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Edition 1.0 2021-05

INTERNATIONAL STANDARD

Radio data system (RDS) – VHF/FM sound broadcasting in the frequency range from 64,0 MHz to 108,0 MHz –
Part 9: RBDS – RDS variant used in North America

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

Part 9: RBDS – RDS variant used in North America

FOREWORD

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International Standard IEC 62106-9 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.

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 62106-10, cancels and replaces IEC 62106:2015, and constitutes a technical revision.

IEC 62106-9 cancels and replaces US NRSC-4-B, National Radio Systems Committee – United States RBDS standard, published in 2011.

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

Draft	Report on voting
100/3399/CDV	100/3553/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- withdrawn,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, 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. [1, 2, 3, 4, 5, 6, 7] [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 whike 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, the original document has been restructured as follows:

Part 1: RDS system: Modulation characteristics and baseband coding

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

Part 3: Coding 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.

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

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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 9: RBDS – RDS variant used in North America

1 Scope

This part of IEC 62106 specifies the Radio Broadcast Data System (RBDS), which is an RDS-compatible variant used in countries of North America. RBDS was first standardized by the U.S. National Radio Systems Committee (NRSC) in 1993 and subsequently revised in 1998, 2004, 2005 and 2011[2]. With the publication of this edition of IEC 62106, the RDS and RBDS standards are now harmonized into a single document.

The frequency range of operation (64,0 MHz to 108,0 MHz as indicated by the title of this document) varies according to regional regulatory authority. The U.S. range is 88 MHz to 108 MHz, as set by the U.S. Federal Communications Commission. [8]

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*

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*

3 Terms, definitions and abbreviated terms

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

[2] The NRSC (www.nrscstandards.org) is jointly sponsored by the National Association of Broadcasters (NAB) and the Consumer Technology Association (CTA). Its purpose is to study and make recommendations for technical standards that relate to radio broadcasting and the reception of radio broadcast signals. See www.nrscstandards.org.

3.2 Abbreviated terms

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

CBC Canadian Broadcasting Corporation

NPR National Public Radio (USA)

NRSC National Radio Systems Committee (USA)

RBDS Radio Broadcast Data System

4 Coding of information

4.1 General

The RBDS standard uses the same data modulation as in IEC 62106-1. It also uses the same RDS features and group type coding as in IEC 62106-2. Open Data Applications coding and registration for application identification are specified in IEC 62106-2 and IEC 62106-3, respectively. Any exceptions for RBDS to these specifications are described in 4.2.

4.2 Exceptions

4.2.1 PI coding

The PI code nibbles are composed differently. The methods used are described in Annex A.

4.2.2 PTY coding

The 5-bit PTY codes are defined with a different meaning in RBDS. The code definitions given in Annex B shall be used for RBDS.

4.2.3 PS

For RBDS, there is no prohibition on using PS for displaying sequential information and there is no requirement that PS be static. For RBDS, there are no restrictions on the content or update rate of the PS field.

Annex A
(normative)

PI coding for North America

A.1 General

PI codes in North America are issued and used differently than in the rest of the world. In areas licensed by the U.S. Federal Communications Commission (except Guam), PI codes are calculated by the station's call letters.[3] Stations in Canada and Mexico use PI codes starting with 0xC and 0xF, respectively (except for certain CBC FM stations in Canada as indicated in Table A.2). This gives each station a unique PI code without the need for any outside coordination.

These PI codes do not make use of coverage area codes (IEC 62106-2). Coverage area codes are only valid for PI codes with nibble 1 being "B" or "E". (PI codes with nibble 1 being "D" were repurposed for AM and HD multicast on FM translators in 2017; see Table A.2 through Table A.4). Broadcasters and receiver manufacturers shall take note of this subtle, yet significant, difference of RBDS.

An optional method for forming PI codes is given in Clause A.4, which can be useful for broadcasters that are providing traffic information using RDS.

Because of this optional method, broadcasters should be aware that PI codes cannot be used in receivers for decoding call letters for display. The PS (program service) data field or the RT+ field STATIONNAME.SHORT may be transmitted instead. [7]

A.2 Call letter conversion

A.2.1 Conversion method to be used

1) Assign decimal values to last 3 letters of call letters using values from Table A.1.

Table A.1 – Letter to decimal value conversion

Letter	Decimal value		Letter	Decimal value
A	0		N	13
B	1		O	14
C	2		P	15
D	3		Q	16
E	4		R	17
F	5		S	18
G	6		T	19
H	7		U	20
I	8		V	21
J	9		W	22
K	10		X	23
L	11		Y	24
M	12		Z	25

3 Excluding FM translators, see Clause A.5. Note: some broadcasters may elect to substitute 0x1 for the first nibble of the PI code to support RDS TMC traffic data transmission. See Clause A.4 for additional information.

2) Calculate a weighted decimal value (**call it "<VAL>"**) for the last 3 letters of the call sign, according to each letter's position, and add together to obtain this decimal value (see exception for 3-letter call signs below).

EXAMPLE 1

K	<3rd letter position>	<2nd letter position>	<1st letter position>
W	<3rd letter position>	<2nd letter position>	<1st letter position>

<3rd letter position value> x 676
\+ <2nd letter position value> x 26
\+ <1st letter position value>
decimal value for 3 letters = <VAL>

3) If station call sign begins with K, add <VAL> to (decimal) 4096 and convert the result to hexadecimal (HEX {<VAL> + 4 096}) to obtain four digit PI code. However, if call sign begins with W, add <VAL> to (decimal) 21 672 and convert to hexadecimal (HEX {<VAL> + 21 672}) to obtain four digit PI code.

IF K… HEX{<VAL> + 4 096} = FOUR DIGIT PI CODE

IF W… HEX{<VAL> + 21 672} = FOUR DIGIT PI CODE

Exceptions to above assignments:

a) Call letters that map to PI codes = _ 0 _ _

RDS receivers conforming to the PI coding specified in IEC 62106-2 will treat a PI code that has nibble 2 of zero as a local station (unique broadcast) and will not AF switch. If a station's call letters map to a PI code = _0_ _, the PI code assignment needs to be reassigned into the A _ _ _ group as follows:

P1 0 P3 P4 → A P1 P3 P4

EXAMPLE 2 1045 →A145; 30F2 → A3F2; 80A1 → A8A1; etc.

b) Call letters that map to PI codes = _ _ 0 0

If station's PI code ends with 00, the PI code will be reassigned into the A F _ _ group as follows:

P1 P2 0 0 → A F P1 P2

EXAMPLE 3 1C00 → AF1C; 3200 → AF32; 8C00 → AF8C; etc.

NOTE 1 For 9 special cases – 1000, 2000, .., 9000 – a double mapping occurs, using exceptions 1 and 2: 1000→A100→AFA1; 2000→A200→AFA2; …; 8000→A800→AFA8; 9000→A900→AFA9

c) Two stations carry identical programming

These stations will need to assign the same PI code for both stations. The radio will need an identical PI code match to switch to the alternate frequency. The call letters can still be displayed independently with the PS information.

EXAMPLE 4 If WYAY and WYAI have identical programming, either the mapping of WYAY (PI code = 0x4F78) or WYAI (PI code = 0x4F68) will need to be used.

d) 3-letter-only call letters

For 3-letter call sign stations, a mapping of pre-assigned PI codes is shown in Table A.4, 3-letter only call signs. The mapping of 3-letter-only call letters is reserved in PI codes ranging from 0x9950 to 0x9EFF.

e) Nationally linked radio stations carrying different call letters

These stations will need to be assigned a PI code with a nibble 1 of 0xB (B_01 to B_FF and E_01 to E_FF; note that the "0xD" range of D_01 to D_FF was repurposed in 2017 for AM and HD multicast on FM translators in 2017; see Table A.3).

NOTE 2 Nibble 2 can only be filled with 1 through F. If a 0 is used, some receivers may not switch to alternate frequencies.