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TECHNICAL SPECIFICATION

Digital Audio Broadcasting (DAB);
Transport of TPEG services

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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 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 "**shall**", "**shall not**", "**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).

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

1   Scope

The present document describes the standardized method to carry TPEG services over Digital Audio Broadcast (DAB).

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 referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at https://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 (V2.1.1): "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 TS 101 759: "Digital Audio Broadcasting (DAB); Data Broadcasting - Transparent Data Channel (TDC)".

[4]   ISO/TS 21219-5: "Intelligent transport systems - Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) -- Part 5: Service framework (TPEG2-SFW)".

2.2   Informative references

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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.

Not applicable.

3   Definitions and abbreviations

3.1   Definitions

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

MSC data group: package of data used for one user application in the Main Service Channel

TPEG transport frame: data-structure implementing the TPEG service in the TPEG binary representation

3.2   Abbreviations

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

CRC   Cyclic Redundancy Check
DAB   Digital Audio Broadcasting
DSCTy   Data Service Component Type
EBU   European Broadcasting Union
FEC   Forward Error Correction
FIG   Fast Information Group
MSC   Main Service Channel
TDC   Transparent Data Channel
TPEG   Transport Protocol Expert Group
TPEG2-SFW   Transport Protocol Expert Group 2 Service FrameWork
TTI   Traffic and Travel Information
UATy   User Application Type

4   Introduction

TPEG permits a wide range of data to be formatted and packaged to make it transportable and decodable by suitably equipped receivers. TPEG is designed to be bearer independent and so may be delivered as a simple stream of bytes. The present document describes the standard method to transport a TPEG byte stream over DAB.

5   Transport of TPEG services

5.1   Transport method

TPEG transport frames (see ISO/TS 21219-5 [4]) shall be carried in MSC data groups. The MSC data groups shall be transported using the TDC in a packet mode service component with data groups, as specified in ETSI TS 101 759 [3], clause 4.1.2.

An MSC data group shall carry one or more complete TPEG transport frames. Every MSC data group shall begin with the start of a TPEG transport frame. MSC data group segmentation shall not be used. A TPEG transport frame shall not exceed the size of the data group data field. Padding bytes with the value 0 may be appended following the TPEG transport frames if a fixed size MSC data group is desired, although this will reduce the efficiency of transmission.

Repetition of data groups shall not be used because the TPEG transport frames are repeated by the TPEG service provider.

MSC data groups shall be used with the header attributes specified in table 1.

Table 1: List of data group header attributes

Header field	Value	Notes
Extension Flag	0	No extension field
CRC Flag	1	CRC used
Segment Flag	0	No segment field
User Access Flag	0	No user access field
Data Group Type	0000	General data
Continuity Index	Increments for each data group	
Repetition Index	0	Repetition is not used

The MSC data groups shall be divided into packets and inserted into a packet mode sub-channel, which may also carry other packet mode service components. Padding shall be inserted as necessary if the final packet is not completely filled with useful data from the MSC data group.

Transmission systems shall always set the CRC flag = 1. Previous versions of the DAB standard (see [1]) permitted the data group CRC to be optional; for a transitional period these transmissions may remain on-air and so receivers shall check the value of the CRC flag.

Forward Error Correction shall be applied to the packet mode sub-channel used to carry the TPEG service component.

The TPEG service component shall not use DAB conditional access.

In FIG 0/3, the DSCTy shall be set to TDC (see ETSI TS 101 756 [2]).

In FIG 0/13, the UATy shall be set to TPEG (see ETSI TS 101 756 [2]).

In FIG 0/14, the FEC Scheme shall be set to 01 (FEC scheme applied according to ETSI EN 300 401 [1], clause 5.3.5).

5.2 Decoder issues

TPEG receiver implementations shall support FEC for packet mode sub-channels.

MSC data groups carry complete TPEG transport frames and may include padding bytes with value 0 at the end.

Assembly of data groups should proceed as follows:

Data groups should be assembled exclusively from error-free packet data, extracted from packets with successful packet CRC confirmation. The data group assembly should confirm the continuity index in the packet header to be incrementing correctly in successive packets. Once a data group has been assembled from a contiguous sequence of error free data packets, when present (the CRC flag indicates whether the transmission uses the data group CRC or not) the data group CRC shall be evaluated to establish that the data group payload is error free.

NOTE: While CRC checks are generally not free from false-positive results, it is highly unlikely that both packet and data group CRCs will have a false-positive at the same time. The chance that a data group assembled from packets with false-positive packet CRCs will give a correct data group CRC should be considered negligible.

This best practice is to ensure that the data group payload is free from errors; TPEG decoders may additionally confirm validity of data using TPEG specific integrity mechanisms.

History

Document history		
V1.1.1	August 2017	Publication