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Digitalna zvokovna radiodifuzija (DAB) - Vmesniki za razpošiljanje - Vmesnik za razpošiljanje oddajnega signala (ETI)

Digital Audio Broadcasting (DAB); Distribution interfaces; Ensemble Transport Interface (ETI)

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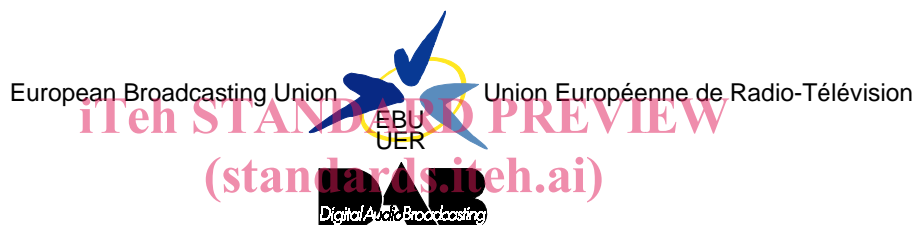
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Digital Audio Broadcasting (DAB); Distribution interfaces; Ensemble Transport Interface (ETI)

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Foreword

This European Telecommunication Standard (ETS) has been produced by the Joint Technical Committee (JTC) of the European Broadcasting Union (EBU), Comité Européen de Normalisation ELECTrotechnique (CENELEC) and the European Telecommunications Standards Institute (ETSI).

NOTE: The EBU/ETSI JTC was established in 1990 to co-ordinate the drafting of ETSs in the specific field of broadcasting and related fields. Since 1995 the JTC 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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EUREKA Project 147 (DAB**)

EUREKA Project 147 was established in 1987, with funding from the EC, to develop a system for the broadcasting of audio and data to fixed, portable or mobile receivers. Their work resulted in the publication of a European Standard, ETS 300 401 [1], for DAB which now has world-wide acceptance. The members of the Eureka 147 Project are drawn from broadcasting organizations and telecommunication providers together with companies from the professional and consumer electronics industry.

** DAB is a registered trademark owned by one of the EUREKA 147 partners.

ETSI Project Team PT 84V

An ETSI Project Team was formed to produce this ETS describing the Digital Audio Broadcasting (DAB) Ensemble Transport Interface (ETI). The work of the Project Team was based on studies carried out by a EUREKA 147 Task Force on the definition of the ETI. The Project Team consisted of members of European broadcasting organizations and the consumer and professional electronics industry who had also been involved in the work of the EUREKA Task Force.

Transposition dates	
Date of adoption:	22 August 1997
Date of latest announcement of this ETS (doa):	31 December 1997
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	30 June 1998
Date of withdrawal of any conflicting National Standard (dow):	30 June 1998

Introduction

This ETS is one of a set associated with ETS 300 401 [1] describes the transmitted signal, the interface between the broadcaster's transmitters and the listener's receiver. The associated ETSs describe additional interfaces which can be used by broadcasters or network providers to build DAB networks.

Figure 1 shows a DAB network in outline. For convenience, the Network is split into a number of different parts, each managed by a different entity. The different entities are: the Programme/Data provider, the Service Component provider, the Ensemble provider and the Transmission Network provider.

NOTE: A Service Component provider may be generating a full DAB service or a component of a DAB service. For the purposes of this ETS, the terms Service provider and Service Component provider are interchangeable.

Programme/Data provider

The Programme/Data provider is the originator of the audio programme or the data being carried within the DAB Service Component. The format for the output of the Programme/Data provider may take many different forms and should be agreed between the Programme/Data provider and the Service Component provider.

Service Component provider

The Service Component provider is producing one or more complete Service Components which can form the complete DAB Service, but may not. The data from the Service Component provider will be of three different types:

- Service Component data which is to be inserted into the DAB Main Service Channel (MSC);
- Service Information related to the Service Component data which is to be inserted into the Fast Information Channel (FIC);
- Other data, not intended for transmission, including status monitoring or control.

The interface between the Service Component provider and the Ensemble provider is known as the Service Transport Interface (STI) and is defined in EN 300 797 [2].

Ensemble provider

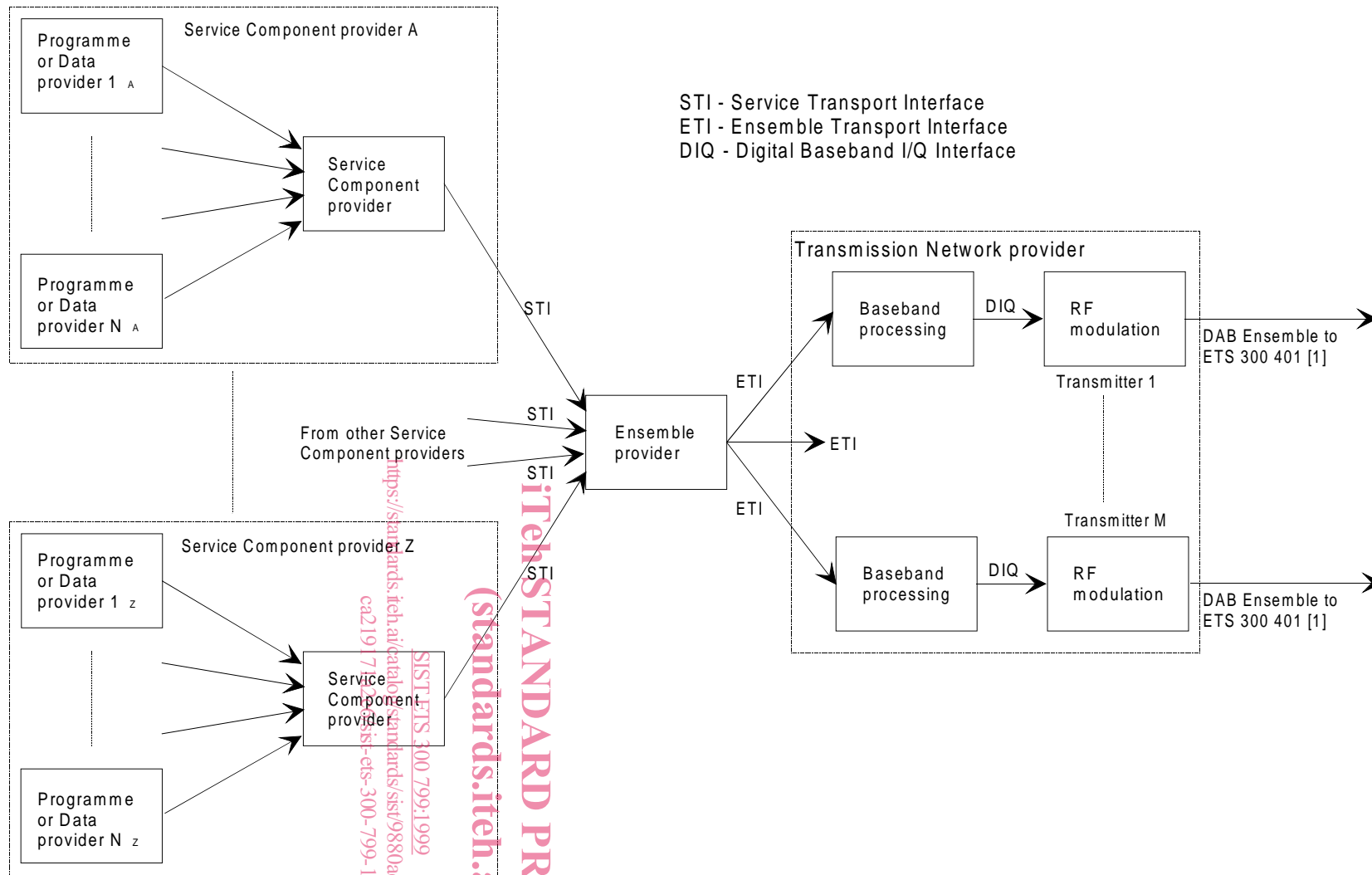
The Ensemble provider receives a set of service components from one or more Service Component providers. He then formats the FIC, and generates an unambiguous description of the full DAB Ensemble.

The ensemble description is passed to the Transmission Network provider via an interface called the ETI which is the subject of this ETS.

Transmission Network provider

The Transmission Network provider generates the DAB Ensemble and transmits it to the receiver. The output of the Transmission provider is defined by ETS 300 401 [1].

In some cases, as an intermediate step, the Transmission provider may find it convenient to generate a base-band representation of the signal to be transmitted. The base-band representation, known as the Digital baseband I/Q Interface, is a set of digital samples defining the In-phase (I) and Quadrature (Q) components of the final carrier. This interface is defined in EN 300 798 [3] and provides a convenient interface between digital processing equipment and radio-frequency modulating equipment.



STI - Service Transport Interface
 ETI - Ensemble Transport Interface
 DIQ - Digital Baseband I/Q Interface

Figure 1: DAB network outline

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1 Scope

This European Telecommunication Standard (ETS) establishes a standard method for the distribution of DAB signals between DAB multiplexing equipment, which may be located at the broadcaster's studio centres, and DAB modulation equipment located at transmission sites.

ETS 300 401 [1] established a broadcasting standard for a DAB system. Broadcasters who implement DAB networks require methods for transporting DAB signals, or the component parts of a DAB signal, between studio centres, where the programme or data service originates, and the transmitter sites from which the signal will be radiated. The network of circuits connecting the studio centre to the transmitters is generally known as the Distribution Network.

This ETS is applicable to Distribution Networks used in a DAB System. It describes the characteristics of a signal suitable for transporting a full DAB Ensemble, comprising a number of sub-channels and a formatted Fast Information Channel (FIC), between the DAB Ensemble provider and the Transmission network provider. The interface is suitable for use on a number of different physical media including standard 2 Mbit/s switched telecommunication networks. Provision is made for the inclusion of appropriate error detection and correction and for the management of network transit delay. Limited capacity is also made available for signalling from the studio centre to other equipment in the distribution network.

This ETS is not applicable to the distribution of DAB signals where the Service Information is available in any form other than as a complete, correctly formatted, FIC. The interface described is intended for use on unidirectional networks and this ETS does not cover the provision of status nor control information in the reverse direction (i.e. from transmitters back to the Ensemble provider or any other central monitoring point).

2 Normative references

This ETS incorporates, by dated and undated references, provisions from other publications. These normative references are cited at appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions to any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

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- [1] ETS 300 401 (1996): "Radio broadcasting systems; Digital Audio Broadcasting (DAB) to mobile, portable and fixed receivers".
- [2] prEN 300 797: "Digital Audio Broadcasting (DAB); Distribution interfaces; Service Transport Interface (STI)".
- [3] prEN 300 798: "Digital Audio Broadcasting (DAB); Distribution interfaces; Digital baseband I/Q interface (DIQ)".
- [4] ITU-T Recommendation G.703 (1972): "Physical/Electrical characteristics of hierarchical digital interfaces: Section 6. Interface at 2 048 kbit/s".
- [5] ITU-T Recommendation X.24 (1988): "List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) on public data networks".
- [6] ITU-T Recommendation V.11 (1988): "Electrical characteristics for balanced double-current interchange circuits for general use with integrated circuit equipment in the field of data communications".
- [7] ITU-T Recommendation G.704 (1988): "Synchronous frame structures used at primary and secondary hierarchical levels: Section 2.3 Basic frame structure at 2 048 kbit/s".
- [8] ITU-T Recommendation G.706 (1988): "Frame alignment and cyclic redundancy check (CRC) procedures relating to basic frame structures defined in Recommendation G.704".

3 Definitions, abbreviations and symbols

3.1 Definitions

For the purposes of this ETS, the definitions of ETS 300 401 [1] and the following definitions apply:

block: A component part of an ETI(NA, G.704) multiframe consisting of 8 G.704 frames. Each block comprises 256 bytes.

CIFcount: The common interleaved Frame (CIF) counter as defined in ETS 300 401 [1].

codeword: A Reed-Solomon codeword, as used by ETI(NA, G.704), comprises 240 bytes. Some of these bytes are data bytes, others are check bytes.

coding array: An array used in the conceptual description of ETI(NA, G.704).

CRC_n: A part of ETI(LI) containing a Cyclic Redundancy Check for header information.

distribution network: The network of data circuits linking the Service provider, Ensemble provider and Transmission Network provider.

ensemble multiplex: A set of data which describes the component parts of the DAB ensemble.

ensemble multiplexer: A multiplexer which generates an Ensemble multiplex.

ensemble provider: The manager of the DAB Ensemble multiplexer.

ensemble transport network: The network carrying the Ensemble Transport Interface.

EOF: A part of ETI(LI) containing End-Of-Frame information.

EOH: A part of ETI(LI) containing End-Of-Header information.

ERR: A part of ETI(LI) which can be modified by the physical layers to allow the reporting of ERRor status information.

ETI(LI): The logical definition of the Ensemble Transport Interface.

ETI(NA, G.704): A network adapted Ensemble Transport Interface containing DAB data as well as additional data to deal with network errors and delay variations.

ETI(NA, X): Any of the specific implementations of ETI(NA) which are described in this ETS.

ETI(NI): A generic reference to a basic physical implementation of the ETI suited to the local connection of equipment. If there is any ambiguity in the text, then ETI(NI) shall be taken to be equivalent to ETI(NI, G.703).

ETI(NI, G.703): A specific implementation of an ETI(NI) used on G.703 interfaces.

ETI(NI, V11): A specific implementation of an ETI(NI) used on V.11 interfaces.

ETI(NI, X): Any of the specific implementations of ETI(NI) which are described in this ETS.

FC: A part of ETI(LI) containing Frame Characterization data.

FCT: A part of ETI(LI) containing a Frame Count.

FICF: A part of ETI(LI) indicating whether FIC information is included, FIC Flag.

FICL: The length, in words, of the FIC data carried by the ETI.

FL: A part of ETI(LI) giving information about the Frame Length.

FP: A part of ETI(LI) containing Frame Phase information.

frame: An ETI Frame carries data representing a 24 ms period of the DAB ensemble.

FRPD: A part of ETI(LI) containing FRame PaDding.

FSYNC: The synchronizing field of ETI(NI, G.703) or ETI(NI, V11) frames.

G.703: An ITU-T Recommendation giving information about the physical characteristics of telecommunication interfaces.

G.704 frame: A framing structure of 32 8-bit timeslots as defined in G.704 (for 2 Mbit/s interfaces).

G.704: An ITU-T Recommendation defining telecommunication framing structures.

GF(28): A mathematical entity (a Galois Field of 256 entries) used in the process of producing Reed-Solomon error protection bytes.

interleaving array: An array used in the conceptual description of ETI(NA, G.704).

LIDATA field: A part of ETI(LI) which carries the data describing the DAB transmitted signal.

Logical Interface (LI): A definition of the ETI which contains all the elements to be carried by the interface, but has no physical manifestation.

MID: A part of ETI(LI) giving information about the DAB Mode Identity.

MNSC: A part of ETI(LI) carrying a Multiplex Network Signalling Channel.

mode: The DAB signal described in ETS 300 401 [1] is able to operate in four different modes (I to IV) to suit different applications.
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MSC: The Main Service Channel, a part of the DAB signal described in ETS 300 401 [1].

MST: A part of ETI(LI) carrying Main Stream information, destined for the MSC and FIC fields of the DAB ensemble.

multiframe: A composite frame structure used in ETI(NA, G.704) to map the 24 ms time-frame of ETI(LI) onto the elemental G.704 frames.

NASC: A part of ETI(NA, G.704) carrying a Network Adapted Signalling Channel.

Network Adaptation (NA): The process of adapting ETI(LI) to suit the characteristics of a particular network.

Network Independent (NI): A physical form of the ETI interface which is not adapted to any particular network but can be used for a local connection between equipment.

NST: A part of ETI(LI) giving information about the Number of Streams being carried.

OFDM generator: The equipment which is the final recipient of the ETI signal and which applies the DAB channel encoding.

Plesiochronous Digital Hierarchy (PDH): A telecommunications network structure having a number of different hierarchical levels.

Reed-Solomon: A form of coding which allows the correction of transmission errors.

SSTC_n: A part of ETI(LI) which defines the Sub-channel Stream Characteristics of data stream n.