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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

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

FOREWORD

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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- withdrawn,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].

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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 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

CT	Clock Time
	NOTE 2 In RDS, Clock Time includes the date.
DI	Decoder Identification
ECC	Extended Country Code
EG	Extended Generic indicator
EON	Enhanced Other Network information
eRT	enhanced RadioText
EWS	Emergency Warning System
	NOTE 3 EWS was used in previous editions of IEC 62106. It can now be an ODA.
FH	Function Header in group type C composed of FID and FN
FID	Function Identifier
FN	Function Number
hex	hexadecimal
IH	In-House application
	NOTE 4 IH was used in previous editions of IEC 62106. It can now be an ODA.
ILS	International Linkage Set indicator
LA	Linkage Actuator
LI	Linkage Indicator
LPS	Long Programme Service name
lsb	least significant bit or least significant byte
LSN	Linkage Set Number
MS	Music Speech switch
	NOTE 5 MS was used in previous editions of IEC 62106. It is now obsolete.
msb	most significant bit or most significant byte
ODA	Open Data Application
ON	Other Network
PI	Programme Identification
PIN	Programme Item Number
	NOTE 6 PIN was used in previous editions of IEC 62106. It is now obsolete.
PS	Programme Service name
PTY	Programme Type
PTYI	Programme Type Indicator
PTYN	Programme Type Name
RFT	RDS2 File Transfer protocol
rfu	reserved for future use
RP	Radio Paging
	NOTE 7 RP was used in previous editions of IEC 62106. It is now obsolete.
RT	RadioText
RT+	RadioText plus
TA	Traffic Announcement

TDC	Transparent Data Channel
	NOTE 8 TDC was used in previous editions of IEC 62106. It can now be an ODA.
TMC	Traffic Message Channel
TN	Tuned Network
TP	Traffic Programme

3.3 Notation and conventions

The notation and conventions given in IEC 62106-1 apply.

4 Message format

4.1 Design principles

The basic design principles underlying the message format and addressing structure are as follows:

a) The original single RDS data-stream (now referred to as data-stream 0) has been supplemented by three new RDS data-streams referred to as data-streams 1, 2 and 3. Data-stream 0 will continue to only carry group types A and B (referred to as legacy data). Data-streams 1, 2 and 3 will only carry a new group type C. Legacy data groups A and B can be carried on data-streams 1, 2 and 3, but first need to be packaged within a type C group, using a mechanism referred to as "tunnelling".

b) The mixture of different kinds of messages within any type A or B group is minimized. For example, one group type is reserved for basic tuning information, another for RadioText, etc. This is important so that broadcasters, who do not wish to transmit messages of certain kinds, are not forced to waste channel capacity by transmitting groups with unused blocks. Instead, they are able to repeat more frequently those group types which contain the messages they want to transmit.

c) Data that has to be acquired quickly for receiver operation and for which a short acquisition time is required, for example Programme Identification (PI), Programme Type (PTY), and Traffic Programme flag (TP) are transmitted frequently and are always transmitted in data-stream 0. In data-stream 0, these features are present in every group and occupy the same fixed positions. They can therefore be decoded without reference to any block outside the one which contains the information.

d) The Programme Service name (PS), a fundamental feature of RDS, is also always transmitted in data-stream 0, using a fixed group type – 0A or 0B for the short form, 15A for the longer (UTF-8, see ISO/IEC 10646) form. By having a fixed group type (i.e. not an ODA), the PS name can be decoded without reference to any other group.

e) For compatibility with existing receivers, other RDS features will continue to use fixed group types and be transmitted in data-stream 0. These include Slow-labelling (1A), Clock-time (4A), RadioText (2A or 2B), PTYN (10A), EON (14A and 14B) and TA status control bursts (15B).

f) The practice of allowing future applications to be defined by using an Open Data Application has been extended, and the data formatting has been made more flexible. In addition to an Open Data Application (see IEC 62106-3) using legacy group types A or B in data-stream 0 (see Table 2), a new group type C Open Data Application has been specified to allow greater data capacity in data-streams 1, 2 and 3.

g) Open Data Applications defined by group types A or B can be carried in any data-stream 0, 1, 2 and 3, although use of data-streams 1 – 3 requires the use of tunnelling.

h) Open Data Applications defined by group type C can only be carried in data-streams 1, 2 and 3. The essential core RDS features (PI, PTY, PS, etc.) will always be transmitted in data-stream 0 in every programme service using group types A or B.

i) The application identification AID which identifies an Open Data Application shall be sent at least once every 5 s.

j) There is no fixed rhythm of repetition of the various types of groups, i.e. there is ample flexibility to interleave the various kinds of messages to suit the needs of the user at any given time and to allow for future developments. However, on data-stream 0, the main RDS features need to use minimum repetition rates specified in Clause 8.

4.2 Group structure

4.2.1 Group type A structure

The group type A structure is illustrated in Figure 1. The main features are the following.

a) The first block in every group always contains a Programme Identification (PI) code.

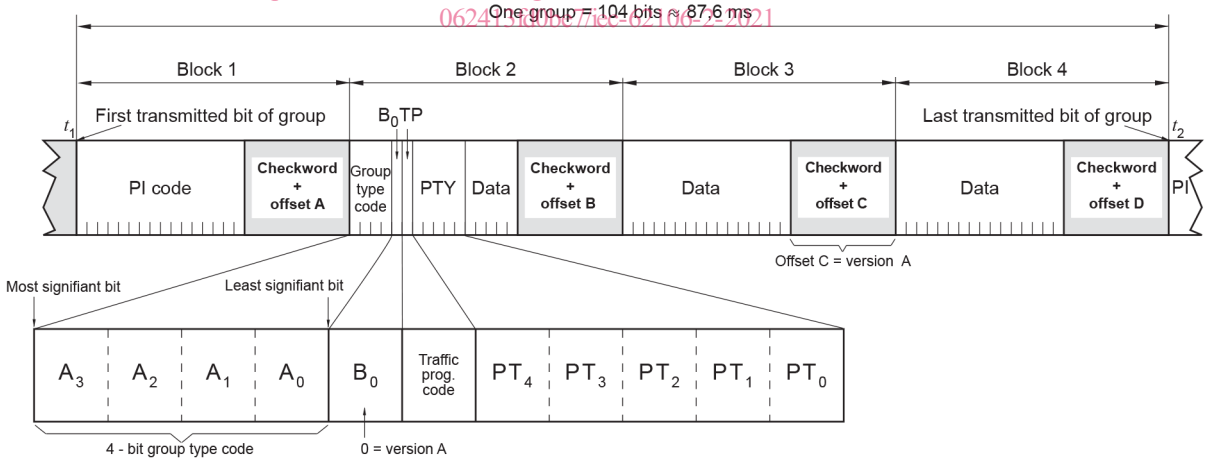
b) The first four bits of the second block of every group are allocated to a 4-bit code which specifies the application of the group. Groups will be referred to as 0 to 15 according to the binary weighting $A_3 = 8$, $A_2 = 4$, $A_1 = 2$, $A_0 = 1$. For each group (0 to 15) two 'versions' can be defined. The 'version' is specified by the fifth bit (B_0) of block 2 as follows:

c) $B_0 = 0$: Defines group type A. The PI code is inserted in block 1 only. This will be called version A, for example group type 0A, 1A, etc.

d) $B_0 = 1$: Defines group type B (see 4.2.2).

e) The Programme Type code (PTY) and Traffic Programme identification (TP) occupy fixed locations in block 2 of every group.

Within the group type A structure, the PI, PTY and TP codes can be decoded without reference to any block outside the one that contains the information. This is essential to minimize acquisition time for these kinds of messages and to retain the advantages of the short (26-bit) block length.



NOTE 1 Block size = 26 bits.

NOTE 2 Checkword + offset 'N' = 10 bit added to provide error protection and block and group synchronization information (see IEC 62106-1).

NOTE 3 $t_1 < t_2$: block 1 of any particular group is transmitted first and block 4 last.

Figure 1 – Group type A structure

Group type A can be used directly in data-stream 0 and has an application data capacity of 37 bits. To use group type A in the upper data-streams 1, 2 and 3, the PI code in block 1 needs to be replaced by 0x0000 to re-define the group as type C utilizing the tunnelling mechanism (see 4.4.1).

4.2.2 Group type B structure

The group type B structure is illustrated in Figure 2. It is similar to the group type A structure with the following differences.

a) The first and third block in every group always contain the Programme Identification (PI) code.

b) The 'version' is specified by bit B_0 of block 2 as follows:

B_0 = 0: Defines group type A (see 4.2.1).

B_0 = 1: Defines group type B.

c) In addition to B_0 = 1 a special offset word (which is called C') is used in block 3 of version B groups. The occurrence of offset C' in block 3 of any group can be used to indicate directly that block 3 is a PI code, without any reference to the value of B_0 in block 2.

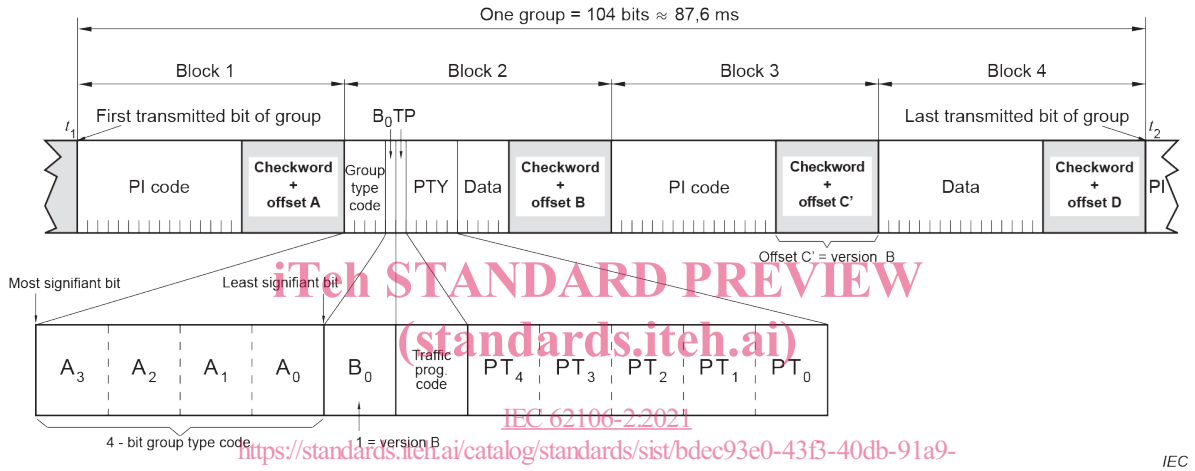
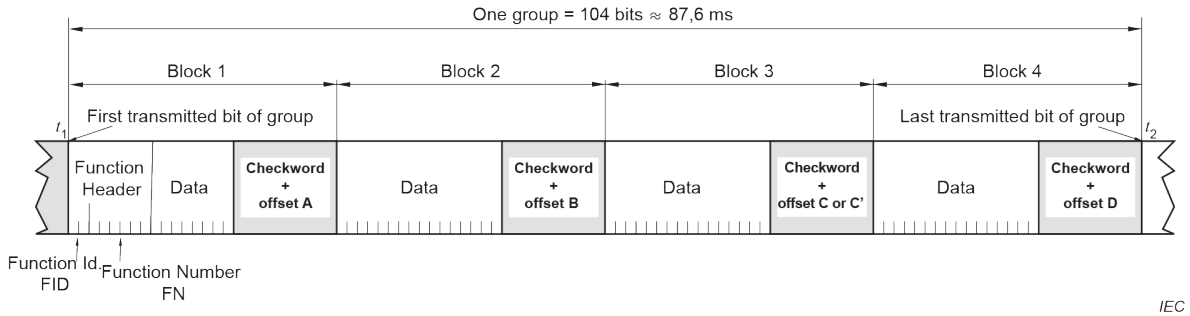


Figure 2 – Group type B structure

The group type B can be used directly in data-stream 0 and has an application data capacity of 21 bits. To use group type B in the upper data-streams 1, 2 and 3, the PI code in block 1 needs to be replaced by 0x0000 to re-define the group as type C utilizing the tunnelling mechanism (see 4.4.1). The PI code in block 3 will be left unchanged.

4.2.3 Group type C structure

The group type C structure is illustrated in Figure 3.



NOTE The Function Header (FH) fully determines the identification of the group.

Figure 3 – Group type C structure