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Technical Specification

Digital Audio Broadcasting (DAB);
Dynamic Label Plus (DL Plus);
Application specification

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Foreword

This Technical Specification (TS) has been produced by Joint Technical Committee (JTC) Broadcast of the European Broadcasting Union (EBU), Comité Européen de Normalisation ELECtrotechnique (CENELEC) and the European Telecommunications Standards Institute (ETSI).

NOTE 1: The EBU/ETSI JTC Broadcast was established in 1990 to co-ordinate the drafting of standards in the specific field of broadcasting and related fields. Since 1995 the JTC Broadcast became a tripartite body by including in the Memorandum of Understanding also CENELEC, which is responsible for the standardization of radio and television receivers. The EBU is a professional association of broadcasting organizations whose work includes the co-ordination of its members' activities in the technical, legal, programme-making and programme-exchange domains. The EBU has active members in about 60 countries in the European broadcasting area; its headquarters is in Geneva.

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The Eureka Project 147 was established in 1987, with funding from the European Commission, to develop a system for the broadcasting of audio and data to fixed, portable or mobile receivers. Their work resulted in the publication of European Standard, EN 300 401 [1], for DAB (see note 2) which now has worldwide acceptance. The members of the Eureka Project 147 are drawn from broadcasting organizations and telecommunication providers together with companies from the professional and consumer electronics industry.

NOTE 2: DAB is a registered trademark owned by one of the Eureka Project 147 partners.

1 Scope

The present document defines a backward compatible extension of the Dynamic Label feature used in Eureka-147 Digital Audio Broadcasting (DAB) (EN 300 401 [1]).

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:

  - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;

  - for informative references.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

For online referenced documents, information sufficient to identify and locate the source shall be provided. Preferably, the primary source of the referenced document should be cited, in order to ensure traceability. Furthermore, the reference should, as far as possible, remain valid for the expected life of the document. The reference shall include the method of access to the referenced document and the full network address, with the same punctuation and use of upper case and lower case letters.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

[1] ETSI EN 300 401: "Radio Broadcasting Systems; Digital Audio Broadcasting (DAB) to mobile, portable and fixed receivers".

[2] IEC 62106: "Specification of the radio data system (RDS) for VHF/FM sound broadcasting in the frequency range from 87,5 to 108,0 MHz".

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Not applicable.

3   Definitions and abbreviations

3.1   Definitions

For the purposes of the present document, the terms and definitions given in EN 300 401 [1] and the following apply:

category: content types characterizing DL Plus objects are grouped in categories

content type: DL Plus objects are characterized by their content types and so can be selected by the listener if offered so by the receiver

Dynamic Label (DL): feature of DAB for providing a programme with text messages; it also provides commands, e.g. for presentation on the receiver terminal

Dynamic Label (DL) message: text messages that are associated with a programme service and are transmitted in the PAD part of that programme

   NOTE: One single DL message should be sufficient for complete comprehension by a (human) listener.

Dynamic Label Plus (DL Plus): extension of the Dynamic label feature; it allows storing and filtering parts of the text (sent as DL messages) in the receiver terminal as DL Plus objects, which then can be selected and accessed by the listener independently from the currently transmitted DL messages

DL plus command: specific structure of DL commands, which is defined within this specification and which is used for carrying the DL tags necessary for identifying DL Plus objects

DL plus object: text string created in a receiver with a defined content type to allow selection by the listener

DL plus tag: contains the location and the content type of a DL Plus object carried in a corresponding Dynamic Label Message

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

3.2   Abbreviations

For the purposes of the present document, the following abbreviations apply:

   DAB   Digital Audio Broadcasting
   DL Plus   Dynamic Label Plus
   DL   Dynamic Label
   DMB   Digital Multimedia Broadcasting
   PAD   Programme Associated Data
   RDS   Radio Data System
   RT+   RadioText Plus

4   Introduction

Digital Audio Broadcasting DAB [1] provides the text feature Dynamic Label (DL) which allows the service provider to send text messages with information such as track playing, now/next, news headlines, weather, sport results, etc. To serve all the different interests of listeners, the service provider has to send DL messages frequently and with different content, one after the other, each message replacing the one before. The more information he wants to provide, the more frequently he has to update the messages, and the less time is left for presentation of a message on the display and for reading by a listener. So it will happen that a listener has to wait until specific information he is interested in shows up and - even worse - has to observe the display continuously in order not to miss the instant when the desired information is displayed.

DL Plus solves this dilemma by allowing the listener to select the kind of information he is interested in. For that purpose DL messages are complemented by tags which identify specific content of the DL message by its content type.

Users can select the content types of information to be presented; they do not need to read, or even be aware of, the complete stream of DL messages.

DL Plus is a backwards compatible extension of the DL feature: the transmitted tags are not visible in the DL message so that listeners with receivers without a DL Plus decoder still view the DL messages as before. For the broadcaster, the additional data rate (for tag transmission) is significantly less than the data rate necessary for text.

A receiver can use the content classification and tagging in two different ways: by improving the presentation of the text messages and/or by providing the information to other applications and devices.

DL messages may contain any kind of text: some will be quite general - news headlines, for example - whilst others relate directly to the audio - artist and title information, for example. In this latter case, special consideration is given to allow correct grouping of all the different item-related information and an unambiguous reference to the audio of the respective programme item. This timing information may also be used to ensure that the text and audio make sense for time-shifted programmes.

DL Plus, by identifying text by content type, can automatically provide information to other devices like mobile phones, PDAs, PCs and personal audio players. This means listeners can interact with the radio station more easily because the transfer of telephone and SMS numbers, web addresses and event information may be done with a single click. DL Plus is designed to stimulate the integration of radio with other devices in order to strengthen the competitiveness of radio with respect to other media and to gain new and greater audiences.

Figure 1 illustrates the way that a DL Plus decoder in a receiver processes the received DL message and DL Plus tags to create DL Plus objects that are then displayed or stored. In this example, the DL message contains the title and artist of a music item that is currently on air. These two pieces of text are tagged so that the receiver may identify them and create the DL Plus objects.
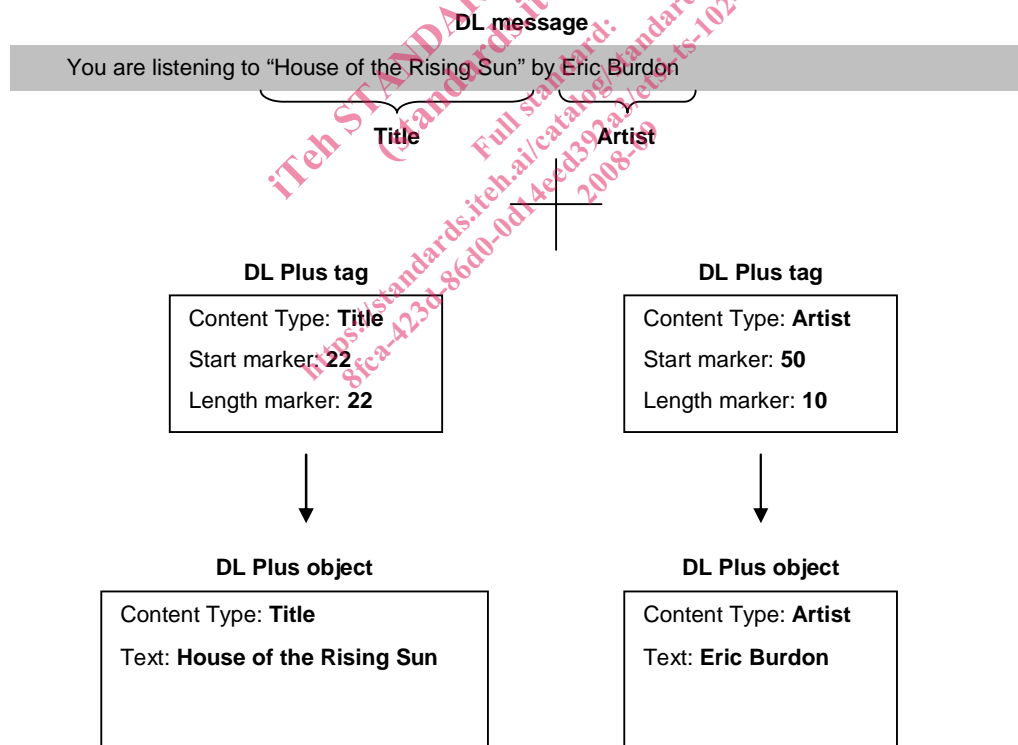
Figure 1: Simplified schematic of DL Plus object creation from DL message and DL Plus tags

The DL Plus tags are carried in the PAD using the same mechanism as the DL message but utilizing the command feature of the DL application. Up to four DL Plus tags may correspond to a single DL message. DL Plus tags contain a content type, a start marker and a length marker to identify the piece of text to be assigned to a DL Plus object. The DL Plus objects may contain additional data fields, if so required by the receiver functionality. It is recommended to store a time stamp indicating the time when the corresponding DL message was received (see clause 9). This allows history oriented handling of the DL Plus objects, e.g. by assembling a play list with the last received programme items.

DL Plus offers similar functionality to the FM-RDS RT+ feature (see annex C).

5   DL Plus objects

DL Plus objects are created in receivers from DL messages and associated DL Plus tags. Therefore the DL Plus objects inherit some basic properties from the DL messages they are based on:

- The text of DL Plus objects shall be contained within a single DL message, and so has a maximum text length determined by the limit of 128 bytes.

- The throughput of DL Plus objects is limited by the throughput of DL messages; the need for non-DL Plus equipped receivers to be able to display all DL messages limits the throughput.

- These limitations restrict the overall amount of data that can be made available for the DL Plus application decoder.

5.1   Content types

Each DL Plus object is assigned a content type chosen by the service provider from those available. 64 content types are currently defined, see table A.1. These content types correspond exactly to those defined for the FM-RDS RT+ feature. A further 64 content types are reserved for future addition.

The user can select which content types should be presentable to him and therefore which should be filtered and chosen from the stream of received DL Plus objects.

The content types are grouped in the following categories:

- **Item**
  Content types within this category are related closely to the current audio programme item. A programme item could be a music track from a popular music programme, or a feature in a magazine programme. In some cases there may be a single programme item in a programme, in other cases there may be many programme items. All content types in the Item category conform to the use of ID3 tags.

- **Info**
  Content types within this category carry information that is more or less unrelated to the audio, but offers important additional information to the listener, including news, headlines, alarms, advertisements and events.

- **Programme**
  Content types within this category describe the programme and the programme service (i.e. the "radio station").

- **Interactivity**
  Content types within this category include telephone numbers, SMS numbers, e-mail addresses or web addresses (URLs) to support the implementation of interactivity by integration of radio and mobile phones, PCs and PDAs.

- **Private**
  Content types within this category are defined by the service provider and have no pre-determined use. The interpretation is dependent on the programme service and may be used in closed user groups with special receivers.

- **Descriptor**
  Content types within this category are used to provide further detail to another DL Plus object
  (see clause 5.2.3).

Up to four DL Plus objects can be created from each DL message and the DL Plus objects may contain different text, the same text, or a portion of the same text which corresponds to the assigned content type.

EXAMPLE: The DL message "Coming soon: BBC PROMs featuring the Rolling Stones in Concert, on Saturday 11.8.2017 at the Royal Albert Hall."
DL Plus tags are transmitted to produce the following DL Plus objects:
INFO.EVENT: "BBC PROMs featuring the Rolling Stones in Concert, on Saturday 11.8.2017 at the Royal Albert Hall"
DESCRIPTOR.APPOINTMENT: "11.8.2017"
DESCRIPTOR.PLACE: "Royal Albert Hall"
The text for both descriptor objects are completely contained in that of the INFO.EVENT object. So the service provider ensures that a receiver can filter, store and present all details but also allows for a more advanced receiver to identify the descriptor objects APPOINTMENT and PLACE and provide them to calendar managing software on a PDA or PC.

5.2 Linking of DL Plus objects

In general, DL Plus objects carry information that is meaningful in itself, without knowledge of information provided by other DL Plus objects (except for DL Plus objects in category Descriptor).

DL Plus provides mechanisms to combine the information of two or more DL Plus objects. There are three structuring methods:

- Aggregating all DL Plus objects with content types belonging to the Item category related to the same programme item.

- Compiling several DL Plus objects of the same content type to a table (applicable to the categories Info, Programme and Interactivity).

- Linking a DL Plus object with content types belonging to the Descriptor category to another DL Plus object.

5.2.1 Aggregating DL Plus objects (category Item)

Whilst a programme item is in progress, several DL messages may be sent and some of them will signal the creation of various DL Plus objects with content types in the Item category (with information about title, artist, composer, etc.) and all referring to the same programme item. These may be aggregated to give a fuller description of the programme item. To ensure that DL Plus objects are associated correctly to the appropriate programme item, two flag bits are defined: the **item toggle bit** and the **item running bit**.

These flag bits are set according to the audio and are transmitted with the DL Plus tags (see clause 6). The timing precision of the signalling is dependant on the transmission of the DL Plus tags.

The value of the item toggle bit is changed at the start of each programme item.

The value of the item running bit is normally set to 1, but it is reset to 0 when the programme is interrupted, for example by a news bulletin or by an announcer, for the duration of the interruption. When the item running bit is 0, a receiver should not display DL Plus objects in the Item category and may interrupt recording of the programme.

The item toggle bit and the item running bit are used by receivers for the association of DL Plus objects in the Item category with programme items and to control the recording of a programme.

If the broadcaster does not wish to signal the boundaries between programme items, then the item toggle bit and the item running bit should be set to zero. However, it is recommended that these bits be correctly signalled to assist time-shifting of programmes (both audio and messages) and the operation of "rewind-radio" devices.

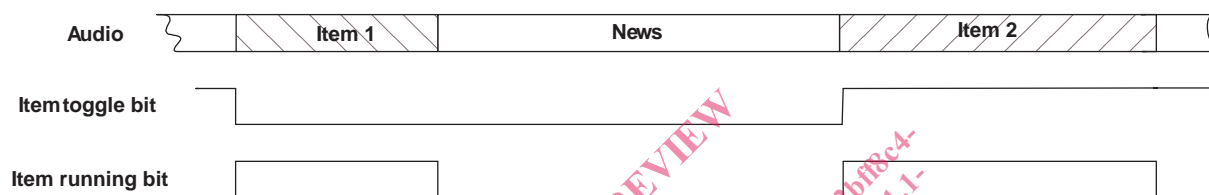Some examples of the use of these bits are shown below.

EXAMPLE 1:
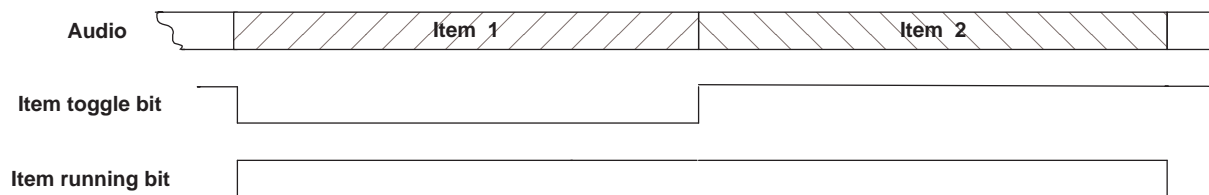
Figure 2: Setting of item toggle bit and item running bit when one programme item follows another

In example 1, each programme item follows the previous one. The item toggle bit changes at the start of each programme item; the item running bit remains set for the whole programme.

EXAMPLE 2:

Figure 3: Setting of item toggle bit and item running bit when news interrupts a programme

In example 2, a news item is transmitted between programme items in the middle of a programme. The item toggle bit changes at the start of each programme item; the item running bit is set for each programme item, but reset for the duration of the news.

EXAMPLE 3:

**Figure 4: Setting of item toggle bit and item running bit when an announcer interrupts
a programme item**

In example 3, an announcer interrupts a programme item. The item toggle bit changes at the start of the programme item; the item running bit is set for the programme item, but reset for the duration of the announcer's interruption.

5.2.2   Compiling DL Plus objects into tables

DL Plus objects can be compiled to a table, provided:

- they all have the same content type from categories Info, Programme or Interactivity; and

- the text of the objects contains redundant spaces.

The term "redundant spaces" is defined as two or more space/blank characters together within the text of the DL message.

The table is identified by a content type belonging to the Info, Programme or Interactivity category - all DL Plus objects with the same content type contribute DL Plus objects to the same table.

The text of DL Plus objects destined for tables shall consist of a *keyword* followed by one or more *elements* each separated by redundant spaces. The keyword is used to identify each row of the table and the elements populate the columns of the table. The combination of the content type and the keyword uniquely identify an entry in a table. The entries in the table may be ordered by reception time or alphabetically by the keyword. The broadcaster may assist receivers to display the information in columns by varying the number of space/blank characters within each redundant spaces separator. Receivers may arrange the information on the display as desired to provide the best presentation.

Some examples are given below. The notation "␣␣" is used to indicate redundant spaces:

- INFO.STOCKMARKET
  "Company␣␣Value (€)␣␣Change␣␣High␣␣Low␣␣Volume"
  "Nokia␣␣12.27␣␣0.41␣␣12.31␣␣12.15␣␣23,332,238"

- INFO.SPORT
  "Bayern München:AC Milano␣␣5:5"

- INFO.WEATHER
  "London␣␣16 C"
  "Munich␣␣23 C"

- INTERACTIVITY.PHONE.OTHER
  "Deutsches Museum␣␣089323990"

NOTE: For the example INFO.STOCKMARKET, the first line could appear as a middle row in the table if the receiver sorts alphabetically and the stock information for Barclays is provided.

The service provider may omit elements from the right if necessary.

5.2.3 Linking a Descriptor object to another DL Plus object

A Descriptor object is meaningful only in combination with another DL Plus object and it provides further detail of the other object.

A DL Plus object (parent object) and its Descriptor objects shall be transmitted in the same DL message; therefore a DL message may carry one parent object with three linked Descriptor objects, or two parent objects each with a linked Descriptor object, or any other combination, provided the limit of four DL Plus objects per DL message is observed.

The Descriptor objects are intended to be passed to intelligent terminals that can automatically use the information. The Descriptor objects may also be provided to the user.

PLACE and APPOINTMENT are intended to provide data for schedule planning software on PDAs and PCs (Calendar e.g. in Outlook). They provide address information and time and date information for events foreseen in the future and for appointments.

PLACE can be combined with: EVENT, SCENE, CINEMA, TV and ADVERTISMENT of category INFO.

APPOINTMENT can be combined with: EVENT, SCENE, CINEMA, TV and ADVERTISMENT (all of category INFO) and PROGRAMME.NEXT.

IDENTIFIER is intended to be used as input for a template to be completed for ordering an item.

IDENTIFIER can be combined with: ITEM.TITLE and ITEM.ALBUM.

PURCHASE and GET_DATA are intended as Hyperlink to Websites, they are directed to internet browsers and other software. In context with sms numbers, these can be forwarded directly to the phone or to the contact management software on PDAs and PCs.

PURCHASE can be combined with: ITEM.TITLE, ITEM.TRACK; also with EVENT, SCENE, CINEMA, and ADVERTISMENT of category INFO. It allows the ordering of music items, tickets for events, products announced in the commercial or advertisement. It also includes acquiring goods that are provided free of charge.