

Draft ETSI EN 303 560 V1.1.1 (2018-01)



**Digital Video Broadcasting (DVB);  
TTML subtitling systems**

*ITeH STANDARD PREVIEW  
(standards.iteh.ai)  
Full standard:  
<https://standards.iteh.ai/catalog/standards/s0560821-b1ff-434c-9c62-4207fc329234/etsi-en-303-560-v1.1.1-201801>*

**EBU**  
OPERATING EUROVISION

**DVB<sup>®</sup>**

---

**Reference**DEN/JTC-DVB-375

---

---

**Keywords**broadcast, digital, DVB, subtitle, TV

---

**ETSI**

650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

---

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° 7803/88

---

**Important notice**

---

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status.

Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommiteeSupportStaff.aspx>

---

**Copyright Notification**

---

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2018.

© European Broadcasting Union 2018.

All rights reserved.

**DECT™**, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members.

**3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

**oneM2M** logo is protected for the benefit of its Members.

**GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

# Contents

Intellectual Property Rights .....	5
Foreword.....	5
Modal verbs terminology.....	6
Introduction .....	6
1 Scope .....	7
2 References .....	7
2.1 Normative references .....	7
2.2 Informative references.....	8
3 Definitions and abbreviations.....	9
3.1 Definitions.....	9
3.2 Abbreviations .....	10
4 Default DVB TTML subtitle conformance point.....	11
4.1 Introduction .....	11
4.2 Document Constraints .....	11
4.2.1 General.....	11
4.2.2 Regions .....	12
4.2.3 Document complexity.....	12
4.2.4 Document encoding .....	12
4.2.5 Namespaces .....	12
4.2.6 Guidance for document authors and content providers (informative) .....	12
4.2.6.1 Overview .....	12
4.2.6.2 Font mapping for generic font family names .....	12
4.2.6.3 Default text colour.....	13
4.2.6.4 Requirement for support of optional features.....	13
4.2.6.5 Specifying active area .....	13
5 Delivery .....	13
5.1 IP delivery .....	13
5.2 Broadcast TS delivery .....	13
5.2.1 PSI/SI signalling .....	13
5.2.1.1 TTML subtitling descriptor.....	13
5.2.1.2 Example TTML profile signalling .....	17
5.2.1.2.1 Signalling conformance only to the default conformance point .....	17
5.2.1.2.2 Signalling conformance to only EBU-TT-D .....	17
5.2.1.2.3 Signalling conformance with EBU-TT-D and the default conformance point .....	17
5.2.1.2.4 Signalling conformance to only IMSC1 Text Profile.....	18
5.2.1.3 Presentation properties in qualifier field .....	18
5.2.1.4 Component descriptors for TTML subtitles.....	19
5.2.2 TS packetization .....	19
5.2.2.1 PES packet format and carriage in the TS.....	19
5.2.2.2 PES packet payload format for TTML subtitling.....	20
5.2.2.2.1 General PES payload field syntax and segment types .....	20
5.2.2.2.2 Occurrences of segments in one PES packet.....	21
5.2.2.2.3 Uncompressed TTML document subtitle segment.....	21
5.2.2.2.4 gzip compressed TTML document subtitle segment.....	21
5.2.3 TTML segmentation .....	21
5.2.3.1 General .....	21
5.2.3.2 Concept of ISDs .....	22
5.2.3.3 Active Period of a TTML segment .....	22
5.2.3.4 TTML documents segmentation rules.....	22
5.2.3.5 Subtitle stream in the absence of subtitles.....	22
5.2.3.6 Continuation of a subtitle across adjacent segments .....	22
5.2.3.7 Untimed elements in TTML segments .....	23
5.2.3.8 Examples of TTML segmentation.....	23

5.2.4	Synchronization .....	23
5.2.4.1	Relationship between MPEG system clock and TTML timeline .....	23
5.2.4.2	Failure of TTML segment reception .....	24
5.2.4.3	Synchronization examples .....	24
5.2.5	Acquisition time.....	27
5.3	Font download.....	27
5.3.1	Introduction.....	27
5.3.2	Font delivery signalling mechanism .....	28
5.3.2.1	Overview.....	28
5.3.2.2	Linkage descriptor with linkage type 0x20 .....	29
5.3.2.2.1	Introduction .....	29
5.3.2.2.2	Linkage descriptor with linkage type 0x20 structure.....	29
5.3.2.2.3	Linkage descriptor with linkage type 0x20 location, occurrence and prioritization.....	30
5.3.2.3	Downloadable Font Information Table (DFIT).....	30
5.3.2.3.1	DFIT structure .....	30
5.3.2.3.2	font_info_type in the loop of the DFIS.....	32
5.3.3	IP download fonts .....	33
5.3.4	Broadcast download fonts.....	33
5.3.5	Downloaded font file, font name and font-id association .....	33
6	IRD requirements .....	34
6.1	General support .....	34
6.2	Forward compatibility .....	34
6.3	Support of PSI/SI signalling and subtitle service selection .....	34
6.3.1	PSI/SI signalling .....	34
6.3.2	Determining which subtitle services can be rendered .....	34
6.3.3	Subtitle service selection .....	34
6.4	Font support in IRDs .....	35
6.4.1	Supported fonts and font family name mapping .....	35
6.4.2	Downloadable font retrieval .....	35
6.4.3	Font selection for subtitle rendering .....	36
6.5	Rendering requirements .....	36
6.5.1	Playback free-running when A/V sync lost temporarily.....	36
6.5.2	Behaviour during trick play .....	36
6.5.3	Subtitle composition with HDR video .....	36
6.5.4	Cropping and scaling of video .....	37
6.6	Additional TTML processor requirements.....	37
<b>Annex A (informative): Change History .....</b>		<b>38</b>
History .....		39

# Intellectual Property Rights

## Essential patents

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org/>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

## Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

# Foreword

This draft European Standard (EN) 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), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

**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.

European Broadcasting Union  
CH-1218 GRAND SACONNEX (Geneva)  
Switzerland  
Tel: +41 22 717 21 11  
Fax: +41 22 717 24 81

The Digital Video Broadcasting Project (DVB) is an industry-led consortium of broadcasters, manufacturers, network operators, software developers, regulatory bodies, content owners and others committed to designing global standards for the delivery of digital television and data services. DVB fosters market driven solutions that meet the needs and economic circumstances of broadcast industry stakeholders and consumers. DVB standards cover all aspects of digital television from transmission through interfacing, conditional access and interactivity for digital video, audio and data. The consortium came together in 1993 to provide global standardization, interoperability and future proof specifications.

<b>Proposed national transposition dates</b>	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

---

## 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.

---

## Introduction

Today's broadcast content can be distributed in many forms and via many different paths. Whilst broadcast services traditionally relied on bitmap-based subtitles because of processing simplicity, advanced processing and text rendering have made text-based approaches feasible. These offer more flexibility and better options to improve the user experience. TTML (Timed Text Markup Language) is established as a common solution for IP-based platforms, but multiple profiles exist.

In Europe, the EBU Group 'Subtitles in XML' published the EBU-TT-D TTML profile [20] which was adopted by the DVB DASH specification [6] and by HbbTV [5]. The W3C later published the IMSC1 TTML profiles [4], which were adopted by ATSC.

There are only minor differences between EBU-TT-D [3], [20] and IMSC1 Text Profile.

The present specification builds on the existing widespread device support for EBU-TT-D [20], in particular through support for HbbTV, to enable the distribution of TTML subtitles together with audio/video content via broadcast.

Clause 4 specifies TTML subtitle constraints for a default conformance point, to be supported by both EBU-TT-D [3], [20] and IMSC1 Text Profile compatible processors.

Clause 5 specifies subtitle delivery, including PSI/SI signalling, TS packetisation, TTML segmentation and synchronization requirements.

Finally clause 6 specifies IRD requirements.

---

# 1 Scope

The present document specifies the transport of TTML [2] **subtitle streams** in DVB MPEG-2 **transport streams**, based on the MPEG-2 system described in ISO/IEC 13818-1 [1]. TTML is an XML-based representation. The present document provides syntax for delivery of TTML **subtitle streams** over MPEG-2 **transport stream**, and is based on EBU-TT-D [3] compatible with the IMSC1 [4] Text Profile of W3C TTML [2].

---

## 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] ISO/IEC 13818-1: "Information technology -- Generic coding of moving pictures and associated audio information -- Part 1: Systems".

[2] W3C Recommendation (TTML): "Timed Text Markup Language 1 (TTML1) (Second Edition)".

NOTE: Available at <http://www.w3.org/TR/2013/REC-ttml1-20130924/>.

[3] EBU Tech 3380 "EBU-TT-D Subtitling Distribution Format", version 1.0.1d.

NOTE: Available at <https://tech.ebu.ch/publications/tech3380>.

[4] W3C Candidate Recommendation (IMSC1): "TTML Profiles for Internet Media Subtitles and Captions 1.0.1 (IMSC1)".

NOTE: Available at <http://www.w3.org/TR/ttml-imsc1.0.1/>.

[5] ETSI TS 102 796: "Hybrid Broadcast Broadband TV".

[6] ETSI TS 103 285: "Digital Video Broadcasting (DVB); MPEG-DASH Profile for Transport of ISO BMFF Based DVB Services over IP Based Networks".

[7] DVB BlueBook A038: "Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems".

NOTE: Available at [https://www.dvb.org/resources/public/standards/a038\\_dvb\\_spec\\_july\\_2017.pdf](https://www.dvb.org/resources/public/standards/a038_dvb_spec_july_2017.pdf).

[8] ISO 639-2: "Codes for the representation of names of languages -- Part 2: Alpha-3 code".

[9] ISO/IEC 8859-1: "Information technology -- 8-bit single-byte coded graphic character sets -- Part 1: Latin alphabet No. 1".

[10] W3C Working Group Note: "TTML Media Type Definition and Profile Registry".

NOTE: Available at <http://www.w3.org/TR/ttml-profile-registry/>.

[11] ETSI EN 301 192: "Digital Video Broadcasting (DVB); DVB specification for data broadcasting".

[12] ETSI TS 102 809: "Digital Video Broadcasting (DVB); Signalling and carriage of interactive applications and services in hybrid broadcast/broadband environments".

- [13] ETSI TS 102 851: "Digital Video Broadcasting (DVB); Uniform Resource Identifiers (URI) for DVB Systems".
- [14] IETF RFC 1952: "GZIP file format specification version 4.3".
- [15] DVB BlueBook A126: "Digital Video Broadcasting (DVB); Allocation of identifiers and codes for Digital Video Broadcasting (DVB) systems".
- NOTE: Available at [https://www.dvb.org/resources/public/standards/a126\\_allocation\\_identifiers.pdf](https://www.dvb.org/resources/public/standards/a126_allocation_identifiers.pdf).
- [16] W3C Recommendation (XML): "Extensible Markup Language (XML) 1.0 (Fifth Edition)".
- NOTE: Available at <https://www.w3.org/TR/2008/REC-xml-20081126/>.
- [17] EBU Tech 3381: "Carriage of EBU-TT-D in ISOBMFF", version 1.0.
- NOTE: Available at <https://tech.ebu.ch/publications/tech3381>.
- [18] W3C Recommendation 13 December 2012 (WOFF): "Web Open Font Format (WOFF) 1.0".
- NOTE: Available at <http://www.w3.org/TR/2012/REC-WOFF-20121213/>.
- [19] ISO/IEC 14496-22:2015: "Information technology -- Coding of audio-visual objects -- Part 22: Open Font Format".
- [20] EBU Tech 3380: "EBU-TT-D Subtitling Distribution Format", version 1.0.
- NOTE: Available at <https://tech.ebu.ch/publications/tech3380>.
- [21] IETF RFC 3986: "Uniform Resource Identifier (URI): Generic Syntax".

## 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] W3C Recommendation (WCAG): "Web Content Accessibility Guidelines (WCAG) 2.0".
- NOTE: Available at <https://www.w3.org/TR/2008/REC-WCAG20-20081211/>.
- [i.2] W3C Candidate Recommendation (CSS): "CSS Fonts Module Level 3: Font matching algorithm".
- NOTE: Available at <https://www.w3.org/TR/css-fonts-3/#font-matching-algorithm>.
- [i.3] IEC 61966-2-1:1999: "Multimedia systems and equipment - Colour measurement and management - Part 2-1: Colour management - Default RGB colour space - sRGB".



## 3 Definitions and abbreviations

### 3.1 Definitions

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

**Intermediate Synchronic Document (ISD):** temporally bounded (possibly empty) subset of TTML content during which no elements change state between active and inactive

NOTE: A TTML document can conceptually be considered as a contiguous sequence of ISDs.

**maximum period of activation (MPA):** maximum duration a single **TTML segment** can be active, referred to as  $T_{MPA}$

**Packet Identifier (PID):** transport stream packet identifier

NOTE: See ISO/IEC 13818-1 [1].

**PES packet:** See ISO/IEC 13818-1 [1].

**Presentation Time Stamp (PTS):** See ISO/IEC 13818-1 [1].

**reserved\_zero\_future\_use:** when used in the clause defining the coded bit stream, indicates that the value may be used in the future for ETSI defined extensions

NOTE: All "reserved\_zero\_future\_use" bits are set to "0".

**subtitle segment:** basic syntactical element of a **subtitle stream**

NOTE: The present document is structured to allow other types of subtitle segments to be defined in the future. In this version of the specification, all **subtitle segments** are **TTML segments**.

**subtitle service properties:** properties defined by TTML subtitling descriptor which include but are not limited to language, purpose, TTS\_suitability, font usage, and qualifier

**subtitle service:** service that provides subtitling for an MPEG program (DVB service) with a set of **subtitle service properties**

**subtitle service qualifier variants:** set of **subtitle services** whose **subtitle service properties** are identical except for the `qualifier_present_flag` and `qualifier_fields` in the TTML subtitling descriptor

**subtitle stream:** stream of **subtitle segments** carried in **transport stream packets** identified by the same **PID**, containing a single **subtitle service**

**transport stream packet:** See ISO/IEC 13818-1 [1].

**transport stream:** stream of **transport stream packets** carrying one or more MPEG programs

NOTE: See ISO/IEC 13818-1 [1].

**TTML document chunk:** self-contained and temporally bounded subset of a TTML document [2]

NOTE: Self-contained in this context means that the document chunk contains all elements to render this subset except the actual fonts used.

**TTML segment:** **subtitle segment** whose payload is an XML serialization of a TTML document chunk, concretely encoded as a well-formed XML 1.0 [16] document

## 3.2 Abbreviations

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

ATSC	Advanced Television Systems Committee
BAT	Bouquet Association Table
bslbf	bit string, left bit first

NOTE: The rightmost bit of a bslbf field is always referred to as  $b_0$ . This will be the last bit of the field transmitted.

CRC	Cyclic Redundancy Check
CSS	Cascading Style Sheets
DASH	Dynamic Adaptive Streaming over HTTP
DFIS	Downloadable Font Information Section
DFIST	Downloadable Font Information sub_table
DFIT	Downloadable Font Information Table
DSI	Download Server Initiate
DSM-CC	Digital Storage Media - Command and Control
DVB	Digital Video Broadcasting
DVB URI	Uniform Resource Identifiers for DVB systems

NOTE: As defined in ETSI TS 102 851 [13].

EIT	Event Information Table
-----	-------------------------

NOTE: As defined in DVB BlueBook A038 [7].

HbbTV <sup>®</sup>	Hybrid broadcast broadband TV
--------------------	-------------------------------

NOTE: As defined in ETSI TS 102 796 [5].

HDR	High Dynamic Range
HRM	Hypothetical Render Model
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol - Secure
IP	Internet Protocol
IRD	Integrated Receiver Decoder
ISD	Intermediate Synchronic Document
MPA	Maximum Period of Activation
MPEG	Moving Pictures Experts Group
NIT	Network Information Table

NOTE: As defined in ISO/IEC 13818-1 [1].

PES	Packetized Elementary Stream
-----	------------------------------

NOTE: As defined in ISO/IEC 13818-1 [1].

PID	transport stream Packet Identifier
-----	------------------------------------

NOTE: As defined in ISO/IEC 13818-1 [1].

PMT	Program Map Table
-----	-------------------

NOTE: As defined in ISO/IEC 13818-1 [1].

PSI	Program Specific Information
PTS	Presentation Time Stamp

NOTE: As defined in ISO/IEC 13818-1 [1].

RGB	Red Green Blue
-----	----------------

SDT	Service Description Table
NOTE:	As defined in DVB BlueBook A038 [7].
SI	Service Information
NOTE:	As defined in ISO/IEC 13818-1 [1].
sRGB	standard Red Green Blue
NOTE:	As defined in IEC as IEC 61966-2-1:1999 [i.3].
TLS	Transport Layer Security
T <sub>MPA</sub>	Time period equal to the maximum period of activation
TS	Transport Stream
NOTE:	As defined in ISO/IEC 13818-1 [1].
TTML	Timed Text Markup Language
NOTE:	As defined in W3C "Timed Text Markup Language 1 (TTML1)" [2].
TTS	Text-To-Speech
uimsbf	unsigned integer, most significant bit first
NOTE:	When a uimsbf field is broken down into bit fields, the least significant bit is always referred to as b <sub>0</sub> . This will be the last bit of the field transmitted.
URI	Uniform Resource Identifiers
NOTE:	Generic form of DVB URI as defined in IETF RFC 3986 [21].
UTF	Unicode Transformation Format
UTF-8	Unicode (or Universal Coded Character Set) Transformation Format - 8-bit
WOFF	Web Open Font Format
NOTE:	As defined in W3C Web Open Font Format (WOFF) 1.0 [18].

---

## 4 Default DVB TTML subtitle conformance point

### 4.1 Introduction

In order to maximize interoperability DVB has chosen a default DVB TTML document conformance point that can be processed by either of two commonly used TTML processor profiles, EBU-TT-D [3] and IMSC1 [4] Text Profile.

### 4.2 Document Constraints

#### 4.2.1 General

A DVB TTML subtitle stream conformant to the default conformance point shall be authored such that it can be processed by an IRD supporting any of the following DVB TTML processor profile combinations:

- only EBU-TT-D [3], configured to meet the additional IRD requirements for the default conformance point in clause 6.6;
- only IMSC1 [4] Text Profile;
- both EBU-TT-D [3] and IMSC1 [4] Text Profile.