



INTERNATIONAL STANDARD

**Radio data system (RDS) – VHF/FM sound broadcasting in the frequency range
from 64,0 MHz to 108,0 MHz –
Part 10: UECP – Universal Encoder Communication Protocol**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 33.060.01; 33.160.20; 33.170

ISBN 978-2-8322-5186-7

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 and abbreviated terms	9
3.1 Terms and definitions.....	9
3.2 Abbreviated terms.....	10
4 RDS encoder hardware model	10
5 RDS encoder software model	12
6 Destination addressing method.....	13
6.1 General.....	13
6.2 Site address.....	14
6.3 Encoder address.....	15
7 Transmission modes.....	15
7.1 General.....	15
7.2 Uni-directional mode	15
7.3 Bi-directional mode, requested response	15
7.4 Bi-directional mode, spontaneous response	15
8 Protocol description.....	15
8.1 Data format.....	15
8.2 Data link layer.....	15
8.2.1 General	15
8.2.2 Data-frame	16
8.2.3 Byte-stuffing method.....	19
8.2.4 Message field format	19
8.3 Message codes.....	21
8.3.1 General	21
8.3.2 Remote and configuration commands	21
8.3.3 RDS messages.....	21
8.3.4 Handling of RDS message bits declared "rfu"	21
8.3.5 Status messages	21
8.3.6 Specific messages.....	21
8.4 Description of data handling.....	21
8.5 Group sequence configuration	22
8.5.1 Basic principles used.....	22
8.5.2 Group sequence determination	22
8.5.3 Extended group sequence command	22
8.5.4 Relative priority group sequence command.....	22
8.5.5 Special transmission conditions	22
8.6 Handling of ODA data	23
8.6.1 Using ODAs on data-stream 0	23
8.6.2 Using ODAs on the upper data-streams 1 to 3	23
Annex A (normative) UECP message command repertoire.....	26
A.1 Message command format	26
A.2 Commands for A or B-type groups on data-stream 0	26
A.2.1 PI / MEC 0x01	26

A.2.2	PS / MEC 0x02	27
A.2.3	Long PS / MEC 0x21	28
A.2.4	Data group for PTYI / MEC 0x04.....	28
A.2.5	TP – TA / MEC 0x03	29
A.2.6	PTY / MEC 0x07	29
A.2.7	PTYN / MEC 0x3E	30
A.2.8	RT / MEC 0x0A.....	30
A.2.9	AF / MEC 0x13	33
A.2.10	EON-AF / MEC 0x14.....	34
A.2.11	ECC and other slow label settings / MEC 0x1A	35
A.2.12	Linkage information / MEC 0x2E.....	36
A.2.13	Free-format data in type A or B group / MEC 0x24.....	36
A.3	Commands for ODAs on data-stream 0	37
A.3.1	Group type 3A ODA configuration and short message command / MEC 0x40	37
A.3.2	ODA assignment group usage sequence signalling / MEC 0x41	39
A.3.3	ODA relative priority group sequence / MEC 0x43	40
A.3.4	ODA data group repetitions and burst mode / MEC 0x44	40
A.3.5	ODA "spinning wheel" timing control / MEC 0x45.....	41
A.3.6	ODA data / MEC 0x46	42
A.3.7	ODA data command access right / MEC 0x47	44
A.4	Commands for clock setting and control for data-stream 0	45
A.4.1	Real time clock for CT / MEC 0x0D.....	45
A.4.2	Real time clock correction for CT / MEC 0x09.....	46
A.4.3	CT on-off command / MEC 0x19	46
A.5	Commands for RDS signal alignment and control on data-stream 0	47
A.5.1	RDS on-off command data-stream 0 / MEC 0x1E.....	47
A.5.2	RDS phase for subcarrier 0 / MEC 0x22	47
A.5.3	RDS level for subcarrier 0 / MEC 0x0E	48
A.6	Message name commands control and set-up commands on data-stream 0.....	49
A.6.1	Site address / MEC 0x23	49
A.6.2	Encoder address / MEC 0x27	49
A.6.3	Make PSN list / MEC 0x28.....	50
A.6.4	PSN enable-disable / MEC 0x0B.....	50
A.6.5	EON elements enable-disable / MEC 0x3F	51
A.6.6	Communication mode / MEC 0x2C.....	52
A.6.7	TA control / MEC 0x2A	53
A.6.8	EON-TA control / MEC 0x15	53
A.6.9	Reference input select / MEC 0x1D	54
A.6.10	Data set select / MEC 0x1C	54
A.6.11	Group sequence determination for data-stream 0 / MEC 0x16	54
A.6.12	Extended group sequence for data-stream 0 / MEC 0x38.....	55
A.6.13	Group variant code sequence for data-stream 0 / MEC 0x29	57
A.6.14	Encoder access right / MEC: 0x3A.....	58
A.6.15	Communications port configuration – Mode / MEC 0x3B	59
A.6.16	Communications port configuration – Speed / MEC 0x3C	60
A.6.17	Communications port configuration – Timeout /MEC 0x3D.....	62
A.6.18	Message acknowledgment / MEC 0x18.....	63
A.6.19	Request message / MEC 0x17.....	64

A.7	Manufacturers' and transmission operators' specific command / MEC 0x2D	65
A.8	Commands for the C-type groups used on data-streams 1 to 3	66
A.8.1	ODA-AID channel assignment for AS group type C (Alternative 1)/MEC 0x50	66
A.8.2	ODA-AID channel assignment for AS group type C (Alternative 2) / MEC 0x51	68
A.8.3	Relative priority group sequence / MEC 0x53	71
A.8.4	Burst mode control for ODA group type C / MEC 0x54	71
A.8.5	RFT file data transfer (Alternative 2)/MEC 0x55.....	72
A.8.6	ODA data group command / MEC 0x56.....	73
A.8.7	RFT file data transfer and associated data for the assignment group(s) variants 0 and 1 (Alternative 1) / MEC 0x57	75
A.8.8	File associated data for AS group variants 2 to 7 (Alternative 1)/MEC 0x58	76
A.8.9	Define in the RFT a file sequence for the AID/MEC 0x59	78
A.8.10	Define the group sequence / MEC 0x61	79
A.8.11	Extended group sequence for group type C/MEC 0x83	80
A.8.12	Upper data-stream level / MEC 0xE0	82
A.8.13	Upper data-streams on – off/MEC 0xE1	82
Annex B (normative)	UECP transmission over IP networks	84
Annex C (informative)	Transport of UECP data within DVB-S radio.....	85
Annex D (informative)	Manufacturer and transmission operator command code registration	86
Annex E (informative)	Listing of Message Element Codes.....	87
Annex F (informative)	Special optional ODA transmission mode on RDS data-stream 0 with group type A or B	89
F.1	"Burst mode" transmission	89
F.2	"Spinning wheel" mode transmission.....	89
Annex G (normative)	Message Element Codes kept for backwards compatibility on data-stream 0	90
G.1	General.....	90
G.2	ODA data group/MEC 0x42	90
G.3	EWS / MEC 0x2B.....	91
G.4	TDC/MEC 0x26.....	92
G.5	TMC / MEC 0x30	93
G.6	DAB Dynamic label message – DL/MEC 0xAA	93
G.7	DAB Dynamic label command/MEC 0x48	94
Annex H (informative)	Example for defining the group sequence for data-stream 0 including ODA groups	96
Annex I (informative)	Example of how to send a logo with two different resolutions using RFT.....	97
I.1	Send files to the encoder	97
I.1.1	General	97
I.1.2	Alternative 1: using MECs 0x50 and 0x57	97
I.1.3	Alternative 2: using MECs 0x51 and 0x55.....	98
I.2	Data-stream number setting.....	100
I.3	File sequence setting.....	100
Bibliography.....		101

Figure 1 – RDS encoder hardware model.....	11
Figure 2 – RDS encoder software model.....	13
Figure 3 – Fictitious example of site addressing.....	14
Figure 4 – UECP data-frame format.....	16
Figure 5 – UECP data frame with the CRC-16 for example 1 being 0x25F4.....	18
Figure 6 – UECP data frame with the CRC-16 for example 2 being 0x800C.....	19
Figure A.1 – Message transmission cycle diagram.....	32
Figure F.1 – "Spinning wheel" mode – one minute transmission cycle that starts with a 4A group.....	89
Table 1 – UECP data-frame description.....	16
Table 2 – Byte-stuffing method.....	19
Table 3 – Message structure.....	20
Table 4 – Data set number.....	20
Table 5 – Programme Service Number.....	21
Table A.1 – Message command format.....	26

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 10: UECP – Universal Encoder Communication Protocol

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.

International Standard IEC 62106-10 has been prepared by technical area 1: Terminals for audio, video and data services and content, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This first edition, together with IEC 62106-1, IEC 62106-2, IEC 62106-3, IEC 62106-4, IEC 62106-5, IEC 62106-6 and IEC 62106-9, cancels and replaces IEC 62106:2015, and constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC 62106:2015:

- The Universal Encoder Communication protocol UECP adapted to support optional RDS2 is new.
- The section dealing with legacy RDS using data-stream 0 only is a transcription of an RDS Forum technical specification which was initially developed by the EBU and which was already in its 7th version [1]. Full backwards compatibility with previous versions was maintained, but RDS features no longer specified in IEC 62106-2 were deleted.

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

Draft	Report on voting
100/3643/FDIS	100/3688/RVD

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

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.

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 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, specifically 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 [2, 3, 4, 5, 6].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 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

NOTE 1 The Part numbers 7 and 8 will not be used.

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

Obsolete or unused functions from the original RDS standard have been deleted.

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 10: UECP – Universal Encoder Communication Protocol

1 Scope

This part of IEC 62106 describes the Universal Encoder Communication Protocol – UECP. The UECP has as its primary objectives to satisfy the need for harmonized RDS encoder communication protocols and to facilitate the interworking of various RDS systems components, such as RDS servers, data bridges and encoders, regardless of the supplier. Furthermore, a harmonised network environment and encoder model is being maintained to facilitate the interchange of component parts of RDS network systems. These harmonized models and a universal layered protocol are specified, based on the ISO/OSI recommendation. The UECP encompasses all current RDS features including any new developments using the ODA protocol.

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 62106-1, *Radio data system (RDS) – VHF/FM sound broadcasting in the frequency range from 64,0 MHz to 108,0 MHz – Part 1: Modulation characteristics and baseband coding*

IEC 62106-2:2021, *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 definition of RDS features*

IEC 62106-4, *Radio data system (RDS) – VHF/FM sound broadcasting in the frequency range from 64,0 MHz to 108,0 MHz – Part 4: Registered code tables*

ETSI EN 300 401, *Radio Broadcasting Systems; Digital Audio Broadcasting (DAB) to mobile, portable and fixed receivers*

ETSI TS 101 756, *Digital Audio Broadcasting (DAB); Registered Tables*

ETSI TS 102 980, *Digital Audio Broadcasting (DAB); Dynamic Label Plus (DL Plus); Application specification*