

INTERNATIONAL STANDARD

**Radio data system (RDS) – VHF/FM sound broadcasting in the frequency range
from 64,0 MHz to 108,0 MHz –
Part 2: Message format: coding and definitions of RDS features**



THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2021 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC online collection - oc.iec.ch

Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 18 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.



IEC 62106-2

Edition 2.0 2021-02

INTERNATIONAL STANDARD

**Radio data system (RDS) – VHF/FM sound broadcasting in the frequency range
from 64,0 MHz to 108,0 MHz –
Part 2: Message format: coding and definitions of RDS features**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 33.160.40

ISBN 978-2-8322-9426-0

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD	6
INTRODUCTION	8
1 Scope	9
2 Normative references	9
3 Terms, definitions, abbreviated terms and conventions	9
3.1 Terms and definitions	9
3.2 Abbreviated terms	9
3.3 Notation and conventions	11
4 Message format	11
4.1 Design principles	11
4.2 Group structure	12
4.2.1 Group type A structure	12
4.2.2 Group type B structure	13
4.2.3 Group type C structure	13
4.2.4 RFT ODA pipe/channel	14
4.3 Group type A and B usage	15
4.4 Group type C usage	16
4.4.1 Transmitting legacy data using data-streams 1, 2 and 3	16
4.4.2 Transmitting group type C ODA data	16
4.4.3 AID and channel number assignment for group type C ODAs	17
5 Description of the RDS features	18
5.1 Alternative Frequencies list (AFs)	18
5.2 Clock Time and date (CT)	18
5.3 Dynamic PTY Indicator (PTYI) using DI	18
5.4 Extended Country Code (ECC)	18
5.5 Enhanced Other Networks information (EON)	18
5.6 Linkage information	19
5.7 Open Data Applications (ODAs)	19
5.8 Programme Identification (PI)	19
5.9 Programme Service name – (PS)	20
5.10 Long Programme Service name – (LPS)	20
5.11 Programme Type (PTY)	20
5.12 Programme Type Name (PTYN)	20
5.13 RadioText (RT)	21
5.14 enhanced RadioText (eRT)	21
5.15 RadioText Plus (RT+ and eRT+)	21
5.16 Traffic Programme identification (TP)	21
5.17 Traffic Announcement identification (TA)	21
5.18 Traffic Message Channel (TMC)	22
6 Coding of the group types	22
6.1 Groups of type 0A and 0B: Basic tuning and switching information with PS name	22
6.2 Group type 1A: Slow labelling codes	23
6.3 Group type 2A and 2B: RadioText	24
6.4 Group type 3A: Application identification for any specific ODA using groups of type A or B	25

6.5	Group type 4A: Clock-Time and date.....	25
6.6	Group type 10A: Programme Type Name PTYN.....	26
6.7	Group type 14A and B: Enhanced Other Networks information (EON).....	27
6.8	Group type 15A: Long Programme Service name – 32 bytes with UTF-8 coding.....	27
6.9	Group type 15B: Fast basic tuning and switching information.....	28
7	Coding of RDS features for control.....	29
7.1	Programme Identification (PI) codes and Extended Country Codes (ECC).....	29
7.1.1	PI structure.....	29
7.1.2	Country Identifier (CI) codes: 'Nibble 1'.....	29
7.1.3	Extended Country Codes (ECC).....	29
7.1.4	Programme service in terms of area coverage (codes for fixed location transmitters only): 'Nibble 2'.....	30
7.1.5	Programme reference number: 'Nibbles 3 and 4'.....	30
7.1.6	PI codes for low-power short range transmitting devices.....	30
7.2	Programme Type (PTY) codes.....	31
7.3	Traffic Programme (TP) and Traffic Announcement (TA) codes.....	31
7.4	Decoder Identification (DI) and dynamic PTY Indicator (PTYI) codes.....	31
7.5	Coding of Alternative Frequencies (AFs).....	32
7.5.1	AF code tables.....	32
7.5.2	Use of Alternative Frequencies in group type 0A.....	34
7.5.3	Use of AF codes in group type 14A.....	36
7.6	Coding of Enhanced Other Networks information (EON).....	37
7.6.1	General.....	37
7.6.2	Coding of frequencies for cross-referenced programme services in EON.....	38
7.6.3	Use of the TP and TA features with EON.....	38
7.6.4	Use of PTY with EON.....	38
8	Required main RDS feature repetition rates on data-stream 0.....	39
Annex A (normative) Method for linking RDS programme services – Linkage information – Group type 1A and 14A.....		44
A.1	General.....	44
A.2	LA – Linkage Actuator.....	45
A.3	EG – Extended Generic indicator.....	45
A.4	ILS – International Linkage Set indicator.....	45
A.5	LSN – Linkage Set Number.....	45
Annex B (informative) Conversion between time and date conventions.....		47
Annex C (normative) RDS2 File Transfer protocol RFT for files up to 163 kB.....		49
C.1	Group coding of the ODA-AID assignment groups.....	49
C.1.1	General principles.....	49
C.1.2	Variant 0.....	49
C.1.3	Variant 1.....	50
C.1.4	Variants 2 to 15.....	51
C.2	Coding of the RFT data group used to carry the file data bytes.....	51
Annex D (informative) CRC-16 ITU-T/CCITT checkword calculation.....		53
D.1	General.....	53
D.2	PASCAL listing of CRC-16-calculation routine.....	53
D.3	C listing of the CRC-16 calculation routine.....	53
D.4	Fictitious example.....	54
Bibliography.....		55

Figure 1 – Group type A structure	12
Figure 2 – Group type B structure	13
Figure 3 – Group type C structure	13
Figure 4 – Tunnelling structure for group types A and B.....	16
Figure 5 – Basic tuning and switching information – Group type 0A	22
Figure 6 – Basic tuning and switching information – Group type 0B	23
Figure 7 – Slow labelling codes – Group type 1A	23
Figure 8 – RadioText – Group type 2A.....	24
Figure 9 – RadioText – Group type 2B	25
Figure 10 – Application identification for any specific ODA – Group type 3A	25
Figure 11 – Clock-Time and date transmission – Group type 4A	26
Figure 12 – Programme Type Name PTYN – Group type 10A	26
Figure 13 – Enhanced Other Networks information – Group type 14A	27
Figure 14 – Enhanced Other Networks information – Group type 14B	27
Figure 15 – Long PS, UTF-8 coded – Group type 15A.....	28
Figure 16 – Fast basic tuning and switching information – Group type 15B	28
Figure 17 – PI code structure.....	29
Figure A.1 – Structure of group type 1A, block 3	44
Figure A.2 – Structure of group type 14A variant 12, block 3 (Linkage information) – National link.....	45
Figure A.3 – Structure of group type 14A variant 12, block 3 (Linkage information) – International link	46
Figure B.1 – Conversion routes between Modified Julian Date (MJD) and Coordinated Universal Time (UTC)	47
Figure C.1 – AID assignment group coding for variant 0.....	49
Figure C.2 – AID assignment group coding for variant 1.....	51
Figure C.3 – AID assignment group coding for variant 2 to 15.....	51
Figure C.4 – RFT data group	52
Table 1 – Group type C Function Header definition	14
Table 2 – Group type A and B usage	15
Table 3 – Group type C assignment methods used to connect channel numbers with one or more AIDs.....	17
Table 4 – Assignment of up to three successive channel numbers to multiple AIDs.....	18
Table 5 – Area coverage codes.....	30
Table 6 – Programme service reference number codes.....	30
Table 7 – PI codes for short range transmitting devices	31
Table 8 – Codes for TP and TA.....	31
Table 9 – Meaning of bits d_0 to d_3	32
Table 10 – VHF frequencies 87,6 MHz to 107,9 MHz code table	32
Table 11 – Special meanings AF code table.....	33
Table 12 – LF/MF code table – ITU regions 1 and 3 (9 kHz spacing).....	33
Table 13 – MF code table – ITU region 2 (10 kHz spacing)	33

Table 14 – Example including AFs for the extended FM Band 37

Table 15 – Data-stream 0 group repetition rates: Transmitter not part of a multi-programme service network: no TMC and only 'basic' RDS features..... 39

Table 16 – Data-stream 0 group repetition rates: Transmitter part of a multi-programme service network: no TMC 40

Table 17 – Data-stream 0 group repetition rates: Transmitter not part of a multi-programme service network: with TMC 41

Table 18 – Data-stream 0 group repetition rates: Transmitter not part of a multi-programme service network: no TMC and with support for UTF-8 coded characters..... 42

Table 19 – Data-stream 0 group repetition rates: Transmitter part of a multi-programme service network: with TMC 43

Table B.1 – Symbols used for time and date calculation..... 47

Table C.2 – Relation between chunk size, max. file size and max.chunk address 50

INTERNATIONAL ELECTROTECHNICAL COMMISSION

RADIO DATA SYSTEM (RDS) – VHF/FM SOUND BROADCASTING IN THE FREQUENCY RANGE FROM 64,0 MHz TO 108,0 MHz –

Part 2: Message format: coding and definitions of RDS features

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 62106-2 has been prepared by technical area 1: Terminals for audio, video and data services and contents, of IEC technical committee 100: Audio, video and multimedia systems and equipment. It is an International Standard.

This second edition cancels and replaces the first edition published in 2018. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC 62106-2:2018:

- a) Subclause 4.2.4 has been added;
- b) Tables 1 and 13 have been modified;
- c) The new function RDS2 file transfer has been added and it is detailed in Annex C; this uses a CRC-16, which is specified in Annex D.

The text of this International Standard is based on the following documents:

CDV	Report on voting
100/3464/CDV	100/3547/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

A list of all parts in the IEC 62106 series, published under the general title *Radio data system (RDS) – VHF/FM sound broadcasting in the frequency range from 64,0 MHz to 108,0 MHz*, can be found on the IEC website.

The language used for the development of this International Standard is English,

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

Since the mid-1980s, a fascinating development has taken place. Most of the multimedia applications and standards have been created or redefined significantly. Hardware has become extremely powerful with dedicated software and middleware. In the mid-1980s, Internet as well as its protocols did not exist. Navigation systems became affordable in the late 1990s, and a full range of attractive smartphones now exist. The computing power of all these new products is comparable with that of the mainframe installations in that era.

Listener expectations have grown faster than the technology. Visual experience is now very important, like the Internet look and feel. Scrolling text or delivering just audio is nowadays perceived as insufficient for FM radio, especially for smartphone users. New types of radio receivers with added value features are therefore required. RDS has so far proven to be very successful.

FM radio with RDS is an analogue-digital hybrid system, which is still a valid data transmission technology and only the applications need adaptation. Now the time has come to solve the only disadvantage, the lack of sufficient data capacity. With RDS2, the need to increase the data capacity can be fulfilled.

RDS was introduced in the early 1980s. During the introductory phase in Europe, the car industry became very involved and that was the start of an extremely successful roll-out. Shortly afterwards, RDS (RBDS) was launched in the USA [1, 2, 3, 4, 5]¹.

The RDS Forum has investigated a solution to the issue of limited data capacity. For RDS2, both sidebands around the RDS 57 kHz subcarrier can be repeated a few times, up to three, centred on additional subcarriers higher up in the FM multiplex while still remaining compatible with the ITU Recommendations.

The core elements of RDS2 are the additional subcarriers, which will enable a significant increase of RDS data capacity to be achieved, and then only new additional data applications will have to be created, using the RDS-ODA feature, which has been part of the RDS standard IEC 62106 for many years.

In order to update IEC 62106:2015 to the specifications of RDS2, IEC 62106 has been restructured as follows:

Part 1: Modulation characteristics and baseband coding

Part 2: RDS message format, coding and definition of RDS features

Part 3: Usage and registration of Open Data Applications ODAs

Part 4: Registered code tables

Part 5: Marking of RDS and RDS2 devices

Part 6: Compilation of technical specifications for Open Data Applications in the public domain

Part 9: RBDS – RDS variant used in North America

Part 10: Universal Encoder Communication Protocol UECP

The original specifications of the RDS system have been maintained and the extra functionalities of RDS2 have been added.

The presentation in Parts 1, 2 and 3 follows the OSI basic reference model for information processing systems [6].

¹ Numbers in square brackets refer to the Bibliography.

RADIO DATA SYSTEM (RDS) – VHF/FM SOUND BROADCASTING IN THE FREQUENCY RANGE FROM 64,0 MHz TO 108,0 MHz –

Part 2: Message format: coding and definitions of RDS features

1 Scope

This part of IEC 62106 defines the coding and definition of features for the Radio Data System (RDS).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 62106 (all parts), *Radio Data System (RDS) – VHF/FM sound broadcasting in the frequency range from 64,0 MHz to 108,0 MHz*

ISO/IEC 10646, *Information technology – Universal Coded Character Set (UCS)*

ISO 14819 (all parts), *Intelligent transport systems – Traffic and travel information messages via traffic message coding*

3 Terms, definitions, abbreviated terms and conventions

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62106-1 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.2 Abbreviated terms

For the purposes of this document, the abbreviated terms given in IEC 62106-1 and the following apply.

AF Alternative Frequency

NOTE 1 Alternative Frequencies are given in the form of lists (method A or B or mapped).

AID Application IDentification for ODAs

CI Country Identifier

CRC-16 16 bit Cyclic Redundancy Check