Radio Broadcasting Systems: Digital Audio Broadcasting (DAB+) to mobile, portable and fixed receivers

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Presentation of a technical overview and main features of the DAB standards family
OUTLINE

- DAB+ features.
- Technical Specifications.
  - Conceptual Block Diagram.
  - Transmission Frame.
- DAB+ service Structure.
- Conclusions
DAB STANDARDS FAMILY

- **DAB**: 1995 – Original audio with PAD and data services standard.
- **DAB+**: 2007 – Enhanced audio service efficiency.

ETSI Standard Documents

- **EN 300 401** – Main Document
- **TR 101 496-1, -2, -3** – Guidelines of use and operation
- **TS 102 563** – Transport of AAC audio
DAB/DAB+ COVERAGE

Source: https://www.worlddab.org/country-information

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DAB+ FEATURES (1 of 5)

➢ Audio Coding Quality.

• DAB+ uses MPEG-4 High Efficiency AAC v2 profile (HE-AAC v2) audio codec.
• A 48 kbps subchannel with HE-AAC v2 provides a similar audio quality as MPEG Audio Layer II at 128 kbps.
• Up to 18 programs at 64 kbps in one ensemble.
DAB+ FEATURES (2 of 5)

➢ Choose the station from a list.

Easy to choose a station, listener has more information about the services availables

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Program Associated Data (PAD): Dynamic Label Segment – Text Delivery.

- Up to 128 characters per text segment.
- All DAB+ receivers have DLS text display.
DAB+ FEATURES (4 of 5)

- Program Associated Data (PAD): Slideshow (SLS) Images.
  - The audio message can be strengthened.
  - Traffic and weather reports.
  - Sport results.
  - Local news, happenings, community events.
DAB+ FEATURES (5 of 5)

➢ Data Services: Electronic Program Guide (EPG).

- Is flexible, can be station, network or ensemble based.
- Some receivers can record programs for later listening.
CONCEPTUAL DAB+ EMISSION BLOCK DIAGRAM

Programme Associated Data
PCM Audio Signal

Services Configuration

Audio Encoder
Data Encoder

MUX controller

DAB Audio Frame

Energy Dispersal
Convolutional encoder

Time Interleaver

Main Service Mux

Control

FIC generator

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CONCEPTUAL DAB EMISSION BLOCK DIAGRAM

Fast Information Channel

Main Service Channel

Transmission Frame Multiplexer

Synch. Channel symbol gen.

FIC and MSC symbol gen.

OFDM signal gen.

DAB transmission signal
The duration of the transmission frame depends on the transmission mode.
TRANSMISSION MODES (1 of 2)

- **Transmission mode I**: intended for SFN in Bands I, II and III
- **Transmission mode II**: intended for local services in Bands I, II, III, IV, V and L-band
- **Transmission mode III**: intended for frequencies below 3 GHz and cable
- **Transmission mode IV**: intended for local services in Bands I, II, III, IV, V and L-band (for optimum SFN operation in L-band)
Transmission parameters that changes between transmission modes:

- Number of carriers on the OFDM modulation.
- Carriers spacing.
- Symbol duration.
- Symbol guard interval.
DAB+ SERVICE STRUCTURE

Ensemble

Services

Service components

Fast Information Channel

Main Service Channel

“DAB ENSEMBLE ONE”

“ALPHA 1 RADIO”

“BETA RADIO”

“ALPHA 2 RADIO”

Audio

Data Service

Audio

Data

Audio

SubCh a

SubCh b

SubCh c

SubCh d

…

…

MCI

SI

FIDC

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CONCLUSIONS

- DAB+ provides a variety of interesting features. This features may help to improve the audience of the radio broadcast service in our country.

- The DAB service multiplex is sufficiently flexible to provide a wide choice of service arrangements to suit programming needs.

2. ETSI EN 300 563 V1.2.1 (2010-05). Digital Audio Broadcasting (DAB); Transport of Advanced Audio Coding (AAC) audio.


4. 2011 Broadcast Fair Presentation. El Nuevo plan de digitalización de la radiodifusión sonora terrestre y el DAB+ en España, Fernando Almaraza Hernán-Pérez.
DIGITAL TELEVISION LABORATORY