EBU – Recommendation R 126

Digital Radio broadcasting:

Common European Digital Radio Profiles

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This recommendation is designed to encourage a common set of digital radio receiver profiles for Europe.

The EBU recommends that for digital radio services in the relevant frequency bands, EBU Members comply with the technical characteristics specified in Annex 1, according to one of the profiles given in the document.

The EBU requests that manufacturers of radio receivers uniquely make digital radio receivers in compliance with one of the profiles given in Annex 1, based on national decisions about the range of services to be offered. Manufacturers should consider the inclusion of FM as a mandatory feature of all digital radio receivers, and AM as a recommended feature for countries where it is used.

Background

For many years, the use of analogue radio receivers has provided the benefit of full access to any radio service everywhere in Europe (or even the world) in given frequency bands. Most analogue radio receivers sold enable both FM and AM reception, and in addition, many can receive 'RDS' services, allowing station identification and more.

With digital radio, despite the wide range of additional features made possible by the technology, the independent decision-making processes taking place in different countries could mean that different and incompatible receivers are needed in different countries, and crossing national borders, a given car radio could even go silent.

In 2008, the EBU, WorldDMB, and EICTA joined together to develop a plan for interoperability and service continuity of digital radio services across Europe. The result is a set of digital radio 'profiles'.

The WorldDMB Digital Radio Receiver Profiles

These specify a minimum set of requirements and features to be built into different classes of digital radio receivers, ensuring their interoperability across European countries whose broadcasters use DAB, DAB+ or DMB (the 'Eureka 147' Family of Standards).

The manufacturing specifications comprise three complimentary Digital Radio Receiver Profiles:

- the Standard Radio (SR)Receiver (**Profile 1**) is expected to serve a mass market for audio

only low cost radio devices;

- the Rich Media Radio (RMR) Receiver (**Profile 2**) for radios with small colour screens able to receive audio, advanced text and picture applications;

- The Multimedia (MM) Receiver (**Profile 3**) for combined devices such as mobile phones, personal media players, and able to receive advanced forms of multimedia including video.

Features and functions appropriate to in-car systems are also defined, including automatic retuning between digital and analogue services and advanced travel and traffic infoservices for radios with real-time satellite navigation. These Profiles will enable drivers travelling across borders to receive all Eureka 147 digital radio broadcasts on their car radios.

Analogue AM and FM reception is recommended for all receiver profiles.

The Digital Radio Receiver Profiles are given in **Annex** to this recommendation.

World DMB Forum

Digital Radio Receiver Profiles

Issue Date: 17 December 2008

World DMB Digital Radio Receiver Profiles

Summary

The World DMB Digital Radio Receiver Profiles are designed to help create a vibrant digital radio market across Europe and the world by defining minimum functionality for different classes of digital radio receivers that use the Eureka 147 based DAB system. This provides broadcasters with confidence that the services they plan will be receivable, and manufacturers that their technology investments will be supported by services. The consumer gains from knowing that the product they have chosen contains the necessary features to provide them with a consistent quality of experience and assured levels of interoperability across Europe and beyond.

Products designed to meet the World DMB Receiver Profiles will decode all audio services, along with other features depending on the complexity of the receiver. The profiles were developed by World DMB, in collaboration with the EBU and EICTA, with the aid of member experts representing silicon manufacturers, consumer device manufacturers, radio broadcasters and other experts from across the industry. The composition of the profiles takes into account manufacturing issues, broadcaster requirements, consumer experience and other market aspects.

Broadcasters and regulators may select any of the audio and multimedia capabilities of the Eureka 147 family of standards to meet the specific needs of their market with confidence, whilst those already broadcasting are able to plan the introduction of more advanced features.

Scope

The World DMB Digital Radio Receiver Profiles define the minimum functionality requirements of products within each profile. Manufacturers may offer additional features in order to differentiate their product from others.

The Receiver Profiles are composed of **mandatory features** which must be implemented and **recommended features** which offer enhancements with wide appeal.

Manufacturers making products to receive Eureka 147 based services are encouraged to self-declare adherence of a product to one of the Receiver Profiles. Manufacturers intend to develop a logo to promote digital radio receivers offering this pan-European interoperability.

Broadcasters may use the Receiver Profiles to plan services for maximum take-up and to help listeners to make sensible purchasing decisions.

Regulators may use the Receiver Profiles to develop strategies and policies for digital radio broadcasting within national boundaries or with reference to trans-national and harmonised markets.

The Receiver Profiles describe minimum functionality; the implementation of each feature in conformance with the relevant ETSI standards is best determined by each manufacturer and is not proscribed.

In-car products are subject to the normal safety related conditions, for example limitations for scrolling, access to services while driving, image per second limitations, etc, according to regulators or OEM requests.

Products which do not meet the requirements of any profile may continue to be manufactured for established digital radio markets on a market-specific basis.

The World DMB Receiver Profiles reflect receiver design issues and broadcaster capabilities appropriate for the current period and for the foreseeable future. Future changes and additions to the ETSI standards defining the Eureka 147 family of standards, technology advances and market developments will be reviewed and may lead to revision of these Receiver Profiles.

World DMB will publicise the Receiver Profiles and actively encourage its members to adopt them.

Receiver Profile 1 - Standard Radio Receiver

This is an audio receiver with a basic alphanumeric display.

Spectrum[1]	Band 3 reception (174 to 240 MHz) is mandatory in all territories. L-Band reception (1452 to 1492 MHz) is mandatory for all in-car products and for receivers sold in territories with L-Band services on-air or licensed[2].
Channel decoding	Decoding of a minimum of one sub-channel is mandatory. Decoding of a minimum of 280 Capacity Units (e.g. 256 kbps@UEP1) is mandatory for sub-channels containing DAB audio services[3]. Decoding of a minimum of 144 Capacity Units (e.g. 256 kbps@EEP3B, 192 kbps@EEP3A, 96kbps@EEP1A) is mandatory for sub-channels containing DAB+[4] or DMB services[5].
Audio	MPEG layer 2[6] decoding is mandatory. MPEG-4 HE AACv2[7] decoding is mandatory[8].
Text	Service label (station name) display is mandatory. Dynamic label display is mandatory on products with a 2-line display or better (except for in-car products). Support for the extended RDS character set[9] is recommended on products with a suitable display.
EPG	EPG[10] presentation is recommended for products with a suitable display. When implemented it may be used to select services.
Analogue services	FM-RDS[11] and MW (AM) decoding is recommended for all products.
Traffic & Travel	For in-car products, TPEG[12] and TMC[13] decoding is recommended. For in car products, announcement signalling and switching is recommended.
Service Following	For in-car products which include FM-RDS decoding, service following between DAB, DAB+ and DMB services and their signalled simulcasts[14] carried on FM-RDS is mandatory. For in-car products, service following between DAB, DAB+ and DMB services and their signalled simulcasts[15] carried in adjacent DAB ensembles is recommended.

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[1] Note that centre frequencies used in Europe are not used throughout the world; receivers designed for global use will need to tune to other centre frequencies

[2] See www.worlddab.org for details

[3] As defined in ISO EN 62104

[4] As defined in ETSI TS 102 563

[5] As defined in ETSI TS 102 428

[6] As defined in ETSI EN 300 401

[7] As defined in ETSI TS 102 563 and ETSI TS 102 428

[8] Note that BSAC audio is used in DMB profile 1 but is not required for European receivers

[9] As defined in the RDS Forum proposed revision to ISO EN 62106 (see www.rds.org.uk)

[10] As defined in ETSI TS 102 818 and TS 102 371; decoded from X-PAD (see EN 300 401 clause 7.4 (v1.4.1 onwards)) and packet mode including FEC (see EN 300 401 clause 5.3.5 (v1.4.1 onwards))

[11] As defined in ISO EN 62106

[12] As defined in ISO TS 18234

[13] As defined in ETSI TS 102 368

[14] Signalling of alternate sources of the same programme using FIG 0/6, FIG 0/21, etc, and on FM-RDS services using RDS ODA 147 (ETSI EN 301 700)

[15] Signalling of alternate sources of the same programme using FIG 0/6, FIG 0/21, etc

Receiver Profile 2 - Rich Media Radio Receiver

This is an audio receiver with a colour screen display of at least 320 x 240 pixels.

All Receiver Profile 1 functionality, *plus:*

Channel decoding	Simultaneous decoding of a minimum of four sub-channels is mandatory. Decoding of a minimum of 288 Capacity Units (total) is mandatory.
Text	DL+[16] and Intellitext[17] presentation are mandatory. Journaline[18] presentation is recommended. Support for the extended RDS character set[19] is mandatory.
EPG	EPG[20] presentation is mandatory. Decoding of the advanced profile is recommended. The EPG can be used to select and record services.
SlideShow	SlideShow[21] presentation is mandatory.
BIFS	MPEG-4 BIFS[22] presentation is mandatory.
Broadcast Website	BWS[23] presentation is recommended when a suitable browser and navigation method exist.
Traffic & Travel	For in-car products, TPEG[24] and TMC[25] decoding is mandatory for products with integrated navigation systems.
Service Following	For personal products[26], service following between DAB, DAB+ and DMB services and their signalled simulcasts carried in adjacent DAB ensembles and on FM-RDS is recommended.

Receiver Profile 3 - Multimedia Receiver

This is a multipurpose receiver with a colour screen display capable of rendering video.

All Receiver Profile 2 functionality, *plus:*

Channel decoding	Decoding of a minimum of 432 Capacity Units (total) is mandatory.
Video	H.264 decoding is mandatory[27].

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[16] As defined in ETSI TS 102 980

[17] As defined in ETSI TS 102 652

[18] As defined in ETSI TS 102 979

[19] As defined in the RDS Forum proposed revision to ISO EN 62106 (see www.rds.org.uk)

[20] As defined in ETSI TS 102 818 and TS 102 371; decoded from X-PAD (see EN 300 401 clause 7.4 (v1.4.1 onwards)) and packet mode including FEC (see EN 300 401 clause 5.3.5 (v1.4.1 onwards))

[21] As defined in ETSI TS 101 499; decoded from X-PAD (see EN 300 401 clause 7.4 (v1.4.1 onwards)) and packet mode including FEC (see EN 300 401 clause 5.3.5 (v1.4.1 onwards))

[22] As defined in ETSI TS 102 428

[23] As defined in ETSI TS 102 498; decoded from X-PAD (see EN 300 401 clause 7.4 (v1.4.1 onwards)) and packet mode including FEC (see EN 300 401 clause 5.3.5 (v1.4.1 onwards))

[24] As defined in ISO TS 18234

[25] As defined in ETSI TS 102 368

[26] For example mobile or handheld products

[27] As defined in ETSI TS 102 428