

DVB Subtitling Systems

Comprehensive and future-proof solutions for subtitling



What is DVB-SUB?

DVB has three specifications for subtitling, two of which have been updated in 2018. The original DVB subtitling system, which was based on Teletext, was first published in 1994 and is still widely used. The image-based system, also in wide use, was first published in 1997 and recently updated to add support for UHD services. It has now been complemented by a new text-based system that was published as an ETSI European Standard in May 2018.

Background

Subtitles are an important aspect of both linear and on-demand video delivery, increasing the accessibility of content for the deaf or hard of hearing (sometimes incorporating additional commentary), for foreign-language content, or in situations where audio playback is not possible.

The fact that a specification for subtitling was among the very first published by DVB shows that this has been an important area of activity for the organization since the very beginning. While DVB did not invent Teletext, on which EN 300 472 was based, it specified how it should be carried in DVB bitstreams.

The arrival, in 1997, of the image (or bitmap) based DVB Subtitling specification (EN 300 743) brought more character sets and colours along with higher quality. Later updates added support for HDTV and, just this year, UHD services.

The publication of the new text-based DVB TTML subtitling systems specification (EN 303 560) offers more flexibility and further options to improve the user experience.

How does it work?

The **DVB TTML subtitling specification** is based on W3C's Timed Text (TTML). First published in 2010, TTML separates the text, styling and region elements of subtitles. It is expressed in XML (Figure 1), which means it can be easily extended with new features. It is a complex and powerful specification that is the basis of several other subtitling specifications, including those developed by the EBU and DVB. TTML enables a range of new styling features such as bold, italic or underlined text, background colours and line padding to improve readability.

```
<?xml version="1.0" encoding="UTF-8"?>
<tt xml:lang="en" xmlns="http://www.w3.org/ns/ttml" xmlns:ttp="http://www.w3.org/ns/ttml#parameter"
  xmlns:ebuttm="urn:ebu:tt:metadata" xmlns:ebutts="urn:ebu:tt:style"
  xmlns:ttm="http://www.w3.org/ns/ttml#metadata" xmlns:tts="http://www.w3.org/ns/ttml#styling"
  ttp:cellResolution="40 47" ttp:timeBase="media">
  <head>
    <styling>
      <style xml:id="pStyle" tts:textAlign="center" ebutts:linePadding="0.5c"/>
      <style xml:id="spanStyle" tts:backgroundColor="#000000" tts:color="#ffffff"
        tts:fontFamily="proportionalSansSerif" tts:lineHeight="125%" tts:fontSize="200%"/>
    </styling>
    <layout>
      <region xml:id="r0" tts:origin="0% 0%" tts:extent="100% 90%" tts:displayAlign="after"
        tts:showBackground="whenActive"/>
    </layout>
  </head>
  <body>
    <div region="r0">
      <p end="00:12:45.884" begin="00:12:42.134" style="pStyle" xml:id="p0">
        <span style="spanStyle"># This is the place to be</span>
        <br/>
        <span style="spanStyle">for Salty Dog and me</span>
      </p>
    </div>
  </body>
</tt>
```

Figure 1. An example of TTML subtitling markup

How does it work? (continued)

DVB TTML defines a mechanism for delivering TTML documents over a Transport Stream. Three processor profiles are supported: EBU-TT-D (which is implemented in HbbTV 2.0 and DVB-DASH), IMSC 1.0.1 (the convergence point across a whole raft of subtitling implementations) and the DVB default conformance point. The latter is in effect EBU-TT-D with some additional constraints to ensure compatibility with both EBU-TT-D and IMSC1.

The transport mechanism defines a PES payload format coupled with a method for synchronizing the short duration TTML documents with the video and audio in the transport stream. The specification also includes optional support for downloadable fonts.

In parallel with the development of DVB TTML, the existing **DVB bitmap subtitling specification** has been updated so that it too can be used with UHD services. While the resolution was maintained to HD, the bitmapped subtitles can be upscaled or repositioned in the UHD raster. A new progressive coding option makes use of the same compression technique as used in the Portable Network Graphics (PNG) format. The inclusion of a new CLUT (Colour Look-Up Table) allows subtitle colours to be specified precisely in several colour and dynamic range systems.

Market Deployment

Both DVB's Teletext and bitmap-based subtitling systems are widely used around the world and will continue to be used for the foreseeable future.

The implementation of the new TTML specification or of the UHD features of the image-based specification will require new or updated receivers. In considering which specification to use, potential implementers should consider the technologies they currently use for broadcast and IP delivery and what receivers they still wish to target in the market.

TTML may already be familiar to those using or planning to use DVB-DASH or CMAF for broadband delivery. The subtitling chunks created for broadcast could potentially be reused later for video-on-demand services. In the context of the transition towards hybrid delivery combining broadcast and broadband, the TTML specification can be seen as a future-proof convergence option. It is ideal for greenfield implementations.

Those already using bitmapped subtitles may find it easiest to continue with that specification. In some parts of the world, e.g. Southeast Asia, bitmaps are attractive owing to the multiplicity of languages and scripts.

Next Steps

The specifications are now stable, and no significant updates are foreseen at this time.

Links

www.dvb.org/standards
www.dvb.org/webinars

Links to DVB's subtitling standards
Watch the February 2018 webinar and download the slides