 Therefore, to prevent each service from any possible interferences, it is essential to specify a
58 co-existence mechanism dedicated to the [2 – 4 MHz] frequency band.

59 It is the purpose of this European Standard to define an access mechanism (or access protocol) in the
60 [2 – 4] MHz frequency band, based on CSMA/CA, for low rate powerline communication services.

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61 1 Scope and object

62 This European Standard applies to electrical equipment using signals in the [2-4 MHz] frequency
63 range to transmit information on low voltage electrical systems/networks within installations in
64 consumers' premises for residential, commercial and light industrial environments.

65 The purpose of this European Standard is to describe a mechanism to limit mutual interferences
66 between equipments operating in the [2-4 MHz] frequency band and to specify the way systems share
67 the same band.

68 It does not specify the signal modulation methods nor the coding methods or functional features
69 (except those preventing mutual interference in the same band).

70 Applications complying with this coexistence standard may offer low rate (lower than 1 Mb/s) services
71 in home and building automation, street lighting control.

72 This European Standard covers typical applications such as energy efficiency, real-time displays of
73 metering information, general command and control, home automation.

74 This European Standard does not cover high rate communication (higher than 1 Mb/s) applications
75 such as Video or Internet networking.

76 This European Standard does not cover Output Voltage Levels.

77 2 Normative references

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

81 EN 50412-2-1:2005 + corrigendum Feb. 2009, *Power line communication apparatus and systems*
82 *used in low-voltage installations in the frequency range 1,6 MHz to 30 MHz – Part 1: Residential,*
83 *commercial and industrial environment – Immunity requirements*

84 FprEN 50561-1:2011 ²⁾, *Power line communication apparatus used in low voltage installations – Radio*
85 *disturbance characteristics – Limits and methods of measurement – Part 1: Apparatus for in-home use*

86 3 Terms, definitions and abbreviations

87 3.1 Terms and definitions

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

89 3.1.1

90 **backoff**

91 random delay a device has to wait before it is allowed to transmit

2) In preparation in CLC/TC 210. The outcome of the vote on FprEN 50561-1:2011 will be known before the next stage for prEN 50412-4:2012. This note is to be removed from the final standard.

92 **3.1.2**93 **channel**

94 transmission path between nodes

95 Note 1 to entry: One channel is considered to be one transmission path. Logically a channel is an instance of communications
 96 medium used for the purpose of passing data between two or more nodes

97 **3.1.3**98 **Channel (with a capital c)**

99 channel limited to one of the four sub-bands of the 2-4 MHz band

100 **3.1.4**101 **data rate**

102 average number of data elements (bits, bytes, or frames) communicated (transmitted) in a unit of time

103 **3.1.5**104 **medium**

105 wire-line facility, of a single wire class, allowing physical connection between nodes

106 **3.2 Abbreviations**

107 For the purposes of this document, the following abbreviations apply.

108 **CCA** Clear Channel Assessment109 **CENELEC** European Committee for Electrotechnical Standardisation110 **CSMA/CA** Carrier-Sense Multiple-Access / Collision Avoidance

111 **ED** Energy Detection
<https://standards.iteh.ai/catalog/standards/sist/0b1b8cbf-f60b-45f8-a1aa-96545a0a6966/osist-pren-50412-4-2014>

112 **ETSI** European Telecommunications Standards Institute113 **IEC** International Electrotechnical Committee114 **ISP** Inter System Protocol115 **LRWBS** Low Rate Wide Band Services116 **MAC** Medium Access Control117 **OBE** Out of Band Emission118 **PLC** Powerline Communication119 **WPAN** Wireless, Personal Area Networks

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120 4 Frequency bands

121 4.1 Introduction

122 The band in use in this European Standard is the [2-4MHz] band. In this European Standard, it is
123 called LRWBS Band for *Low Rate Wide Band Services* band.

124 4.2 LRWBS channels

125 The LRWBS band is divided into 4 (four) Channels numbered ch#1 to ch#4.

126 The following table describes the band corresponding to each Channel.

127 **Table 1 – Channels definition**

Channel #	Starting frequency MHz	Ending frequency MHz
Ch#1	2	2,5
Ch#2	2,5	3
Ch#3	3	3,5
Ch#4	3,5	4

128

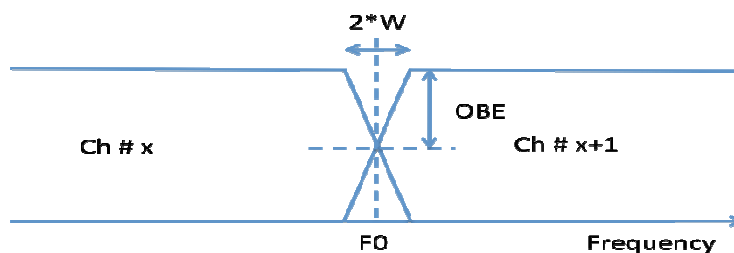
129 Signalling in a particular Channel requires an access protocol described in Clause 5.

130 This European Standard doesn't address any Channel hopping mechanism.

131 4.3 Channel Out of Band Emission

132 In order to prevent leakage and interference between adjacent Channels, equipments shall limit the
133 Out of Band Emission (OBE) according to the above graph.

134 Figure 1 presents the OBE between the channel X and Channel X+1.



135

136 **Figure 1 – OBE definition**

137 Proposed Values for W and OBE TBD : W = 50 KHz and OBE = 40 dB.

138 The OBE applies also in the lower band of CH#1 and in the upper band of Ch#4.

139 4.4 Channels allocation limitations

140 Equipments shall not transmit simultaneously in more than 2 Channels.

141 5 Access protocol

142 5.1 Overview

143 The access protocol is adapted from IEEE 802.15.4:2006 Carrier-Sense Multiple-Access with Collision
144 Avoidance (CSMA/CA) mechanism.

145 The access protocol used in this European Standard allows different systems to operate on the same,
146 or electrically connected, mains network. These systems may use the same or different protocol or
147 modulation but shall use the following access protocol.

148 Access protocol in a particular Channel is based on an Energy Detection (ED) threshold. ED threshold
149 improves coexistence by allowing transmission backoff if the Channel is occupied by any device,
150 regardless of the communication protocol it may use.

151 To ensure a fair channel access to different systems in the same network, transmission shall not be
152 permanent.

153 The transmission limitation is directly inspired of EN 50065-1.

154 5.2 Energy Detection description

155 Before transmitting in a particular Channel, the equipment shall perform a Clear Channel Assessment
156 (CCA) according to the following method:

157 CCA shall report a busy medium in case of

158 1) detection of a signal with the same communication protocol that is currently in use by the device

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159 OR

160 2) energy received in the Channel above the energy detection (ED) threshold.

161 The energy detection (ED) threshold shall be calculated by each device to report correctly a busy
162 medium with a probability of 90 %.

163 5.3 CSMA/CA algorithm

164 The CSMA/CA algorithm shall be used before any transmission in a particular Channel.

165 The algorithm is implemented using units of time called Backoff periods.

166 The Backoff period shall be calculated with the following formula:

167
$$\text{Backoff Period} = N * TB$$

168 where

169
$$N \geq 8;$$

170
$$TB = 125 \text{ ms.}$$