

This document is a preview generated by EVS

RAADIOANDMEESTUSSÜSTEEMI (RDS)
SPETSIFIKATSIOON VHF/FM RAADIORINGHÄÄLINGULE
RAADIOSAGEDUSVAHEMIKUS 87,5 MHZ KUNI 108,0
MHZ

Specification of the radio data system (RDS) for VHF/FM sound broadcasting in the frequency range from 87,5 MHz to 108,0 MHz

ESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 62106:2015 sisaldab Euroopa standardi EN 62106:2015 ingliskeelset teksti.	This Estonian standard EVS-EN 62106:2015 consists of the English text of the European standard EN 62106:2015.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 15.05.2015.	Date of Availability of the European standard is 15.05.2015.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 33.160.40

Standardite reproduutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:
Aru 10, 10317 Tallinn, Eesti; koduleht www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:

Aru 10, 10317 Tallinn, Estonia; homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

May 2015

ICS 33.160.40

Supersedes EN 62106:2009

English Version

Specification of the radio data system (RDS)
for VHF/FM sound broadcasting in the frequency range
from 87,5 MHz to 108,0 MHz
(IEC 62106:2015)

Spécification du système de radiodiffusion de données
(RDS) pour la radiodiffusion sonore VHF/FM dans la bande
de fréquences de 87,5 MHz à 108,0 MHz
(IEC 62106:2015)

Spezifikation des Radio-Daten-Systems (RDS)
für den VHF/FM-Tonrundfunk im Frequenzbereich
87,5 MHz bis 108,0 MHz
(IEC 62106:2015)

This European Standard was approved by CENELEC on 2015-05-04. CENELEC 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.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

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

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

Foreword

The text of document 100/2122A/CDV, future edition 3 of IEC 62106, prepared by Technical Area 1 "Terminals for audio, video and data services and contents" of IEC/TC 100 "Audio, video and multimedia systems and equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62106:2015.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2016-02-04
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2018-05-04

This document supersedes EN 62106:2009.

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.

Endorsement notice

The text of the International Standard IEC 62106:2015 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated :

- | | | |
|-----------------|------|--|
| IEC 62634 | NOTE | Harmonized as EN 62634. |
| ISO 3166 Series | NOTE | Only Part 1 harmonized as EN ISO 3166-1. |

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here:
www.cenelec.eu

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
ISO/IEC 10646	2014	Information technology - Universal Coded Character Set (UCS)	-	-
ISO 14819	Series	Intelligent transport systems - Traffic and travel information messages via traffic message coding	EN ISO 14819	Series
ITU-R Recommendation BS.450-3	-	Transmission standards for FM sound broadcasting at VHF	-	-
ITU-R Recommendation BS.643-3	-	Radio data system for automatic tuning and other applications in FM radio receivers for use with pilot-tone system	-	-
ITU-T Recommendation E.212	-	The international identification plan for public networks and subscriptions: For the three digit Mobile Country Codes used in Annex M of this RDS specification refer to Complement to ITU-T Rec. E.212 (05/2004) published by ITU Geneva as Annex to ITU Operational Bulletin 897, dated 2007-12-01	-	-
US NRSC-4-B		National Radio Systems Committee - NRSC-4-A: United States RBDS standard		
ETSI EN 301 700	-	Digital Audio Broadcasting (DAB);VHF/FM Broadcasting: cross-referencing to simulcast DAB services by RDS-ODA 147	-	-

CONTENTS

FOREWORD.....	9
INTRODUCTION.....	11
1 Scope.....	12
2 Normative references.....	12
3 Abbreviations	12
4 Modulation characteristics of the data channel (physical layer)	13
4.1 General.....	13
4.2 Subcarrier frequency	14
4.3 Subcarrier phase.....	15
4.4 Subcarrier level.....	15
4.5 Method of modulation	15
4.6 Clock-frequency and data-rate.....	15
4.7 Differential coding	16
4.8 Data-channel spectrum shaping.....	16
5 Baseband coding (data-link layer)	19
5.1 Baseband coding structure	19
5.2 Order of bit transmission	20
5.3 Error protection	21
5.4 Synchronisation of blocks and groups	21
6 Message format (session and presentation layers)	22
6.1 Addressing.....	22
6.1.1 Design principles	22
6.1.2 Principal features	22
6.1.3 Group types	23
6.1.4 Open data channel/Applications Identification	25
6.1.5 Coding of the group types	27
6.2 Coding of information	44
6.2.1 General	44
6.2.2 Coding of information for control.....	44
6.2.3 Coding and use of information for display	54
6.2.4 Coding of clock time and date (CT).....	54
6.2.5 Coding of information for Transparent Data Channels (TDC)	55
6.2.6 Coding of information for in house applications (IH)	55
6.2.7 Coding of Radio Paging (RP).....	55
6.2.8 Coding of Emergency Warning Systems (EWS)	56
7 Description of features.....	57
7.1 Alternative frequencies list (AF).....	57
7.2 Clock Time and date (CT).....	57
7.3 Decoder Identification (DI) and dynamic PTY Indicator (PTYI)	57
7.4 Extended Country Code (ECC)	57
7.5 Enhanced Other Networks information (EON)	57
7.6 Emergency Warning System (EWS).....	57
7.7 In House application (IH).....	57
7.8 Music Speech switch (MS).....	58
7.9 Open Data Applications (ODA)	58
7.10 Programme Identification (PI)	58

7.11	Programme Item Number (PIN).....	59
7.12	Programme Service name (PS).....	59
7.13	Programme Type (PTY).....	59
7.14	Programme Type Name (PTYN)	59
7.15	Radio Paging (RP)	59
7.16	RadioText (RT)	59
7.17	Enhanced RadioText (eRT)	59
7.18	RadioText Plus (RT+).....	60
7.19	Traffic Announcement identification (TA)	60
7.20	Transparent Data Channels (TDC).....	60
7.21	Traffic Message Channel (TMC)	60
7.22	Traffic Programme identification (TP).....	60
8	Marking	60
Annex A (normative)	Offset words to be used for group and block synchronisation	62
Annex B (informative)	Theory and implementation of the modified shortened cyclic code	63
B.1	General.....	63
B.2	Encoding procedure	63
B.2.1	Theory	63
B.2.2	Shift-register implementation of the encoder	65
B.3	Decoding procedure	65
B.3.1	Theory	65
B.3.2	Implementation of the decoder	67
Annex C (informative)	Implementation of group and block synchronisation using the modified shortened cyclic code	69
C.1	Theory	69
C.1.1	Acquisition of group and block synchronisation	69
C.1.2	Detection of loss of synchronisation	69
C.2	Shift register arrangement for deriving group and block synchronisation information.....	69
Annex D (normative)	Programme identification codes and extended country codes	72
D.1	General.....	72
D.2	PI structure	72
D.3	Extended country codes	72
D.4	Country codes: 'Nibble 1'	73
D.5	Programme in terms of area coverage (codes for fixed location transmitters only): 'Nibble 2'	76
D.6	Programme reference number: 'Nibbles 3 and 4'	76
D.7	PI codes for low-power short range transmitting devices	77
Annex E (normative)	Basic and extended RDS character sets.....	78
Annex F (normative)	Programme type codes	98
Annex G (informative)	Conversion between time and date conventions	101
Annex H (informative)	ARI (Autofahrer-Rundfunk-Information) system – Discontinuation	103
Annex J (normative)	Language identification	104
Annex K (informative)	RDS logo	106
Annex L (informative)	Open data registration.....	107
Annex M (normative)	Coding of Radio Paging (RP).....	110

M.1	General.....	110
M.2	Basic paging protocol.....	110
M.2.1	Coding characteristics for paging.....	110
M.2.2	Transmitter network group designation	111
M.2.3	Locking to a channel	113
M.2.4	Loss of synchronization.....	113
M.2.5	Group type 7A message format	113
M.3	Enhanced paging	119
M.3.1	General	119
M.3.2	Multi-operator/area paging	119
M.3.3	Extension of paging addressing mode	126
M.3.4	Battery saving mode	126
M.3.5	Group type 7A message format	129
M.3.6	Address notification bit versus pager individual address.....	138
M.4	Examples of the traffic handling capacity of the specified radio paging system.....	139
Annex N (normative)	Country codes and extended country codes for countries outside the European Broadcasting Area	142
N.1	African Broadcasting Area	142
N.2	Allocations of symbols for countries in ITU Region 2	144
N.3	Allocations of symbols for countries in ITU Region 3	146
Annex P (normative)	Coding of RadioText Plus information (RT+).....	148
P.1	General.....	148
P.2	Definitions.....	148
P.3	RT+ tag	149
P.4	RT+ information elements and data model	150
P.4.1	General	150
P.4.2	List of RT/eRT content types	150
P.4.3	Structures of RT+ messages	151
P.4.4	Receiver data model	152
P.5	Coding RT+ in ODA groups	153
P.5.1	General	153
P.5.2	RT+ identification (Group type 3A).....	154
P.5.3	Coding of the RT+ tag	155
P.5.4	Clearing of RT+ messages	156
P.6	Broadcasting conventions.....	159
P.7	Receiving conventions	159
P.8	Marking.....	160
Annex Q (normative)	Coding of enhanced RadioText (eRT)	161
Q.1	General.....	161
Q.2	Coding eRT in ODA groups	161
Q.2.1	General	161
Q.2.2	eRT identification (Group type 3A).....	161
Q.2.3	Coding of the eRT text string.....	162
Q.3	Broadcasting conventions.....	164
Q.4	Receiving conventions	165
Q.5	Marking.....	165
Annex R (informative)	RBDS in the USA.....	166
Annex S (normative)	List of RDS specific abbreviations	167

Bibliography	168
Figure 1 – Block diagram of radio-data equipment at the transmitter	14
Figure 2 – Block diagram of a typical radio-data receiver/decoder	15
Figure 3 – Amplitude response of the specified transmitter or receiver data-shaping filter 17	17
Figure 4 – Amplitude response of the combined transmitter and receiver data-shaping filters	18
Figure 5 – Spectrum of biphasic coded radio-data signals	18
Figure 6 – Time-function of a single biphasic symbol	19
Figure 7 – 57 kHz radio-data signals	19
Figure 8 – Structure of the baseband coding	20
Figure 9 – Message format and addressing	20
Figure 10 – ODA version A groups	26
Figure 11 – ODA version B groups	27
Figure 12 – Basic tuning and switching information – Type 0A group	27
Figure 13 – Basic tuning and switching information – Type 0B group	27
Figure 14 – Programme item number and slow labelling codes – Type 1A group	29
Figure 15 – Programme Item Number – Type 1B group	30
Figure 16 – RadioText – Type 2A group	30
Figure 17 – RadioText – Type 2B group	31
Figure 18 – Application identification for open data – Type 3A group	32
Figure 19 – Open data – Type 3B group	33
Figure 20 – Clock-time and date transmission – Type 4A group	34
Figure 21 – Open data – Type 4B group	34
Figure 22 – Transparent data channels – Type 5A group	35
Figure 23 – Transparent data channels – Type 5B group	35
Figure 24 – In-house applications – Type 6A and 6B group	36
Figure 25 – Radio paging – Type 7A group	36
Figure 26 – Type 7B group	37
Figure 27 – Traffic message channel – Type 8A group	37
Figure 28 – Open data – Type 8B group	37
Figure 29 – Allocation of EWS message bits – Type 9A group	38
Figure 30 – Open data – Type 9B group	38
Figure 31 – Programme type name PTYN – Type 10A group	39
Figure 32 – Open data – Type 10B group	39
Figure 33 – Open data – Type 11A and 11B groups	40
Figure 34 – Open data – Type 12A and 12B groups	40
Figure 35 – Enhanced paging information – Type 13A group	41
Figure 36 – Open data – Type 13B group	42
Figure 37 – Enhanced other networks information – Type 14A groups	42
Figure 38 – Enhanced Other Networks information – Type 14B groups	43
Figure 39 – Open data – Type 15A group	43
Figure 40 – Fast basic tuning and switching information – Type 15B group	44

Figure 41 – Structure of Block 3 of Type 1A groups	52
Figure 42 – Structure of variant 12 of block 3 of type 14A groups (linkage information) – National link.....	53
Figure 43 – Structure of variant 12 of block 3 of type 14A groups (linkage information) – International link	53
Figure 44 – Structure of Variant 7 of Block 3 of type 1A groups for Identification of a programme carrying EWS information	56
Figure B.1 – Generator matrix of the basic shortened cyclic code in binary notation	64
Figure B.2 – Shift-register implementation of the encoder	65
Figure B.3 – Parity-check matrix of the basic shortened cyclic code	66
Figure B.4 – Shift-register implementation of the decoder	67
Figure C.1 – Group and block synchronisation detection circuit.....	70
Figure D.1 – PI structure	72
Figure D.2 – Structure of Variant 0 of Block 3 of type 1A groups (ECC).....	73
Figure D.3 – European Broadcasting Area – Correspondence between geographical locations and the symbols used.....	74
Figure G.1 – Conversion routes between Modified Julian Date (MJD) and Coordinated Universal Time (UTC)	101
Figure J.1 – Language identification code allocation	104
Figure M.1 – Group type 7A message format for radio paging	113
Figure M.2 – Group type 7A paging without an additional message	114
Figure M.3 – Group type 7A paging with an additional 10 digit message.....	115
Figure M.4 – Group type 7A paging with an additional 18 digit message.....	115
Figure M.5 – Group type 7A paging with an additional alphanumeric message	116
Figure M.6 – Group type 7A paging with an additional international 15 digit message.....	117
Figure M.7 – Functions message in international paging	118
Figure M.8 – Variant 0 of 1A group with PIN	120
Figure M.9 – Variant 2 of 1A group with PIN	121
Figure M.10 – Variants of 1A group without PIN.....	122
Figure M.11 – Group type 13A	128
Figure M.12 – Group type 7A paging with tone-only message	130
Figure M.13 – First 7A group of a variable-length message.....	131
Figure M.14 – Group type 7A national paging with additional alphanumeric message	132
Figure M.15 – Group type 7A national paging with additional variable-length numeric message.....	134
Figure M.16 – Group type 7A national paging with additional variable-length functions message.....	135
Figure M.17 – The two first 7A groups of an international alphanumeric message.....	136
Figure M.18 – The two first 7A groups of an international variable-length numeric message.....	137
Figure M.19 – The two first 7A groups of an international variable-length functions message.....	137
Figure M.20 – Traffic handling capacity, busy hour, call rate = 0,10 calls/pager/hour	140
Figure M.21 – Traffic handling capacity, busy hour, call rate = 0,067 calls/pager/hour	141
Figure M.22 – Traffic handling capacity, busy hour, call rate = 0,05 calls/pager/hour	141

Figure P.1 – RT+ information of the category ‘Item’ (see Table P.2) will be attached to the programme elements Item 1 and Item 2	153
Figure P.2 – RT+ information of the category ‘Item’ will be attached to the programme elements Item 1 and Item 2, but not to the programme element News	153
Figure P.3 – RT+ information of the category ‘Item’ will be attached only to the programme element Item 1, but not to the programme element Talk.....	153
Figure P.4 – Bit allocation for group 3A (message bits and AID).....	154
Figure P.5 – Coding of the message bits of the application group	155
Figure Q.1 – Bit allocation for group 3A (message bits and AID)	162
Figure Q.2 – Coding of the message bits of the application group	163
 Table 1 – Encoding rules	16
Table 2 – Decoding rules	16
Table 3 – Group types	23
Table 4 – Main feature repetition rates	24
Table 5 – Group repetition rates	25
Table 6 – ODA group availability signalled in type 3A groups	26
Table 7 – STY codes	41
Table 8 – Codes for TP and TA	45
Table 9 – Bit d ₀ to d ₃ meanings	45
Table 10 – VHF code table.....	46
Table 11 – Special meanings code table	46
Table 12 – Code tables according to ITU regions; LF/MF code table – For ITU regions 1 and 3 (9 kHz spacing)	46
Table 13 – Code tables according to ITU regions; MF code table – For ITU region 2 (10 kHz spacing).....	47
Table A.1 – Offset word codes	62
Table B.1 – Offset word syndromes using matrix of Figure B.3.....	67
Table C.1 – Offset word syndromes for group and block synchronisation.....	71
Table D.1 – PI code structure.....	72
Table D.2 – European Broadcasting Area – Symbols used for ECC and PI country codes	75
Table D.3 – Area coverage codes	76
Table D.4 – Programme reference number codes	76
Table D.5 – PI codes for short range transmitting devices.....	77
Table E.1 – Basic RDS character set.....	78
Table E.2 – Non-transmitted UCS-2 equivalents (1 of 7)	79
Table E.3 – Extended RDS character set, for eRT only (1 of 13)	85
Table F.1 – Programme type codes and corresponding terms for display.....	98
Table G.1 – Symbols used	101
Table J.1 – Language identification codes	104
Table M.1 – Pager group codes.....	111
Table M.2 – Codes for additional message content	114
Table M.3 – Paging segment address codes for 10 and 18 digit messages	115
Table M.4 – Paging segment address codes for alphanumeric messages	116

Table M.5 – Paging segment address codes for international 15 digit messages	117
Table M.6 – Paging segment address codes for functions message	118
Table M.7 – Sub-usage codes	122
Table M.8 – Group designation codes	126
Table M.9 – Cycle selection codes	127
Table M.10 – Message sorting codes	128
Table M.11 – Codes for message types	130
Table M.12 – Description of the control byte	131
Table M.13 – Use of paging call repetition flag	132
Table M.14 – Paging segment address codes for alphanumeric message	133
Table M.15 – Paging segment address codes for variable length numeric message	134
Table M.16 – Paging segment address codes for national paging with variable-length functions message	135
Table M.17 – Address notification (50 bit)	138
Table M.18 – Address notification (25 bit)	139
Table M.19 – Z3 parity relationship	139
Table P.1 – RT+ information elements	148
Table P.2 – Code list and ‘RT+ class’ description of ‘RT/eRT content types (1 of 3)	157
Table Q.1 – eRT information elements	161

INTRODUCTION

IEC 62106:2000 (first edition) and IEC 62106:2009 (second edition) have the same main text and annex structure. However, the main text of this edition is slightly restructured to more closely conform to ISO/IEC Directives, Part 2:2011. Nevertheless, cross-referencing between this edition and the previous editions remains possible. To find the corresponding subclause quickly between this edition and the first edition, it is basically sufficient to subtract 3 clauses. Example: see 3.1.5.1 in the first edition, published in 2000 becomes, see 6.1.5.1.

This document is a preview generated by EVS