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Hybrid Digital Radio (DAB, DRM, RadioDNS); SlideShow; User Application Specification

European Broadcasting Union — Union Européenne de Radio-Télévision

EBU·UER

DAB Digital Audio Broadcasting

Reference
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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, ETSI EN 300 401 [1], for DAB (see note 2) which now has worldwide acceptance.

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

The DAB family of standards is supported by World DMB, an organization with members drawn from broadcasting organizations and telecommunication providers together with companies from the professional and consumer electronics industry.

The RadioDNS Project was established in 2010 to standardize the combination of broadcast radio systems with additional applications, content and meta-data delivered over fixed or mobile IP networks. The project produced a specification using DNS to locate the broadcaster's Internet domain which is in use worldwide, and now standardized as ETSI TS 103 270 [6]. RadioDNS operates the authoritative name servers for the radiodns.org domain, and has members drawn from broadcasting organizations, manufacturers and service providers.

NOTE 3: "RadioDNS Hybrid Radio" and the RadioDNS Hybrid Radio logo are registered trademarks of RadioDNS Limited, a not-for-profit company owned by its members.

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**may not**", "**need**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

1 Scope

The present document describes an application that provides a visual accompaniment to a radio service.

In respect to previous versions of the present document, hybrid radio provisions have been added to allow a seamless experience for users when consuming radio services delivered by digital radio broadcasting systems (DAB, DRM) or IP or a combination of both. The use of the present document allows content to be created once by the service provider for delivery by both mechanisms and allows manufacturers to implement devices with many common elements.

The application can be delivered using broadcast or IP, or a combination of the two.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

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

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

The following referenced documents are necessary for the application of the present document.

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

[2] ETSI TS 101 756: "Digital Audio Broadcasting (DAB); Registered Tables".

[3] ETSI EN 301 234: "Digital Audio Broadcasting (DAB); Multimedia Object Transfer (MOT) protocol".

[4] ETSI ES 201 980: "Digital Radio Mondiale (DRM); System specification".

[5] ETSI TS 101 968: "Digital Radio Mondiale (DRM); Data applications directory".

[6] ETSI TS 103 270: "Radio DNS; Hybrid lookup for radio services".

[7] ETSI TS 102 818: "Hybrid Digital Radio (DAB, DRM, RadioDNS); XML specification for Service and Programme Information (SPI)".

[8] ISO/IEC IS 15948: "Information technology -- Computer graphics and image processing -- Portable Network Graphics (PNG): Functional specification".

[9] ISO/IEC 10918 (all parts): "Information technology -- Digital compression and coding of continuous-tone still images: Requirements and guidelines".

[10] ISO 8601:2004: "Data elements and interchange formats -- Information interchange -- Representation of dates and times".

[11] IETF RFC 2782: "A DNS RR for specifying the location of services (DNS SRV)".

[12] IETF RFC 4627 (2006): "The application/json Media Type for Javascript Object Notation (JSON)".

[13] IETF RFC 4329 (2006): "Scripting Media Types".

[14] IETF RFC 2616: "Hypertext Transfer Protocol -- HTTP/1.1".

[15] IETF RFC 2818: "HTTP over TLS".

[16] IETF RFC 5246: "Transport Layer Security TLS v1.2".

[17] "Stomp Protocol Specification, Version 1.0".

NOTE: Available at http://docs.codehaus.org/display/STOMP/Protocol.

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

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

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] ISO 3166-2:2007: "Codes for the representation of names of countries and their subdivisions -- Part 2: Country subdivision code".

[i.2] draft-daviel-http-geo-header-01.txt April 2000: "Geographic extensions for HTTP transactions".

NOTE: Available at http://geotags.com/geo/draft-daviel-http-geo-header-01.html.

[i.3] IETF RFC 5909: "Network Time Protocol Version 4: Protocol and Algorithms Specification".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

device: hardware device or software client receiving the SlideShow application

image: PNG, JPG or APNG binary data

slide: image data, along with any associated parameters

SlideShow Reference Time: time held on the device, against which application time parameters are compared

3.2 Abbreviations

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

APNG Animated Portable Network Graphics
DAB Digital Audio Broadcasting
DLS Dynamic Label Segment
DMB Digital Multimedia Broadcasting
DNS Domain Name Server
DRM Digital Radio Mondiale
FIG Fast Information Group
HTML Hyper Text Markup Language
HTTP Hyper Text Transfer Protocol
IP Internet Protocol
IS International Standard
ISO International Standards Organization
JFIF JPEG File Interchange Format

JPEG	Joint Pictures Expert Group
JSON	JavaScript Object Notation
JSONP	JavaScript Object Notation with Padding
MOT	Multimedia Object Transfer
MSC	Main Service Channel
NTP	Network Time Protocol
PAD	Programme Associated Data
PNG	Portable Network Graphics
PPI	Pixels Per Inch
RDS	Radio Data Sytsem
SDC	Service Description Channel
SRV	SeRVice (record)
UI	User Interface
URL	Universal Resource Locator
UTC	Universal Time Coordinated
UTF	Unicode TransForm
VGA	Video Graphics Array
X-PAD	eXtended Programme Associated Data

4 Introduction

SlideShow is an application for devices that enables a Service Provider to provide a sequence of images for a Service. These may be used by the Service to visualize the audio being received, for example:

- A news programme complemented by photos from the events being reported.
- A music programme having each song accompanied by cover art of the current song.
- During an advertising break, or a promotional slot, showing images for advertising or promotional purposes.

5 Application behaviour

5.1 Initialization

5.1.1 General

The application should be automatically started when a SlideShow service is discovered for the current radio service through any of the following means:

- for DAB, reception of a SlideShow application definition in FIG0/13 [1];
- for DRM, reception of a SlideShow application definition in SDC data entity type 5 [4];
- for IP, a specific DNS SRV record.

When the application is started, or the radio service is changed, it is recommended that a device wait for up to 1 s in order to receive an image to show on the display. After that time, and until an image is received, the device may display a station logo at the most appropriate size, taken from the Service and Programme Information SI document [7].

The IP transport may also provide text information, which may be the only available transport of text for some services, whilst others may provide text via the broadcast channel (e.g. RDS Radio Text, DAB Dynamic Label, DRM text message).

5.1.2 Application priority

The Service Provider may provide zero or more DNS SRV records, indicating that the SlideShow service can be provided by more than one server. Each DNS SRV record has a Priority parameter, as an integer number, where a lower value indicates a higher priority.

If a broadcast application is being signalled, it shall be assumed to have a Priority = 100.

EXAMPLE: A Service Provider advertises the SlideShow in two ways:

- A DNS SRV record with Priority = 101
- A broadcast application – assumed Priority = 100

As the broadcast application has Priority 100, the preferred method of reception is from broadcast. IP cannot be used, unless the device is unable to receive the broadcast application.

5.1.3 Fall-back behaviour

If an error condition occurs, for instance a loss of IP connectivity or if the Service Provider indicates that a particular stream of content is not currently being provided over IP, then receiver should use broadcast to acquire the content. .If the IP connectivity is subsequently restored, the device should attempt a reconnection.

EXAMPLE: A DAB Service Provider advertises the SlideShow on IP.
The Device subscribes to receive TEXT information.
The Service Provider returns an error indicating that TEXT is not currently provided over IP.
The Device shall fall back to using DAB Dynamic Label for text content for the remainder of the session.

5.2 Operation

The SlideShow user application works with one display only: it can display only one slide at a time. Two device profiles are defined (see also clause 9):

- **simple**
- **enhanced**

Two modes of operation are defined:

- **normal**
- **interactive**

The permitted combinations of profile and modes are summarized in table 1.

Table 1: Permitted Combinations of Profiles and Modes

Profile	Normal Mode	Interactive Mode
Simple	Yes	No
Enhanced	Yes	Yes

In the **normal mode**, images are presented at the TriggerTime specified on each image without any requirement for user interaction.

In the **interactive mode**, the device presents an overview of categories with titles received so far and allows the user to choose one category out of this list. Choosing a category allows the user to view all the slides received under this category.

Figure 1: Example of interactive mode UI for a touch screen device showing received categories on the left and the currently selected image (informative)

The following behaviour guidance is given:

- The user shall be allowed to switch to interactive mode.
- The device shall offer a menu view where the user shall be able to get an overview about the already received slide categories, which contain at least one displayable slide.
- When browsing through a category the user shall always know which slide (slide x of y) is currently present.
- Navigating to a certain slide may be possible via arrow keys, numbers, touchscreen (gestures), etc.
- The user shall be able to navigate into a certain category and back into the menu view.
- The user shall be allowed to leave the interactive mode (switch back to normal mode).

5.3 Common Parameters

5.3.1 General

Whilst the methods of delivery vary between broadcast and IP, there are a number of parameters common to both, as listed below:

- Trigger time
- Click-through URL
- Expire time
- Categorization

The function of these parameters are described in the following clauses. The implementation details of how these are signalled to a device are detailed in clause 6 for broadcast and clause 7 for IP.

5.3.2 Trigger Time

When the device is in **normal** mode, the presentation of each slide may be controlled by the Service Provider by using the **Trigger Time** parameter, given as a datetime or as the string value **'NOW'**.

Depending on the conditions, the device shall perform one of the five actions shown in table 2 for a slide sent by the Service Provider.

Table 2: TriggerTime Values and Behaviours

Value of Trigger Time	Behaviour
Greater than current SlideShow Reference Time	The image is intended for display at the specified point in the future. The device shall hold the image in the holding buffer until this time is reached. When the TriggerTime equals the SlideShow Reference Time, the image shall be displayed immediately.
Equal to the current SlideShow Reference Time	The image shall be shown immediately on the receiver's display.
Less than the current SlideShow Reference Time	The image shall be held in the holding buffer, but shall not be displayed.
Equals the string value: NOW	This value has special significance and indicates that the slide shall be shown immediately on the receiver's display. This value only applies at the instant of reception. An image in the holding buffer which gets updated with this value should be displayed only once unless a subsequent TriggerTime update of NOW is received.
No TriggerTime	The image shall be held in the holding buffer, but shall not be displayed. A subsequent TriggerTime update may be received for the slide, which may then apply one of the other conditions.

If the specified TriggerTime behaviour cannot be achieved (e.g. insufficient storage for the image), then the image shall not be displayed.

The TriggerTime has an accuracy of 1 s.

Methods for synchronizing the SlideShow Reference Time are given in annex D.

5.3.3 ClickThroughURL

This describes a URL that may be used by a device to respond to a user action (e.g. tapping the screen while the slide is displayed) to show a linked X(HTML) resource within a capable application on the device, e.g. an integrated web browser.

For example, a web page giving further information/content related to the slide.

The URL is specified as a string using UTF-8 encoding, up to a maximum of 512 bytes.

5.3.4 Expire time

This parameter specifies the datetime after which presentation of a slide is no longer valid. Once this is reached or passed, the device shall remove the slide from the display and any cache.

The Expire Time has an accuracy of 1 s.

A value for this parameter may only be provided once, and any subsequent updates shall be ignored.

5.3.5 Categorization

5.3.5.1 General

Images may be categorized so they can be browsed by the user in **interactive** mode.

When a slide is received containing a CategoryID/SlideID parameter value which matches that of any slide already in the Holding Buffer, the other slides with the same CategoryID/SlideID value shall be decategorized by setting their CategoryID/SlideID parameter value to 0x0000.

5.3.5.1 Category ID

An 8-bit number that uniquely identifies a Category. CategoryID shall not be 0x00, except to remove a previously delivered slide from a category.