

ETSI TR 101 495 V2.1.1 (2017-08)



Digital Audio Broadcasting (DAB); Guide to DAB standards

PREVIEW
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Reference

RTR/JTC-DAB-86

Keywords

audio, broadcast, broadcasting, DAB, digital

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Foreword

This Technical Report (TR) 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 [i.1], for DAB (note 2) which now has world-wide 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 WorldDAB, an organization with members drawn from broadcasting organizations and telecommunication providers together with companies from the professional and consumer electronics industry.

Modal verbs terminology

In the present document "**should**", "**should not**", "**may**", "**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).

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1 Scope

The present document provides brief explanations about the many different standards and guidelines for Digital Audio Broadcasting (DAB), what they cover and how they interrelate. The present document seeks to provide a useful guide to allow implementers to determine which aspects of the DAB system are in common use, and which are more specialized, for both consumer and professional equipment. Those specifications that are no longer considered to be in mainstream use (and are identified as "Historical" in the ETSI Work Programme) are also detailed.

2 References

2.1 Normative references

Normative references are not applicable in the present document.

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 referenced 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] ETSI EN 300 401: "Radio broadcasting systems; Digital Audio Broadcasting (DAB) to mobile, portable and fixed receivers".
- [i.2] ETSI TS 101 756: "Digital Audio Broadcasting (DAB); Registered Tables".
- [i.3] ETSI TS 103 176: "Digital Audio Broadcasting (DAB); Rules of implementation; Service information features".
- [i.4] ETSI TS 102 367: "Digital Audio Broadcasting (DAB); Conditional Access".
- [i.5] ETSI TS 102 563: "Digital Audio Broadcasting (DAB); DAB+ audio coding (MPEG HE-AACv2)".
- [i.6] ETSI TS 103 466: "Digital Audio Broadcasting (DAB); DAB Audio Coding (MPEG layer II)".
- [i.7] ETSI TS 101 757: "Digital Audio Broadcasting (DAB) Conformance testing for DAB Audio".
- [i.8] ETSI EN 301 234: "Digital Audio Broadcasting (DAB); Multimedia Object Transfer (MOT) protocol".
- [i.9] ETSI TS 101 759: "Digital Audio Broadcasting (DAB); Data Broadcasting - Transparent Data Channel (TDC)".
- [i.10] ETSI TS 102 427: "Digital Audio Broadcasting (DAB); Data Broadcasting - MPEG-2 TS streaming".
- [i.11] ETSI EN 300 797: "Digital Audio Broadcasting (DAB); Distribution interfaces; Service Transport Interface (STI)".
- [i.12] ETSI TS 101 860: "Digital Audio Broadcasting (DAB); Distribution interfaces; Service Transport Interface (STI); STI Levels".
- [i.13] ETSI EN 300 798: "Digital Audio Broadcasting (DAB); Distribution interfaces; Digital baseband In-phase and Quadrature (DIQ) interface".

- [i.14] ETSI ETS 300 799: "Digital Audio Broadcasting (DAB); Distribution interfaces; Ensemble Transport Interface (ETI)".
- [i.15] ETSI TS 102 693: "Digital Audio Broadcasting (DAB); Encapsulation of DAB Interfaces (EDI)".
- [i.16] ETSI TS 102 821: "Digital Radio Mondiale (DRM); Distribution and Communications Protocol (DCP)".
- [i.17] ETSI TS 101 499: "Hybrid Digital Radio (DAB, DRM, RadioDNS); SlideShow; User Application Specification".
- [i.18] ETSI TS 102 818: "Hybrid Digital Radio (DAB, DRM, RadioDNS); XML Specification for Service and Programme Information (SPI)".
- [i.19] ETSI TS 102 371: "Digital Audio Broadcasting (DAB); Digital Radio Mondiale (DRM); Transportation and Binary Encoding Specification for Service and Programme Information (SPI)".
- [i.20] ETSI TS 103 177: "Digital Audio Broadcasting (DAB); Filecasting; User Application Specification".
- [i.21] ETSI TS 102 980: "Digital Audio Broadcasting (DAB); Dynamic Label Plus (DL Plus); Application specification".
- [i.22] ETSI TS 102 979: "Digital Audio Broadcasting (DAB); Journaline; User application specification".
- [i.23] ETSI TS 102 428: "Digital Audio Broadcasting (DAB); DMB video service; User Application Specification".
- [i.24] ETSI TS 103 551: "Digital Audio Broadcasting (DAB); Transport of TPEG services".
- [i.25] ETSI TS 103 461: "Digital Audio Broadcasting (DAB); Domestic and in-vehicle digital radio receivers; Minimum requirements and Test specifications for technologies and products".
- [i.26] ETSI TR 101 496 (all parts): "Digital Audio Broadcasting (DAB); Guidelines and rules for implementation and operation".
- [i.27] ETSI TR 101 497: "Digital Audio Broadcasting (DAB); Rules of Operation for the Multimedia Object Transfer Protocol".
- [i.28] ETSI TS 101 498 (all parts): "Digital Audio Broadcasting (DAB); Broadcast Website".
- [i.29] ETSI TR 101 758: "Digital Audio Broadcasting (DAB); Signal strengths and receiver parameters; Targets for typical operation".
- [i.30] ETSI TS 101 993: "Digital Audio Broadcasting (DAB); A Virtual Machine for DAB; DAB Java Specification".
- [i.31] ETSI TS 102 368: "Digital Audio Broadcasting (DAB); DAB - TMC (Traffic Message Channel)".
- [i.32] ETSI TS 102 632: "Digital Audio Broadcasting (DAB); Voice Applications".
- [i.33] ETSI TS 102 635 (all parts): "Digital Audio Broadcasting (DAB); Middleware".
- [i.34] ETSI TS 102 652: "Digital Audio Broadcasting (DAB); Intellitext; Application specification".
- [i.35] ETSI TS 102 978: "Digital Audio Broadcasting (DAB); IPDC Services; Transport specification".
- [i.36] ETSI ES 201 735: "Digital Audio Broadcasting (DAB); Internet Protocol (IP) Datagram Tunnelling".
- [i.37] ETSI ES 201 736: "Digital Audio Broadcasting (DAB); Network Independent Protocols for Interactive Services".

- [i.38] ETSI ES 201 737: "Digital Audio Broadcasting (DAB); Interaction channel through Global System for Mobile communications (GSM) the Public switched Telecommunications System (PSTN); Integrated Services Digital Network (ISDN) and Digital Enhanced Cordless Telecommunications (DECT)".
- [i.39] ETSI EN 301 700: "Digital Audio Broadcasting (DAB); VHF/FM Broadcasting: cross-referencing to simulcast DAB services by RDS-ODA 147".
- [i.40] 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".

3 Abbreviations

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

API	Application Programming Interface
BWS	Broadcast WebSite
CA	Conditional Access
DAB	Digital Audio Broadcasting
DCP	Distribution and Communications Protocol
DECT	Digital Enhanced Cordless Telecommunications
DIQ	Digital baseband In-phase and Quadrature
DL	Dynamic Label
DMB	Digital Multimedia Broadcasting
DRM	Digital Radio Mondiale
EBU	European Broadcasting Union
EDI	Encapsulation of DAB Interfaces
EPG	Electronic Programme Guide
ETI	Ensemble Transport Interface
FIC	Fast Information Channel
FIDC	Fast Information Data Channel
FM	Frequency Modulation
FM-RDS	Frequency Modulation - Radio Data System
GHz	Giga (10 ⁹) Hertz
GI	Group Information
GIO	Guidelines and rules for Implementation and Operation
GSM	Global System for Mobile communication
HE-AAC	High Efficiency - Advanced Audio Coding
HTML	Hyper Text Markup Language
IEC	International Electrotechnical Committee
IP	Internet Protocol
IPDC	Internet Protocol Data Channel
ISDN	Integrated Services Digital Network
JTC	Joint Technical Committee
LI	Logical Interface
Mbit/s	Mega (10 ⁶) bits per second
MHEG	Multimedia and Hypermedia information coding Experts Group
MHz	Mega (10 ⁶) Hertz
MOT	Multimedia Object Transfer
MPEG	Moving Pictures Expert Group
MSC	Main Service Channel
MTU	Maximum Transfer Unit
ODA	Open Data Application
OFDM	Orthogonal Frequency Division Multiplexing
PAD	Programme Associated Data
PFT	Protection, Fragmentation and Transport
PI	Programme Information
PSI/SI	Programme Specific Information/Service Information
PSSC	Personal DAB Service Session Control
PSTN	Public Switched Telecommunications System

RDI	Receiver Data Interface
RDS	Radio Data System
RDS-ODA	RDS Open Data Application
RF	Radio Frequency
RTP	Real-time Transport Protocol
SAT	Sub-channel Assignment Table
SFN	Single Frequency Network
SI	Service Information
SPI	Service and Programme Information
STI	Service Transport Interface
STI-C	Service Transport Interface - Control
STI-D	Service Transport Interface - Data
T-DAB	Terrestrial DAB
TDC	Transparent Data Channel
TMC	Traffic Message Channel
TPEG	Transport Protocol Experts Group
XML	eXtensible Markup Language

4 Introduction

The DAB system originated as a European funded project known as Eureka 147. The members of the project team decided to standardize the system at ETSI and the system standard was first published in 1995. Since then the system has been modified in various ways and additional standards documents have also been created to facilitate additional features, interoperable equipment interfaces for contribution and distribution networks, additional transport modes, data applications and so on. The present document is designed to provide some background and guidance to those considering using the DAB system so that the appropriate standards documents are consulted.

DAB is primarily a system for digital radio and so the coding and modulation is designed to provide reliable mobile reception. This also allows non-audio services to be carried, including mobile video services, traffic data, and a host of other applications.

DAB is relatively wideband for a broadcast radio system and therefore carries several services, known as a multiplex. However, the multiplex is primarily a feature of the transmission system. One key benefit of digital radio is that it should be easy to use: therefore receiver makers should ensure that the user can understand the way to select services, and this is often best achieved with a flat list.

DAB is most widely used as a digital radio transmission system using DAB+ audio coding and text messages carried as dynamic labels. Additional data often accompanies the audio: visuals via the SlideShow application, and logos and programme information via the SPI application.

5 DAB system standards

5.1 Introduction

The DAB system is built around a core which defines the coding, modulation and transmission system parameters. Surrounding the core, two basic data mechanisms are provided: stream mode and packet mode. Also defined is the signalling channel that allows a receiver to make sense of the content of the multiplex.

Audio coding and data transport definitions are provided in separate documents, along with the enumeration of certain signalling parameters and the rules of operation for complex service information features.

This scheme is shown in figure 1.

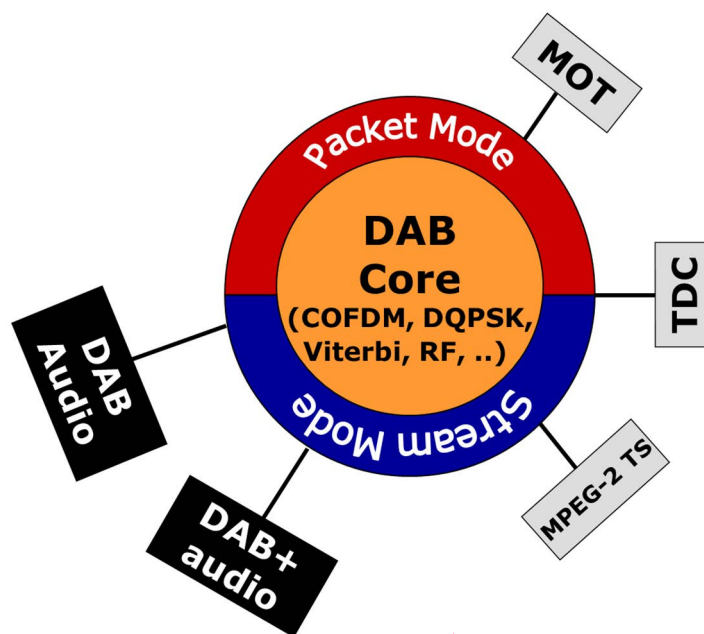


Figure 1: Building blocks of the DAB system

5.2 DAB system definition

5.2.1 DAB system standard

ETSI EN 300 401 [i.1] is the DAB system standard. It was first published in 1995. In 2016 the WorldDAB Technical Committee performed a detailed review of the standard and the way that it had been utilized during its 20 year lifetime. The conclusion of that work was a simplified and revised version of the standard published as V2.1.1 in 2017. It describes the DAB system, designed for delivery of high-quality digital audio programme and data services for mobile, portable and fixed reception from terrestrial transmitters in frequency bands from 30 MHz to 300 MHz. The DAB system is designed to provide spectrum and power efficient techniques in terrestrial transmitter network planning, known as the Single Frequency Network (SFN).

ETSI EN 300 401 [i.1] defines the DAB transmission signal. It includes the coding algorithms for multiplexing of audio programmes and data services, channel coding and modulation. Provision is also made for transmission of additional data services which may be programme related or not, within the limit of the total system capacity. ETSI EN 300 401 [i.1] provides information on the system configuration which includes information about the ensembles, services, service components and linking of them. ETSI EN 300 401 [i.1] describes the nominal characteristics of the emitted DAB signal.

5.2.2 Registered tables

To allow development of additional features and data services without the need to revise the DAB system standard, ETSI TS 101 756 [i.2] contains the enumeration of various parameters. It also contains the enumeration for certain parameters in the MOT standard, ETSI EN 301 234 [i.8].

The tables in ETSI TS 101 756 [i.2] are maintained by the WorldDAB Technical Committee. The procedure for registering a new value in an existing table or the registration of a new table is described in clause 4 of ETSI TS 101 756 [i.2].

Additionally there are annexes containing translations of Programme Type Codes and Announcement Type Codes and the definition of the Latin-based character set and its minimum representation on displays.