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Digitalna videoradiodifuzija (DVB) – Specifikacija DVB za podatkovno radiodifuzijo

Digital Video Broadcasting (DVB); DVB specification for data broadcasting

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Foreword

This European Standard (Telecommunications series) has been produced by the 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: 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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Digital Video Broadcasting (DVB) Project

Founded in September 1993, the DVB Project is a market-led consortium of public and private sector organizations in the television industry. Its aim is to establish the framework for the introduction of MPEG-2 based digital television services. Now comprising over 200 organizations from more than 25 countries around the world, DVB fosters market-led systems, which meet the real needs, and economic circumstances, of the consumer electronics and the broadcast industry.

National transposition dates	
Date of adoption of this EN:	4 June 1999
Date of latest announcement of this EN (doa):	30 September 1999
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 March 2000
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1 Scope

The present document is designed to be used in conjunction with EN 300 468 [2] and ETR 211 [4]. The DVB System provides a means of delivering MPEG-2 Transport Streams (TS) via a variety of transmission media. These TSs have traditionally been oriented to containing MPEG-2 Video and Audio. Data broadcasting is seen as an important extension of the MPEG-2 based DVB transmission standards. Examples for data broadcasting are the download of software over satellite, cable or terrestrial links, the delivery of Internet services over broadcast channels (IP tunnelling), interactive TV etc. Four different application areas with different requirements for the data transport have been identified. For each application area a data broadcasting profile is specified in the present document. The following is a short description of the application areas and the profiles.

Data piping

- The data broadcast specification profile for data pipes supports data broadcast services that require a simple, asynchronous, end-to-end delivery of data through DVB compliant broadcast networks. Data broadcast according to the data pipe specification is carried directly in the payloads of MPEG-2 TS packets (see ISO/IEC 13818-1 [1]).

Data streaming

- The data broadcast specification profile for data streaming supports data broadcast services that require a streaming-oriented, end-to-end delivery of data in either an asynchronous, synchronous or synchronized way through DVB compliant broadcast networks. Data broadcast according to the data streaming specification is carried in Program Elementary Stream (PES) packets which are defined in MPEG-2 Systems (see ISO/IEC 13818-1 [1]).
- Asynchronous data streaming is defined as the streaming of only data without any timing requirements (e.g. RS-232 data).
- Synchronous data streaming is defined as the streaming of data with timing requirements in the sense that the data and clock can be regenerated at the receiver into a synchronous data stream (e.g. E1, T1). Synchronized data streaming is defined as the streaming of data with timing requirements in the sense that the data within the stream can be played back in synchronization with other kinds of data streams (e.g. audio, video).

Multiprotocol encapsulation

- The data broadcast specification profile for multiprotocol encapsulation supports data broadcast services that require the transmission of datagrams of communication protocols via DVB compliant broadcast networks. The transmission of datagrams according to the multiprotocol encapsulation specification is done by encapsulating the datagrams in DSM-CC sections (see ISO/IEC 13818-6 [5]), which are compliant with the MPEG-2 private section format (see ISO/IEC 13818-1 [1]).

Data carousels

- The data broadcast specification for data carousels supports data broadcast services that require the periodic transmission of data modules through DVB compliant broadcast networks. The modules are of known sizes and may be updated, added to, or removed from the data carousel in time. Modules can be clustered into a group of modules if required by the service. Likewise, groups can in turn be clustered into SuperGroups.
- Data broadcast according to the data carousel specification is transmitted in a DSM-CC data carousel which is defined in MPEG-2 DSM-CC (see ISO/IEC 13818-6 [5]). the present document defines additional structures and descriptors to be used in DVB compliant networks. The method is such that no explicit references are made to PIDs and timing parameters enabling preparation of the content off-line.

Object carousels

- The object carousel specification has been added in order to support data broadcast services that require the periodic broadcasting of DSM-CC User-User (U-U) Objects through DVB compliant broadcast networks, specifically as defined by DVB Systems for Interactive Services (SIS) (see ETS 300 802 [10]). Data broadcast according to the DVB object carousel specification is transmitted according to the DSM-CC Object Carousel and DSM-CC Data Carousel specification which are defined in MPEG-2 DSM-CC (see ISO/IEC 13818-6 [5]).

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] ISO/IEC 13818-1: "Information technology - Generic coding of moving pictures and associated audio information - Part 1: Systems".
- [2] EN 300 468: "Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems".
- [3] ETR 162: "Digital Video Broadcasting (DVB); Allocation of Service Information (SI) codes for DVB systems".
- [4] ETR 211: "Digital Video Broadcasting (DVB); Guidelines on implementation and usage of Service Information (SI)".
- [5] ISO/IEC 13818-6: "Information technology -- Generic coding of moving pictures and associated audio information -- Part 6: Extensions for DSM-CC"
- [6] EN 300 472: "Digital Video Broadcasting (DVB); Specification for conveying ITU-R System B Teletext in DVB bitstreams".
- [7] IETF RFC 1112 (1989): "Host Extensions for IP Multicasting", Stanford University.
- [8] IETF RFC 2045 (1996): "Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies".
- [9] IETF RFC 2046 (1996): "Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types".
- [10] ETS 300 802: "Digital Video Broadcasting (DVB); Network-independent protocols for DVB interactive services".
- [11] ISO/IEC 8802-1 and 2: "Information technology; Telecommunications and information exchange between systems; Local and metropolitan area networks; Specific requirements; Part 1: Overview of Local Area Network Standards Part 2: Logical link control".
- [12] ETS 300 743: "Digital Video Broadcasting (DVB); Subtitling systems".
- [13] ISO 8859: "Information processing - 8-bit single-byte coded graphic character sets, Latin alphabets".
- [14] ISO 639-2: "Codes for the representation of names of languages - Part 2: Alpha-3 code3".
- [15] IETF RFC 1950 (1996): "ZLIB Compressed Data Format Specification version 3.3".

3 Abbreviations

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

AFI	Authority and Format Identifier
BCD	Binary Coded Decimal
bslbf	bit string, left bit first
CRC	Cyclic Redundancy Code
DAVIC	Digital Audio Visual Council
DDB	DownloadDataBlock
DII	DownloadInfoIndication
DSI	DownloadServerInitiate
DSM-CC	DSM-CC data carousel specification
DVB	Digital Video Broadcasting
EBU	European Broadcasting Union
EIT	Event Information Table
ETR	ETSI Technical Report
ETS	European Telecommunication Standard
gi	GroupInfoByte
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers (USA)
IP	Internet Protocol
ISO	International Organization for Standardization
LLC	Logical Link Control
MAC	Media Access Control
mi	ModuleInfoBytes
MIME	Multipurpose Internet Mail Extensions
MPEG	Moving Pictures Expert Group
NSAP	Network Service Access Point
OUI	Organizational Unique Identifier
PCR	Program Clock Reference
PES	Program Elementary Stream
PID	Packet Identifier
PMT	Program Map Table
PSI	Program Specific Information
PTS	Presentation Time Stamps
RFC	Request For Comment
rpchof	remainder polynomial coefficients, highest order first
RS	Reed Solomon
SDT	Service Description Table
SI	Service Information
SIS	Systems for Interactive Services
SNAP	SubNetwork Attachment Point
TS	Transport Stream
T-STD	Transport System Target Decoder
uimsbf	unsigned integer most significant bit first
U-U	User-User

4 Data piping

4.1 Data transport specification

The data broadcast service shall insert the data to be broadcast directly in the payload of MPEG-2 TS packets.

The data broadcast service may use the `payload_unit_start_indicator` field and the `transport_priority` field of the MPEG-2 Transport Stream packets in a service private way. The use of the `adaptation_field` shall be MPEG-2 compliant.

The delivery of the bits in time through a data pipe is service private and is not specified in the present document.

4.2 PSI and SI specifications

The data broadcast service shall indicate the use of a data pipe by including one or more `data_broadcast_descriptors` in SI (see EN 300 468 [2]). Each descriptor shall be associated with a particular data pipe via a `component_tag` identifier. In particular, the value of the `component_tag` field shall be identical to the value of the `component_tag` field of a `stream_identifier_descriptor` (see EN 300 468 [2]) that may be present in the PSI program map section for the stream that is used as a data pipe.

4.2.1 Data_broadcast_descriptor

The `data_broadcast_descriptor` is used in the following way:

data_broadcast_id: this field shall be set to 0x0001 to indicate a DVB data pipe (see ETR 162 [3]).

component_tag: this field shall have the same value as a `component_tag` field of a `stream_identifier_descriptor` (if present in the PSI program map section) for the stream that is used as a data pipe.

selector_length: this field shall be set to zero.

selector_byte: this field is not present.

4.2.2 Stream type

The specification of the `stream_type` in the program map section is not defined in the present document.

5 Asynchronous data streaming

5.1 Data transport specification

The data broadcast service shall insert the data to be broadcast in PES packets as defined by MPEG-2 Systems ISO/IEC 13818-1 [1]. The PES packets shall be of non-zero length. The mapping of the PES packets into MPEG-2 Transport Stream packets is defined in MPEG-2 Systems ISO/IEC 13818-1 [1].

The asynchronous data streaming specification uses the standard PES packet syntax and semantics with the following constraints:

stream_id: this field shall be set to the value of 0xBF (`private_stream_2`).

PES_packet_length: this is a 16-bit field which shall be set to a non-zero value.

5.2 PSI and SI specifications

The data broadcast service shall indicate the use of an asynchronous data stream by including one of more data broadcast descriptors in SI (see EN 300 468 [2]). Each descriptor shall be associated with a particular stream via a `component_tag` identifier. In particular, the value of the `component_tag` field shall be identical to the value of the `component_tag` field of a `stream_identifier_descriptor` (see EN 300 468 [2]) that may be present in the PSI program map section for the stream that is used as a data stream.

5.2.1 Data_broadcast_descriptor

The data broadcast descriptor is used in the following way:

data_broadcast_id: this field shall be set to 0x0002 to indicate an asynchronous data stream (see ETR 162 [3]).

component_tag: this field shall have the same value as a `component_tag` field of a `stream_identifier_descriptor` (if present in the PSI program map section) for the stream on which the data is broadcast.

selector_length: this field shall be set to zero.

selector_byte: this field is not present.

5.2.2 Stream type

The presence of an asynchronous data stream in a service shall be indicated in the program map of that service by setting the stream type of that stream to the value of 0x06 or an user private value.

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6 Synchronous and synchronized data streaming

6.1 Data transport specification

The data broadcast service shall insert the data to be broadcast in PES packets as defined by MPEG-2 Systems. The PES packets shall be of non-zero length. The mapping of the PES packets into MPEG-2 Transport Stream packets is defined in MPEG-2 Systems ISO/IEC 13818-1 [1].

The synchronous and synchronized data streaming specifications use the standard PES packet syntax and semantics with the following constraints:

stream_id: this field shall be set to the value of 0xBD (`private_stream_1`) for synchronous and synchronized data streams. **PES_packet_length:** this is a 16-bit field which shall be set to a non-zero value.

The data is inserted in PES packets using the `PES_data_packet` structure. The syntax and semantics of the `PES_data_packet` structure are defined in Table 1.