

INTERNATIONAL STANDARD

**Radio data system (RDS) – VHF/FM sound broadcasting in the frequency range from 64,0 MHz to 108,0 MHz –
Part 6: Compilation of technical specifications for Open Data Applications in the public domain**

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CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references	7
3 Terms, definitions, abbreviated terms and conventions	7
3.1 Terms and definitions.....	7
3.2 Abbreviated terms.....	7
3.3 Notation and conventions.....	8
4 ODAs in the public domain	8
4.1 ODAs in the 37-bit ODA application group structure.....	8
4.1.1 Traffic Message Channel (TMC)	8
4.1.2 Other public ODAs.....	8
4.2 ODAs in the group type C structure for the upper data-streams 1, 2 and 3.....	8
Annex A (normative) Coding of RadioText Plus (RT+) tagging information for RadioText in group type 2A/B	9
A.1 General.....	9
A.2 Terms used.....	9
A.3 RT+ tag.....	10
A.4 RT+ information elements and data model.....	11
A.4.1 General	11
A.4.2 List of RT content types.....	11
A.4.3 Structures of RT+ messages.....	12
A.4.4 Receiver data model.....	13
A.5 RT+ coding for RT	15
A.5.1 General	15
A.5.2 RT+ identification (group type 3A)	15
A.5.3 Coding of the RT+ tag	16
A.5.4 Clearing of RT+ messages.....	17
A.6 Broadcasting conventions	20
A.7 Receiving conventions	20
A.8 Marking.....	20
Annex B (normative) Coding of RadioText Plus(RT+) tagging information for RadioText in the eRT ODA of Annex C	21
Annex C (normative) Coding of enhanced RadioText (eRT)	22
C.1 General.....	22
C.2 Coding eRT in ODA groups.....	22
C.2.1 General	22
C.2.2 eRT identification (Group type 3A) and coding of the text string.....	22
C.2.3 Coding of the eRT text string	23
C.2.4 UTF-8 decoding problems when used with RT+	24
C.3 Broadcasting conventions	25
C.4 Receiving conventions	25
C.5 Marking.....	25
Annex D (normative) Coding of AF lists in the frequency range 64,1 MHz to 107,9 MHz: ODA-AF.....	26
D.1 Objective to be achieved.....	26
D.2 Description of the coding process	26

D.2.1	ODA-AF identification (group type 3A)	26
D.2.2	AF coding in the application group	27
D.2.3	AF method A.....	29
D.2.4	AF method B.....	29
D.2.5	Convention for identification of the AF method used	30
Figure A.1	– Example 1: RT+ information of the category 'Item' (see Table A.2) will be attached to the programme elements Item 1 and Item 2	14
Figure A.2	– Example 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	14
Figure A.3	– Example 3: RT+ information of the category 'Item' will be attached only to the programme element Item 1, but not to the programme element Talk	14
Figure A.4	– Bit allocation for group 3A (message bits and AID)	15
Figure A.5	– Coding of the message bits of the application group	16
Figure C.1	– Bit allocation for group 3A (message bits and AID)	23
Figure C.2	– Coding of the message bits of the application group type A	24
Figure D.1	– New ODA-AF – group type 3A	26
Figure D.2	– New ODA-AF application group – group type A.....	27
Table A.1	– RT+ information elements for RT	9
Table A.2	– Code list and 'RT+ class' description of RT content types (1 of 3)	18
Table B.1	– RT+ information elements for eRT.....	21
Table C.1	– eRT information elements	22
Table D.1	– 9-bit AF code table for VHF Band I (64,0 MHz to 88,0 MHz).....	27
Table D.2	– 9-bit AF code table for VHF Band II (87,5 MHz to 108 MHz).....	27
Table D.3	– 9-bit special meanings code table	28
Table D.4	– LF/MF code table – ITU regions 1 and 3 (9 kHz spacing)	28
Table D.5	– MF code table – ITU region 2 (10 kHz spacing).....	28

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**RADIO DATA SYSTEM (RDS) –
VHF/FM SOUND BROADCASTING IN THE FREQUENCY
RANGE FROM 64,0 MHz TO 108,0 MHz –****Part 6: Compilation of technical specifications
for Open Data Applications in the public domain**

FOREWORD

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International Standard IEC 62106-6 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 and IEC 62106-5, 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:

- Provision has been made to carry RDS on multiple data-streams (RDS2);
- New are AF coding below 87,5 MHz (down to 64,0 MHz) using ODA-AID 0x6365;

- RT+ can now be used simultaneously for RT and eRT, each having its own RT+ ODA;
- Data-streams 1, 2 and 3 are exclusively UTF-8 coded. For backwards compatibility, UCS-2 encoded eRT on data-stream 0 is retained.

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

CDV	Report on voting
100/2912/CDV	100/3060/RVC

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

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 "<http://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.

A bilingual version of this publication may be issued at a later date.

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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.

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

The following future parts are planned:

- Part 7: RBDS
- Part 8: 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 IEC 62106:2015 have been deleted.

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

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

1 Scope

This part of IEC 62106 contains the technical specifications for Open Data Applications in the public domain. This document is maintained by the RDS Forum Office. The RDS Forum Office applies an easy procedure for registering new Open Data Applications, to ensure that they can be used without the need to change the RDS standard. The ODA feature permits defining new applications that can be decoded on a receiver. The receiver needs to the adequate software handler for the specific AID, which identifies the application. Receivers that have not implemented the software handler needed for decoding are not affected by ODA data received for any of the applications already defined and specified.

The procedure for registering a new ODA is described in IEC 62106-3.

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 IEC 62106-2 apply.

3.3 Notation and conventions

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

4 ODAs in the public domain

4.1 ODAs in the 37-bit ODA application group structure

4.1.1 Traffic Message Channel (TMC)

This ODA has been standardized in ISO 14819 (all parts).

4.1.2 Other public ODAs

There exist four other public ODAs:

- Annex A: Coding of RadioText Plus (RT+) tagging information for RadioText in group type 2A/B.
- Annex B: Coding of RadioText Plus (RT+) tagging information for enhanced RadioText (eRT).
- Annex C: Coding of enhanced RadioText (eRT) using UTF-8 coding as standardized in ISO/IEC 10646.
- Annex D: Coding of AF lists in the frequency range 64,1 MHz to 107,9 MHz.

4.2 ODAs in the group type C structure for the upper data-streams 1, 2 and 3

Such applications are still under development.

Annex A (normative)

Coding of RadioText Plus (RT+) tagging information for RadioText in group type 2A/B

A.1 General

RT+ is designed to let the listener (or user) take additional benefit from the RadioText (RT) service by enabling receivers to offer direct access to specific elements of RadioText messages (e.g. to the title of the broadcast song transmitted at the same time, to news, to telephone numbers such as those used for voting, to web addresses for browsing web content offered by the radio programme provider, etc.).

These RT+ messages carried in the RadioText messages are identified by their location within the message and by the class code of their RT content type (see Table A.2). Thus, a receiver is able to store the different RT+ messages, and the listener may then select and request a specific content type from the storage at any instant in time that fits the user's needs. The advantage of this method is that a user is no longer forced to watch a lot of information passing by. The listener rather gets the opportunity to select specifically any favourite information to be shown on a static display.

Moreover, RT+ gives the possibility to present selected RT message elements to car drivers on a quasi static display without any major risk of distracting the attention of the driver. Furthermore, RT+ is well suited for mobile phones with built-in RDS FM receivers: telephone numbers may be routed directly from the RadioText to the dialer.

RT+ is based on RT messages and is completely backwards compatible. All additional information necessary for implementing the RT+ service is carried as an Open Data Application in group type 3A and in an associated ODA application group (see Table A.1).

The Application Identification (AID) assigned to RT+ for RT in group type 2A/B is 0x4BD7.

Table A.1 – RT+ information elements for RT

RT+ information elements		
RT message	RT+ identification	RT+ tags
Group type 2A/B (see IEC 62106-2)	AID in group type 3A	ODA application group type A

A.2 Terms used

Category: The 'RT content types' listed in Table A.2 are grouped in categories: Item (information on programme element), Info (general information services), Programme (information on the programme), Interactivity (related information), Descriptors (places and addresses, date, time, etc.) and Private classes (to be defined by individual broadcasters) and reserved codes for future amendments.

Descriptor: a category of 'RT content types' used for describing places and addresses, date and time, specific identifiers, etc.

Length marker: part of the RT+ information element which describes the additional length of the tagged RadioText message. Counted are characters (64 maximum), not bytes. The addresses of the RadioText characters range from 0 to 63.

Programme item: time-slice of a programme, for example a piece of music or a documentary report.

RT+: an extension of the RT RadioText feature, which allows storing and filtering of parts of the RadioText messages in the receiver terminal as RT+ objects that then can be displayed, selected and accessed by the listener, also independently from the transmitted RadioText messages sent at the same time.

'RT content type': the content of an RT+ message is characterized by an RT+ class code, listed in Table A.2. Sixty-four different codes exist in this table.

RT+ information elements: these are all RT+ elements for any given RT+ message, i.e. the RT+ element defined for group 3A, the RT+ ODA application group elements and the corresponding tagged RadioText elements (RT).

RT+ message: the basic information entity that is sent by the broadcaster to the listener. The listener can select the RT+ messages by their content type.

RT+ content: the RT+ content consists of one or two tagged RadioText elements (RT in group type 2A/B).

RadioText: feature of RDS for providing a programme with text messages.

RadioText message: Text messages that are associated with a programme. One single RT message is not likely to be sufficient for complete comprehension by the user.

Start marker: Part of the RT+ information element which describes the start position (number found by counting the text character positions within a text string) of the respective tagged RadioText message element (RT).

A.3 RT+ tag

When a RadioText message like "You are listening to 'House of the rising sun' by Eric Burdon" is sent out, the RT+ information elements 'Title' and 'Artist' are marked by two RT+ tags.

An RT+ tag consists of three elements:

- a) RT content type;
- b) start marker pointing to the position (inside the RT) of the first character of that RT+ message;
- c) length marker indicating the additional length (in addition to the character at the start position) of that RT+ message.

The 'RT content type' is taken from a list with 64 entries (see Table A.2).

For the example given below the two tags are as follows:

RT content type	ITEM.TITLE
Start marker	22
Length marker	22

RT content type	ITEM.ARTIST
Start marker	50
Length marker	10

Start marker and length marker can be derived from the following scheme below:

```
You are listening to 'House of the rising sun' by Eric Burdon
0----0----1----1----2----2----3----3----4----4----5----5----6----
0----5----0----5----0----5----0----5----0----5----0----5----0----
```

The addresses of the RadioText characters range from 0 to 63, so the start marker can take the same values.

The length marker is ranging from 0 to 63 and from 0 to 31 respectively (see A.5.3).

If two RT+ messages are contained in the RadioText, they shall not overlap.

The tag information sent out should not change during the lifetime of the associated RadioText.

A.4 RT+ information elements and data model

A.4.1 General

The content of RT+ messages is carried in the RadioText (RT) messages. Their content is described by RT content type code (see Table A.2) in each RT+ tag.

A.4.2 List of RT content types

The list of defined RT content type codes, grouped in categories, is given in Table A.2. There are 64 RT+ classes of content type available, which a programme service provider can offer and the listener can select from, each with a specific RT+ class. The classes can be grouped into the following categories.

a) Item

The programme is made up of a sequence of programme items (see NOTE), corresponding to an entry in a programme schedule. A programme item may consist again of several programme elements. For all programme elements which can be designated by RT+ classes of the category "Item" in Table A.2, this document uses the term "Item". In popular music programmes an item is a song, in a programme with classical music it may be a complete symphony. A speech based programme item may also be assembled from different items (see the NOTE below). Programme elements like News and Talk as shown in Figure A.2 and Figure A.3 are not "Items", as there do not exist any appropriate RT+ classes of the category "Item" in Table A.2. A programme item can be described by one, several or even all classes of this category, but for the duration of the "Item", the associated RT+ message of each class can only have a single value, for example the RT+ message classified as "Item". "Title" will remain fixed to "House of the rising sun" until the start of the next song.

NOTE A programme item can consist of only one element (e.g. radio drama) and can also be designated by RT+ classes of the category "Item" in Table A.2.

b) Info

RT+ messages of this category carry textual service information that is more or less unrelated to the audio service, but is offering important additional information to the listener, including info about alarms, advertisements and events.

c) Programme

RT content types of this category describe the programme service.

d) Interactivity

Telephone numbers, Short Message text SMS used for mobile phone services addressed with SMS numbers, e-mail addresses or web addresses (URLs) are given. The listener may send contributions for chat conversations to a chat centre. These contributions may be broadcast by the radio station. Questions for voting may be sent as RT+ content. The listener may send a response back to the voting centre.

e) Private classes

While all other RT+ classes describe precisely the RT content type, also to permit their interpretation by automatic routines within the receiver terminal or by a human user, the Private classes can be freely defined just as required for a specific programme service provider. The interpretation is then dependent on the programme service and does require a template on the receiver terminal. Alternatively, a program provider may supply his customers with special receivers, where the facilities to interpret own Private classes are already built-in. In this particular case, no template is required.

f) Descriptors

An RT+ message belonging to one of the categories above can be complemented by an information element of the category Descriptor. Both shall always be transmitted in the same RadioText just as the corresponding tags in the same application group. As an example: the Descriptor GET_DATA contains the URL-address or the SMS number for retrieving more data describing the RT+ message the Descriptor is referring to. The listener can then get access to more information for the music item, special news, events, etc.

A.4.3 Structures of RT+ messages

For some classes, RT+ messages may be structured by the programme service provider following a general pattern, for example results of football matches may be given as RT content type INFO.SPORT with two parts, one indicating the match and the other the result.

"Bayern München:AC Milano 5:5"

This specification generalizes the scheme given above as follows:

The two different parts are separated by two or more consecutive space characters (see NOTE), that are redundant spaces. The redundant spaces serve as a delimiter between these two parts. The first part is called the key word and will be used primarily for explanation of the text which follows.

NOTE In the examples given in this text, a space character is represented by the symbol "␣".

The key word carries an explanation for the user, whereas the second part may also carry a phone number, the SMS- or MMS-telephone number or the email address to be contacted.

This scheme permits an advanced receiver to accumulate all information (carried in the sequence of RT+ messages of the same RT content type) and then to build one table for presentation to the user.

This scheme may be used for the categories 'Info', 'Programme' and 'Interactivity', and shall not be used for the categories 'Item' and 'Descriptor' for the specific RT+ classes, identified in Table A.2 with footnote d.

For explanation, the following examples are given for different classes, first lines indicating the structure, and then a line giving a specific example:

- INFO.STOCKMARKET
[Name__Latest value in €] or more extended:
[Name__Latest value in €__Change__High__Low__Volume] e.g.
'Nokia__12,27__0,41__12,31__12,15__23 332 238'
- INFO.SPORT
[Match__Result] or more extended:
[Kind of Sport__Match__Result] e.g.
'Football__Bayern München:AC Milano__5:5'
- INFO.WEATHER
[Description__Temperature] e.g.
'Raining__16 degrees C°' or
'Munich__23 degrees C°'
- Interactivity
- PHONE.OTHER
[Description__Phone Number] e.g.
'Deutsches Museum__089323990'

If it makes sense, elements may be omitted from the right in a given structure

(e.g. INFO.STOCKMARKET: 'Nokia__12,27__0,41__12,31__12,15')

Alternatively, the description of the classes PHONE.OTHER, SMS.OTHER, EMAIL.OTHER and MMS.OTHER may be put into tag 1 and the second part, i.e. the phone number or the address, will be put into tag 2. This then gives the text editor more freedom to introduce some additional glue words in the RadioText message.

EXAMPLE 'The match Bayern München:AC Milano ended 5:5'

RadioText messages may contain several space characters for optimizing the layout in static displays. However, if the RT messages are used in context with an RT+ service, redundant spaces in parts marked by RT+, are only allowed for the purpose of delimiting two or more parts of the RT+ content.

A.4.4 Receiver data model

The RT+ feature is designed to allow a broad range of receiver models with different display capabilities and memory complexity to be used. The broadcaster may provide special radio skins (templates) for presenting RT+ information on the receiver display. Each programme provider may deposit various templates for different programme types on a web server (to be defined). This web server can be addressed by the receiver for downloading a particular template (see also A.5.2). This requires the receiver to be able to download actively external data (pull information by unicast, for example to download templates using a telephone connection).

A simple receiver will store a small selection of RT+ classes only. The storage will contain only the current content of the 'RT+ classes'. The storage of a given class will be overwritten by a new version of that same class. The receiver may offer a choice to the listener to enable

a selection of any particular 'RT+ class' to be presented on the display. For example, a listener may want to see one or several 'RT+ classes' of the category 'Item' simultaneously, i.e. 'Title' and 'Artist' of the 'Item' received at that moment.

More complex receivers will store not only the current content of several classes, but will use a memory to keep the information collected during the past. For reviewing the list of earlier received 'Items', it is essential for the receiver that it can combine the different RT+ information elements (received at different times) correctly, so that elements of different 'Items' are not mixed. For that purpose, an 'Item toggle bit' changes every time a new 'Item' starts and the 'Item running bit' indicates whether the 'Item' is still running. Both bits are sent continuously together with every pair of the RT+ tags.

The examples in Figure A.1, Figure A.2 and Figure A.3 show the setting of the 'Item toggle bit' and the 'Item running bit' for different audio sequences.

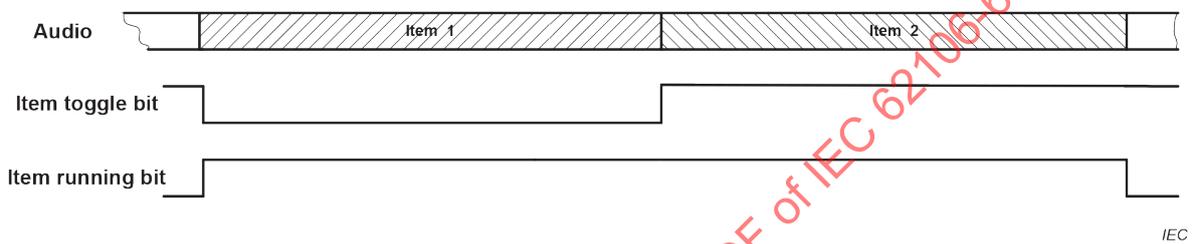


Figure A.1 – Example 1: RT+ information of the category 'Item' (see Table A.2) will be attached to the programme elements Item 1 and Item 2



Figure A.2 – Example 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

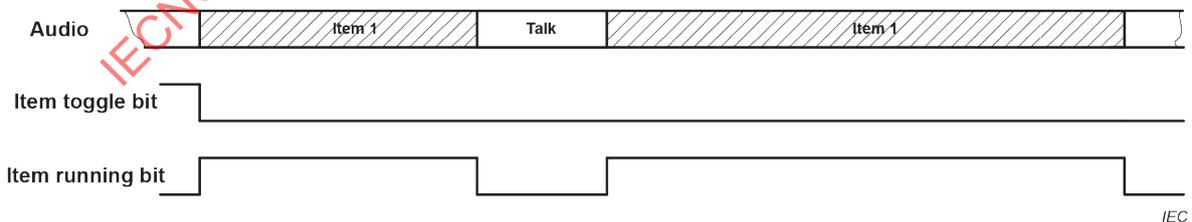


Figure A.3 – Example 3: RT+ information of the category 'Item' will be attached only to the programme element Item 1, but not to the programme element Talk

Receivers can provide more convenience by assembling an ordered cumulative list of all RT+ content of a specific class. For example, the class INFO.SPORT may be displayed as a list of the football match results. This is easy to implement for those classes of the category 'Info' that use redundant space characters as a delimiter between several parts of the text. The first part, the keyword, can then be used to establish a table which is ordered according to the keywords. Updating is also possible, if the keyword is not changed.

NOTE 1 The broadcaster can set the 'Item toggle bit' and the 'Item running bit' as required.

NOTE 2 The default setting for both the 'Item toggle bit' and the 'Item running bit' is '0'.

A.5 RT+ coding for RT

A.5.1 General

To transmit the RT+ tags, the ODA feature is used and the necessary details are defined by A.5.2 to A.5.4.

The message bits of group type 3A in block 3 carry control data for the application AID 0x4BD7 in block 4. The tag information, to identify the RT+ messages within the RadioText, is carried by the RT+ ODA application group, signalled in block 2 of the 3A group. Only type A groups can be used for the application group.

A.5.2 RT+ identification (group type 3A)

The coding of the message bits in group type 3A and the Application Identification (AID) for the ODA RT+ is shown in Figure A.4.

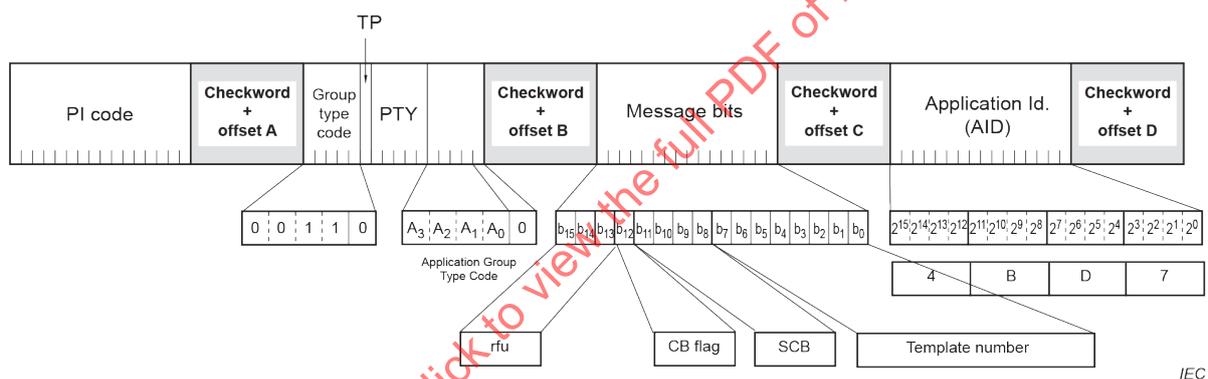


Figure A.4 – Bit allocation for group 3A (message bits and AID)

Application group type code:

- The group type for transmitting the RT+ application data can be chosen from IEC 62106-3.
- The group type code is signalled in block 2 of the 3A group.

The meaning of the message bits of group type 3A is as follows:

a) rfu

Reserved for future use, and not affecting any of the functions of the other bits. The rfu bits shall be set to zero until they are defined.

b) CB flag

The CB flag gives the information, if there is a template available for the ongoing programme. The template may already be present in the receiver (downloaded previously) or can be downloaded at that moment, if the user wants it. The identification of the desired template is accomplished by sending back from the receiver terminal to the web server the PI code and the Extended Country Code (ECC), the 'Server Control Bits' and the 'Template number'.

If the CB flag is set to '0', no special radio skin (template) is available and 'Server Control Bits' and 'Template number' bits are reserved for future use.

If the CB flag is set to '1', a special radio skin (template) is available for the ongoing transmission.

c) Server Control Bits (SCB)

It may occur, that the same PI code is used repeatedly within a national area (e.g. for local programme stations far away from each other). In these cases, the Server Control Bits are used to distinguish between programmes using the same PI code.

NOTE The Server Control Bits are allocated by the operator of the web server.

d) Template number

The Template number gives the number of a specific template, from a choice of templates provided by the broadcaster. Up to 256 templates per programme service can be addressed.

A.5.3 Coding of the RT+ tag

The coding of the message bits of the application group is shown in Figure A.5.

In the message bits of the RT+ application group two RT+ tags are conveyed. All 'RT+ classes' or 'RT content types' can be put into the one or the other tag of the application group. If an RT+ message contains more than 32 characters, the associated tag information shall be coded in tag 1. Content types of the category 'Descriptor' are always referring to the content type in the other tag (in the same application group) and this gives additional information.

The start addresses in the tags may be chosen according to the needs during the RT generation. Therefore, the sequence of the tags in the application group does not determine the sequence of the information elements in the RT.

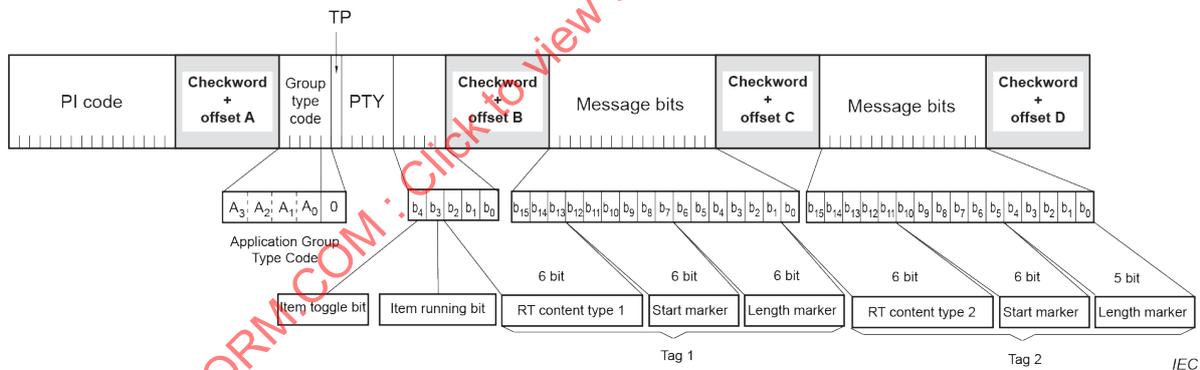


Figure A.5 – Coding of the message bits of the application group

The meaning of the message bits is as follows:

a) 'Item toggle bit'

This bit shall be toggled when a new 'Item' starts.

NOTE 1 Item means a specific programme element (see also A.4.2 and Table A.2).

b) 'Item running bit'

This bit shall be set to 1 if an 'Item' is running. Otherwise, it shall be set to 0.

NOTE 2 The 'Item toggle bit' and the 'Item running bit' will be set or reset independently from the tag information sent out at the same time.

NOTE 3 In the receiver, these two bits can be used to group all 'RT/eRT content types' of the category 'Item' sent for one item and store them in memory (subsequently for several items) or, when storing and presenting information for only one item, to delete all information belonging to the elapsed item before starting to gather information for the new one.

NOTE 4 Even though not intended by this document, these bits can be used for recording purposes.

c) 'RTcontent type'

This 6-bit value specifies the tags by assigning to them a content type according to the 'RT+ class' codes given in Table A.2. If only one RT+ information element (tag) is used, then the content type in the second tag shall be set to 'Dummy'. If no RT+ information element is existing, the content type in both tags shall be set to 'Dummy'. In both cases, the bits in the start and length markers are then undefined.

d) Start marker

This 6-bit value indicates the position of the first character of the RT+ message within the RadioText (start marker 0 means the first character in the RadioText).

e) Length marker

This 6-bit (or 5-bit for length marker in tag 2) value gives the additional length (number of characters following the first character at the start position) of the RT+ message.

As it is not permitted that RT+ messages overlap, only one element may comprise more than 32 characters and 5 bits are then sufficient for coding the length marker in tag 2. Flipping of the two tags is permitted if the second RT+ information element exceeds 32 characters but the first is under 32.

A.5.4 Clearing of RT+ messages

There is no specific clear command. Clearing will be done by overwriting the content of a 'RT+ class' with one or more space(s) taken as RT+ messages out of the current RadioText. This assumes that the RadioText in transmission contains at least one space character and at least one tag is unused and available to address the class to be cleared.

EXAMPLE

Hotline: 0123456677

```
0---0---1---1---2---2---3---3---4---4---5---5---6---
0---5---0---5---0---5---0---5---0---5---0---5---0---
```

'RT content type'	PHONE.HOTLINE
Start marker	9
Length marker	9

'RT content type'	INFO.NEWS
Start marker	8
Length marker	0

The second tag information (transmitted simultaneously with the RadioText 'Hotline: 0123456677') will cause the previously sent message of the class INFO.NEWS to be deleted.

If a class of the category 'Item' is cleared, all classes of category 'Item' shall be cleared.

Table A.2 – Code list and 'RT+ class' description of RT content types (1 of 3)

Category	Code ^a	RT+ class	Description
Dummy	0	DUMMY_CLASS	To assign a class if the RadioText contains no RT+ information
Item	1	ITEM.TITLE ^b	Title of item, for example, track title of an album
	2	ITEM.ALBUM ^b	The collection name to which this track belongs
	3	ITEM.TRACKNUMBER ^b	The track number of the item on the album on which it was originally released
	4	ITEM.ARTIST ^b	A person or band/collective generally considered responsible for the work
	5	ITEM.COMPOSITION ^b	A complete composition (classical music broadcasters should use this item to identify the composition)
	6	ITEM.MOVEMENT ^b	A movement is a large division of a composition or musical form (classical music broadcasters should use this item to identify the movement)
	7	ITEM.CONDUCTOR ^b	The artist(s) who performed the work. In classical music, this would be the conductor
	8	ITEM.COMPOSER ^b	Name of the original composer/author
	9	ITEM.BAND ^b	Band/orchestra/accompaniment/musician
	10	ITEM.COMMENT ^b	Any comment related to the content
	11	ITEM.GENRE ^b	The main genre of the audio, for example 'classical', 'hip-hop', 'jazz', 'oldies', 'drama', etc.
Info	12	INFO.NEWS	Message/headline
	13	INFO.NEWS.LOCAL	Local news
	14	INFO.STOCKMARKET ^d	Quote information; either as one part or as several distinct parts: 'name latest value __change high __low __volume' ^c
	15	INFO.SPORT ^d	Result of a game; either as one part or as several distinct parts: 'match __result', for example 'Bayern München: Borussia __5:5'
	16	INFO.LOTTERY ^d	Raffle/lottery: 'key word __values'
	17	INFO.HOROSCOPE ^d	Horoscope; either as one part or as two distinct parts: 'key word __text', for example 'sign of the zodiac __blablaba'
	18	INFO.DAILY_DIVERSION	Daily tip/diversion/joke
	19	INFO.HEALTH ^d	Information about health: 'key word __info'
	20	INFO.EVENT	Information about an event
	21	INFO.SCENE	Information about scene (hot locations to be, ...)
	22	INFO.CINEMA	Information about movies in cinema
	23	INFO.TV	Information about TV-movies
	24	INFO.DATE_TIME	Information about date and time (receiver to choose between date and time). Not CT (Clock Time); shall not be used to set the internal clock of a device
	25	INFO.WEATHER ^d	Information about weather; either as one part or as two distinct parts: 'key word __info', e.g. 'Rain __17 °C'
	26	INFO.TRAFFIC	Information about traffic. This shall not replace TMC, but rather alert users in case of exceptional traffic news
	27	INFO.ALARM	Alarm information

Table A.2 (2 of 3)

Category	Code ^a	RT+ class	Description
Info	28	INFO.ADVVERTISEMENT	Info about an advertisement. May be in parallel to an audio advertisement
	29	INFO.URL ^d	Link to URL either as one part or as two distinct parts: 'key word _url'
	30	INFO.OTHER ^d	Other information, not especially specified: 'key word _info'
Pro-gramme	31	STATIONNAME.SHORT	Name describing the radio station (call letters)
	32	STATIONNAME.LONG	Name describing the radio station
	33	PROGRAMME.NOW	EPG info programme now
	34	PROGRAMME.NEXT	EPG info programme next
	35	PROGRAMME.PART	Part of the radio show being broadcast; for example one or more parts of the PROGRAMME.NOW
	36	PROGRAMME.HOST	Name of the host of the radio show
	37	PROGRAMME.EDITORIAL_STAFF	Name of the editorial staff; for example name of editorial journalist
	38	PROGRAMME.FREQUENCY ^d	Information about radio shows. A link towards another frequency with other content (not AF list). May be one part or two distinct parts: 'key word _frequency'
	39	PROGRAMME.HOMEPAGE ^b	Link to radio station homepage
	40	PROGRAMME.SUBCHANNEL ^d	For so-called multicasting applications; may be one part or two distinct parts: 'key word _sub-channel'
Inter-activity	41	PHONE.HOTLINE	The telephone number of the radio station's hotline
	42	PHONE.STUDIO	The telephone number of the radio station's studio
	43	PHONE.OTHER ^d	Name and telephone number; either as one part or as two distinct parts: 'key word _phone number'
	44	SMS.STUDIO	The telephone number of the radio station's studio (to send directly an SMS to the studio)
	45	SMS.OTHER ^d	Name and SMS number; either as one part or as two distinct parts: 'key word _sms number'
	46	EMAIL.HOTLINE	The email address of the radio station's hotline
	47	EMAIL.STUDIO	The email address of the radio station's studio
	48	EMAIL.OTHER ^d	Name and email address; either as one part or as two distinct parts: 'key word _email address'
	49	MMS.OTHER ^d	Name and MMS number; either as one part or as two distinct parts: 'key word _mms number'
	50	CHAT	chat content: sent by users to a specific address and broadcast by the radio station
	51	CHAT.CENTRE	Address, where replies to the chat shall be sent (may be URL or SMS)
	52	VOTE.QUESTION	A question (typically binary) which can be answered by 'yes' or 'no' or '1' or '2'
	53	VOTE.CENTRE	URL or SMS number to send the answer to

Table A.2 (3 of 3)

Category	Code ^a	RT+ class	Description
rfu	54		Class reserved for future use
	55		Class reserved for future use
Private classes ^e	56		
	57		
	58		
Descriptor ^f	59	PLACE	Adds info about a location
	60	APPOINTMENT	Adds info about date and time
	61	IDENTIFIER ^b	For music it is the International Standard Recording Code (http://www.ifpi.org/isrc/)
	62	PURCHASE ^b	Address where item can be purchased, can be a URL or an SMS number
	63	GET_DATA	Retrieves either via an SMS or URL-link more data about the other RT+ message of the same RadioText message. (Info request via point to point, or unicast)

^a This is the code to be used for 'RT content type' (see A.5.3); the decimal code shall be converted to the corresponding binary code.

^b For this RT+ class, a corresponding MP3 ID3v2 tag exists.

^c _ = space; two or more consecutive spaces act as a separator between several parts of the RT+ message (see A.4.3).

^d For this RT+ class the RT+ message may be structured as described in A.4.3.

^e 'Private classes' may be defined by the service provider (see A.4.2).

^f Descriptor will always define the other RT+ message of the same RadioText message.

A.6 Broadcasting conventions

When RT+ information is generally available, 3A type groups shall be transmitted at least every 10 s. During the lifetime of a RadioText RT/eRT containing RT+ messages, application groups carrying the tags shall be sent with a minimum frequency of 0,5 groups per second. The tag information sent out shall not change during the period of the associated RadioText ('Item toggle bit' and 'Item running bit' may change).

The RT A/B flag shall be toggled when the RadioText changes. The RT+ tag information for the application group shall be sent to the RDS encoder immediately after the new RadioText.

A.7 Receiving conventions

When the receiver detects a change in the RadioText A/B flag (indicating a new message) RadioText decoding and decoding of RT+ tags may start simultaneously and RT+ information elements may be displayed or stored, once the corresponding part of the RT RadioText is received completely error-free.

The different 'RT+ classes' may be stored and then be displayed automatically or when the user retrieves a certain 'RT content type'. For certain content types it may make sense to save more than the current or the last information in the memory (e.g. a list of the 'Titles' belonging to the last 10 'Items').

Depending on the reception conditions, it may be necessary to evaluate the tag information of a few application groups before decoding RT+ information.

A.8 Marking

Equipment implementing RadioText Plus should be marked with the designation 'RT+'.

Annex B (normative)

Coding of RadioText Plus(RT+) tagging information for RadioText in the eRT ODA of Annex C

Table B.1 shows the RT+ information elements for enhanced RadioText (eRT).

The assigned Application Identification (AID) is 0x4BD8.

Table B.1 – RT+ information elements for eRT

RT+ information elements		
eRT message	RT+ identification	RT+ tags
ODA application group for eRT (see Annex C)	AID in group type 3A	ODA application group type A

The coding of the RT+ information is the same as specified for RT in Annex A. Only the AID is different, which permits to have on the same transmission RT messages with RT+ and eRT messages with RT+.

The simultaneous transmission of RT and eRT is possible with RDS2 using the upper streams. If RDS2 is used, eRT can be on the upper streams 1-3 and RT can be at the same time on stream 0.

NOTE When eRT uses RT+ tagging, the eRT message length is limited to 64 characters, given the limitation imposed by RT+ coding as explained in Annex A. The corresponding length of the byte string depends on the characters used for a given language. It cannot exceed 128 bytes, which is the limit of eRT coding. Because of this limitation, even 64 characters cannot always be achieved as the maximum.

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Annex C (normative)

Coding of enhanced RadioText (eRT)

C.1 General

Since eRT is an Open Data Application (ODA), it is completely backwards compatible. All information necessary for implementing the eRT service is carried as an Open Data Application in group type 3A and in an associated ODA application group (see Table C.1).

The ODA Application Identification (AID) assigned to eRT is 0x6552.

Table C.1 – eRT information elements

eRT information elements		
eRT message	eRT identification	Optional RT+ tags
ODA application group type A for eRT	Group type 3A	See Annex B

eRT is a RadioText (128 bytes maximum) alternative to RT in group type 2 A/B that may be used wherever the basic RDS character set defined in IEC 62106-4 is insufficient.

The eRT application group (see Figure C.2) differs only slightly from RT group type 2A/B. The difference is that the text A/B flag bit in block 2 of group 2A/B has in eRT become part of the segment counter, so that in eRT 32 segments instead of 16 in RT become possible.

C.2 Coding eRT in ODA groups

C.2.1 General

To transmit the eRT, the necessary details are defined by Clause C.2.

The message bits of group type 3A carry control data for the application. The RadioText information is carried by the eRT ODA application group. Only type A groups can be used.

C.2.2 eRT identification (Group type 3A) and coding of the text string

The coding of the message bits in group type 3A and the Application Identification (AID) for the ODA eRT is shown in Figure C.1.

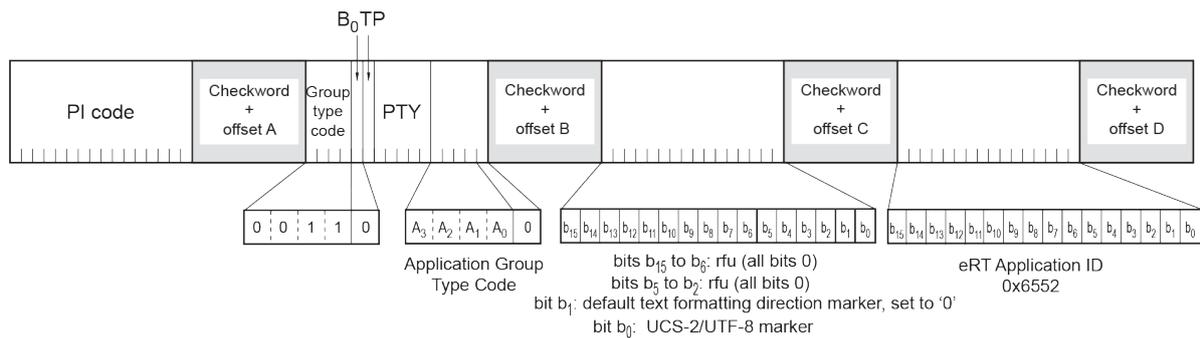


Figure C.1 – Bit allocation for group 3A (message bits and AID)

Application group type code:

- The group type for transmitting the eRT application data can be chosen as specified in IEC 62106-3.
- The group type code is signalled in block 2 of the 3A group.

The meaning of the message bits in block 3 of group type 3A is as follows.

- Marker for UCS-2 /UTF-8 coding (bit b_0):
Set to '0' – On data-stream 0 for UCS-2 encoding or '1' for UTF-8 encoding reasons of backwards compatibility.
Set to '1' – On data-streams 1, 2 and 3 where only UTF-8 encoding shall be used.
- Marker for text formatting direction (bit b_1):
Set to '0', which means transmission of the byte string is always from left to right.
- Bits b_2 to b_5 are all set to '0' for the reason of backwards compatibility with the earlier eRT specification (rfu).
- rfu – bits b_6 to b_{15} are all set to '0'.

C.2.3 Coding of the eRT text string

NOTE For details of UTF-8 (UCS Transformation Format 8), see ISO/IEC 10646.

Figure C.2 shows the coding of message bits of the application group.

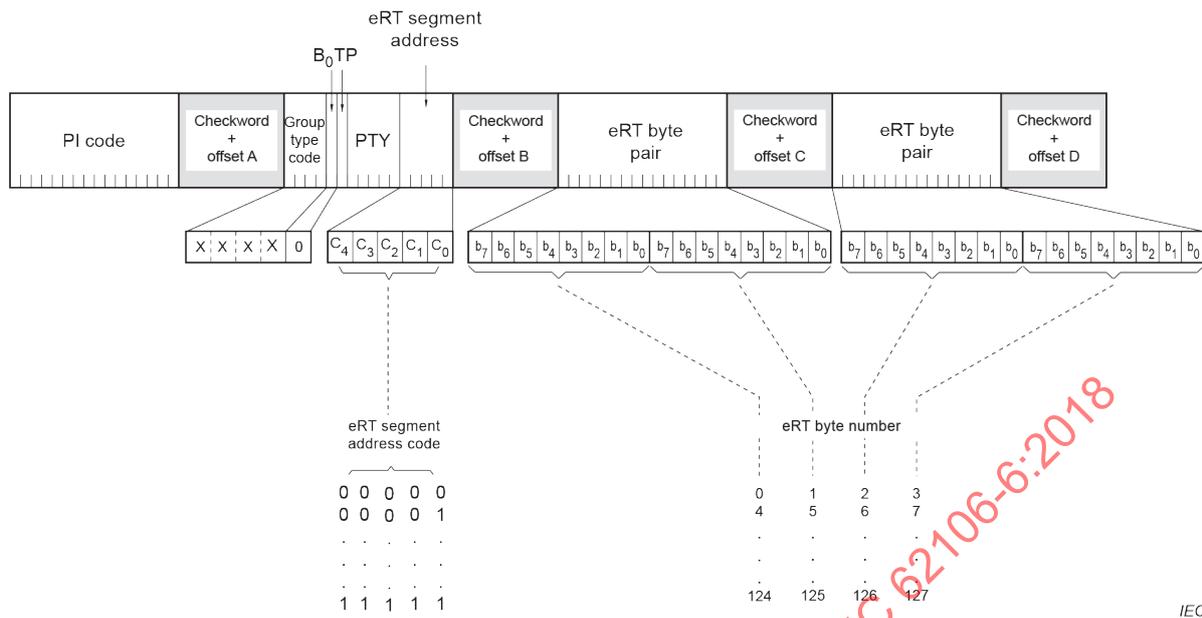


Figure C.2 – Coding of the message bits of the application group type A

If RT+ (see Annex B) is used with eRT text strings, the RT+ information elements shall be derived from the character string, i.e. for the 'Start Marker' and the 'Length Marker' determination of any of the two RT+ tags, the eRT text string in terms of the number of characters within that string shall be evaluated, disregarding the fact that the string is transmitted as a string of UCS-2 or UTF-8 coded characters. The maximum number of characters permitted, if used with RT+, is 64. Without using the RT+ feature, a theoretical maximum message length of 128 characters is possible on the upper data-streams 1,2 and 3, UTF-8 coded and provided they all occupy only one byte per character.

The 5-bit segment address defines the current byte number within the eRT text string, in terms of four bytes each, contained in the third and fourth blocks. The text string increases from left to right and the most significant byte is transmitted first.

A new text shall start with the segment address '00000' segment and there shall be no gaps up to the highest used segment address of the current message. The number of text segments is determined by the length of the message, and each message shall be ended by the control character 'carriage return' 0x0D, if the current message requires less than 128 bytes. The bytes left unused in the same segment address shall also be filled with 0x0D.

To ensure a RadioText message that is no longer valid is cleared from the display, the broadcaster should send a blank message only containing a 0x0D control character. The bytes left unused in the same segment address shall also be filled with 0x0D.

C.2.4 UTF-8 decoding problems when used with RT+

UTF-8 encoding has become very attractive and it is widely used on the Internet. However, in RDS this kind of encoding, attractive as it appears to be on the first look, can create some text decoding problems, specifically if used with RT+. This is due to the fact that the number of bytes needed for a symbol with UTF-8 encoding will vary between one, two or more, and then, when RDS reception is not optimal, gaps in a received text byte string are very likely, as symbols may be spread over two or more different blocks of the eRT application group. Although the UTF-8 decoder can normally recognize the number of bytes belonging to any given symbol, there is a problem with several non-received consecutive bytes, as then it is not possible to detect how many characters such a gap had represented exactly. Spaces can be substituted for what has been missed, but the exact character positions of the respective RT+ tags can then no longer be determined.

Therefore, UTF-8 decoding will only work correctly when RDS receiving conditions are generally good.

C.3 Broadcasting conventions

When eRT RadioText is available, 3A type groups shall be transmitted at least every 10 s. During the lifetime of eRT RadioText messages, the application groups for eRT shall be sent with a minimum frequency of four groups per second.

The same enhanced RadioText messages should be transmitted at least three times to improve reception reliability.

The transmission capacity of RDS is not sufficient to use normally RT and eRT at the same time on stream 0, i.e. it shall be either one or the other RadioText mode. If RDS2 is used, eRT can be on the upper streams 1, 2 and 3 and RT can be at the same time on stream 0.

C.4 Receiving conventions

A space shall be substituted by the receiver for any unrecognized symbol or control character.

C.5 Marking

Equipment implementing eRT RadioText should be marked with the designation 'eRT'.

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