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Information technology — Coding of audio-visual objects —

Part 30: Timed text and other visual overlays in ISO base media file format

Technologies de l'information — Codage des objets audiovisuels —

Partie 30: Texte temporisé et autres recouvrements visuels dans le format ISO de base pour les fichiers médias

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

This second edition cancels and replaces the first edition (ISO/IEC 14496-30:2014), which has been technically revised. It incorporates ISO/IEC 14496-30:2014/Cor.1:2015. The main changes compared to the previous edition are as follows:

— all Clauses (except Clause 1 and Clause 3) and Annex A have been technically revised.

A list of all parts in the ISO/IEC 14496 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document defines a storage format based on, and compatible with, the ISO base media file format (ISO/IEC 14496-12), which is used by the MP4 file format (ISO/IEC 14496-14) and the Motion JPEG 2000 file format (ISO/IEC 15444-3) among others. This document enables timed text and subtitle streams to

— be used in conjunction with other media streams, such as audio or video;

— be used in an MPEG-4 systems environment, if desired;

— be formatted for delivery by a streaming server, using hint tracks; and

— inherit all the use cases and features of the ISO base media file format on which MP4 and MJ2 are based.

Information technology — Coding of audio-visual objects —

Part 30:
Timed text and other visual overlays in ISO base media file format

1 Scope

This document describes the carriage of some forms of timed text and subtitle streams in files based on ISO/IEC 14496-12 (the ISO base media file format). The documentation of these forms does not preclude other definition of carriage of timed text or subtitles; see, for example, 3GPP Timed Text (3GPP TS 26.245), or the carriage of captioning information embedded in a media stream of another type (see Annex A).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

W3C Recommendation, Timed Text Markup Language 1.0, Second Edition, https://www.w3.org/TR/ttml1/

ISO/IEC 14496-12:2015, *Information technology — Coding of audio-visual objects — Part 12: ISO base media file format*

W3C Community Group Report, *WebVTT*, http://www.w3.org/2013/07/webvtt.html

3GPP TS 26.245:2017, *Transparent end-to-end Packet switched Streaming Service (PSS); Timed text format*

IETF RFC 2141, *URN Syntax*

IETF RFC 3986, *Uniform Resource Identifier (URI): Generic Syntax*

IETF RFC 6381, *MIME Codecs and Profiles*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1.1
timed text document
file-based representation of textual content, possibly XML, used to produce timed text streams and possibly representing timed text track samples

3.1.2
timed text stream
stream of content, which when decoded results in textual content, possibly containing internal timing values, to be presented at a given presentation time and for a certain duration

3.1.3
subtitle stream
timed text stream potentially also presenting images

3.1.4
internal timing value
value contained in the payload of a timed text stream sample representing a time

EXAMPLE A start time, an end time, or a duration, corresponding to a timed behaviour of a part or the whole of the sample.

3.1.5
timed text track
ISOBMFF representation of a timed text stream

3.1.6
subtitle track
ISOBMFF representation of a subtitle stream

3.2 Abbreviated terms

TTML Timed Text Markup Language

WebVTT Web Video Text Tracks

ISOBMFF ISO base media file format

4 General definitions

4.1 Layout

This subclause defines common layout behaviour for processing of timed text or subtitle samples.

Unless specified by an embedding environment (e.g. an HTML page), the track header box information (i.e. `width`, `height`) shall be used to size the subtitle or timed text track content with respect to the associated track(s) as follows:

1) If the flag `track_size_is_aspect_ratio` is not set, and the track `width` and `height` are set to values different from 0, the size of the timed text track shall be the track `width` and `height`.

2) If the flag `track_size_is_aspect_ratio` is not set, and the track `width` and `height` are set to 0, the size of the timed text track shall match the reference size.

3) If the flag `track_size_is_aspect_ratio` is set, it indicates that the content of the track was authored to an aspect ratio equal to the track header `width`/`height`. In this case, neither `width` nor `height` shall be 0. The timed text track shall be sized to the maximum size that will fit within the reference size and should equal its width or height, while preserving the indicated aspect ratio.

If only one track is associated with the timed text track, the reference size is the size of the associated track. If multiple tracks are associated, the reference size is the size of the composition of tracks as described by the matrices in the track headers of the associated tracks.

Upon file creation, the `width` and `height` of the subtitle or timed text track should be set appropriately according to the `width` and `height` of the associated track(s), as declared in their track header. A

typical usage is that the timed text or subtitle track has the same `width` and `height` as an associated visual track, and no translation.

If the track it is supposed to overlay is not stored in an ISOBMFF file or if it is stored as a track in a different ISOBMFF file, the values 0x0 may be used; or the `track_size_is_aspect_ratio` flag may be used and the `width` and `height` set to the desired aspect ratio.

For some timed text documents, the region as defined by the `width`, `height` and `track_size_is_aspect_ratio` corresponds to the visual area filled by the rendering of the timed text documents.

When the track width and height attributes are set to a value different from 0 and the `track_size_is_aspect_ratio_flag` is not used, additional region positioning using the translation values tx and ty from the track header matrix, as defined for 3GPP Timed Text tracks, may be used (3GPP TS 26.245:2017, 5.7 defines the text track region using tx, ty, and the track width and height).

NOTE 1 The 3GPP region is not the same as a WebVTT region.

Unless specified by an embedding environment (e.g. an HTML page), visually composed tracks including video, subtitle, and timed text shall be stacked or layered using the 'layer' value in the track header box. The layer field provides the same functionality as z-index in TTML.

NOTE 2 Timed text and subtitle tracks are normally stacked in front of the associated visual track(s).

4.2 Timing

This subclause defines common timing behaviour for processing of timed text or subtitle samples.

The general processing of timed text or subtitle tracks is that the text content of the sample is delivered to the decoder at the sample decode time, at the latest. The rendering of the sample happens at the composition time, taking into account edit lists if any, and for the whole sample duration, without timing behaviour. However, timed text or subtitle sample data of specific formats may contain internal timing values. Internal timing values may alter the rendering of the sample during its duration as specified by the timed text or subtitle format.

NOTE If an internal timing value does not fall in the time interval corresponding to the sample composition time and sample composition time plus sample duration, the rendering of the sample can be different from the rendering of the same sample data with a composition time such that the internal timing value lies in the associated composition interval.

The subclauses defining the storage of specific formats in the ISOBMFF specify how internal timing values relate to the track time or to the sample decode or composition time (see subclauses 5.3 and 6.3). For instance, start or end times may be relative to the start of the sample, or the start of the track.

For sections of the track timeline that have no associated subtitles or timed text content, 'empty' samples may be used, as defined for each format, or the duration of the preceding sample extended. Samples with a size of zero are not used.

The `timescale` field in the media header box should be set appropriately to achieve the desired timing accuracy. It is recommended to be set to the value of the `timescale` field in the media header box of (one of) the associated track(s).

4.3 Language

Timed text tracks should be marked with a suitable language in the media header box, indicating the audience for whom the track is appropriate. In the case where it is suitable for a single language, the media header must match that declared language. The value 'mul' may be used for a multi-lingual text.

4.4 Resources shared by multiple samples

Common resources, such as images and fonts that are referred to by URLs, may be stored as items in a MetaBox as defined by ISO/IEC 14496-12. These items may be addressed by using the item_name as a relative URL in the timed text sample, as defined by ISO/IEC 14496-12:2015, 8.11.9.

NOTE A derived specification, with its applicable brand, can restrict this use of meta boxes for common items.

Fonts not supplied with the content may be already present on the target system(s), or supplied using any suitable supported mechanism (e.g. font streaming as defined in ISO/IEC 14496-18).

4.5 Associating timed text tracks

Timed text tracks may be explicitly or implicitly associated with other tracks in the file. They are explicitly associated with a track when the timed text track uses a track reference of type '`subt`' to that track, as defined in ISO/IEC 14496-12, or to a track in the same alternate group. If no '`subt`' track reference is used, the timed text track is said to be implicitly associated to all tracks in the file. In particular, if track groups are not used, the timed text track is associated to all tracks in the file. Association is used to indicate which track(s) a timed text track is intended to overlay and may be used to determine the desired rendered size when that information is not provided in the track header of the timed text track, as defined in subclause 4.1. Timed text and subtitle tracks may be associated with any type of track, including visual tracks (e.g. video tracks, graphics tracks, image tracks) or audio tracks as determined by some external context.

5 Timed Text Markup Language (TTML)

5.1 General

This subclause describes how documents based on TTML, as defined by the W3C, and derived specifications (for example SMPTE-TT), are carried in files based on the ISO base media file format. A TTML Track is a track carrying TTML documents, which can be documents that correspond to a specification based on TTML.

5.2 Layout

Subclause 4.1 defines the general layout behaviour for timed text and subtitle tracks. In particular, this means for TTML tracks that the track width and height provide the spatial extent of the root container, as defined in the TTML Recommendation. Any 'extent' attribute declared on the 'tt' element in the contained TTML document shall match the track width and height. If the 'extent' attribute is not declared on the 'tt' element in the contained TTML document, the track header width and height may be set to 0 or to any desired size.

NOTE This is used when the document is authored in a resolution-independent manner (e.g. using percentage layout).

Alternatively, when a resolution-independent document has been authored to a specific aspect ratio (whether or not the aspect ratio is explicitly signalled in the document) the `track_size_is_aspect_ratio` flag may be used to signal the authored aspect ratio. In this case, the track header `width` and `height` shall be set to values that indicate the authored aspect ratio (e.g. 16 by 9).

5.3 Timing

The top-level internal timing values in the timed text samples based on TTML express times on the track presentation timeline – that is, the track media time as optionally modified by the edit list. For example, the begin and end attributes of the <body> element, if used, are relative to the start of the track, not relative to the start of the sample. This is shown in Figure 1, using W3C TTML syntax.

In Figure 1, the sample composition time of each of the samples are 0, 30 minutes, and 1 hour, which correspond to the time at which the decoder will present the TTML content. The first sample, as per W3C Recommendation, Timed Text Markup Language 1.0, will not display any content in the first minute or after 2 minutes, and again, per TTML, will remain as such until the next sample is processed. The second sample contains a document describing the rendering between composition time 0 and 32 minutes. However, since it is provided to the decoder after 30 minutes and since internal timing values are relative to the start of the track, the TTML decoder will display the text as if the decoder seeked to 30 minutes into the document. It will not render anything for the first minute from the beginning of the sample, and then render some text for 1 other minute, and then again no rendering until the next sample is processed. The processing of sample 3 is similar, where the top level internal timings on the div elements are handled as relative to the start of the track.

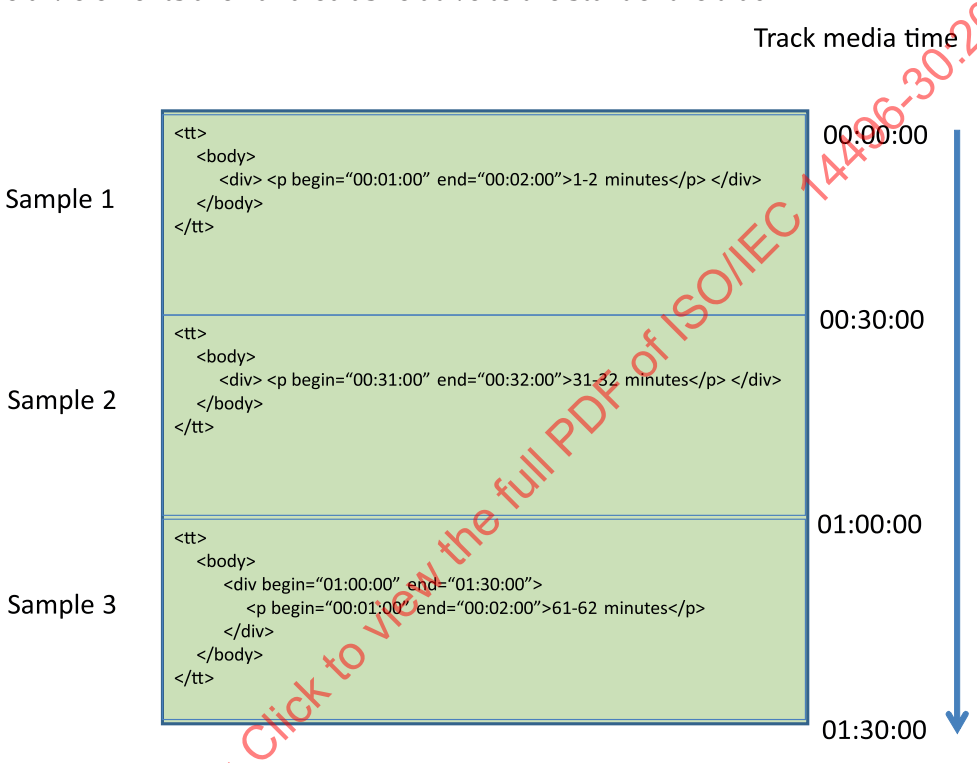

Figure 1 — Example of a TTML track with three samples

No transport layer buffer or timing model is defined to guarantee that subtitle content can be read and processed in time to be synchronously presented with audio and video. It is assumed that users of this track format will define timed text content profiles and hypothetical render models that will constrain content parameters so that compatible decoders may identify and decode those profiles for synchronous presentation.

The following document constraints may need to be specified to define a timed text profile that will guarantee synchronous decoding of conforming content on conforming decoders:

— maximum allowed document size;

— number of document buffers in the hypothetical render model;

— video overlay timing of the hypothetical render model;

— maximum total compressed image size in megabytes per sample;

— maximum total decoded image size in megapixels per sample;

— maximum decoded image dimensions;

— maximum text rendering rate required by a document;

— maximum image rendering rate required by a document;

— maximum number of simultaneously displayed characters;

— maximum font size;

— maximum number of simultaneously displayed images.

NOTE Defining timed text content profiles is outside the scope of this document, but providing a method to signal an externally defined timed text profile in the subtitle sample description is possible using the sample entry description.

An 'empty' sample is defined as containing a TTML document that has no content. A TTML document that has no content is any document that contains (a) no element or (b) no <body> element or (c) no elements containing character data or
 elements; for example, the following document:

<tt xmlns="http://www.w3.org/ns/ttml" />

The duration of the TTML document carried in a sample may be less than the sample duration, but should not be greater.

5.4 Track format

TTML streams shall be carried in subtitle tracks, and as a consequence according to ISOBMFF, the media handler type is 'subt', and the track uses a subtitle media header, and associated sample entry and sample group base class.

5.5 Sample entry format

TTML streams shall use the XMLSubtitleSampleEntry format.

The namespace field shall be set to at least one unique namespace. It should be set to indicate the primary TTML-based namespace of the document, and should be set to all namespaces in use in the document (e.g. TTML + TTML-Styling + SMPTE-TT).

The schema_location field should be set to schema pathnames that uniquely identify the profile or constraint set of the namespaces included in the namespace field.

When sub-samples are present (see 5.6), then the auxiliary_mime_types field shall be set to the mime types used in the sub-samples — e.g. "image/png".

5.6 Sample format

A TTML subtitle sample shall consist of an XML document, optionally with resources such as images referenced by the XML document. Every sample is therefore a sync sample in this format; hence, the sync sample table is not present.

Other resources such as images are optional. Resources referenced by an XML document may be stored in the same subtitle sample as the document that references them, in which case they shall be stored contiguously following the XML document that references those resources. Resources should be stored in presentation time order.

When resources are stored in a sample, the Track Fragment Box ('traf') shall contain a Sub-Sample Information Box ('subs') constrained as follows:

— `entry_count` and `sample_delta` shall be set to 1 since each subtitle track fragment contains a single subtitle sample;

— `subsample_count` shall be set to the number of resources plus 1;

— `subsample_priority` and `discardable` have no meaning; they shall be set to zero on encoding and may be ignored by decoders.

If sub-samples are used, the XML document shall be the first sub-sample entry. Each resource the document references shall be defined as a subsequent sub-sample in the same table.

The XML document shall reference each sub-sample object using a URI, as per IETF RFC 3986. When a URN is used, it shall be of the form:

urn:<nid>:.....:<index>[.<ext>]

where

<nid> is the registered URN namespace ID per IETF RFC 2141;

<index> is the sub-sample index "j" in the 'subs' referring to the object in question;

<ext> is an optional file extension - e.g. "png".

The first resource in the sample will have a sub-sample index value of 1 in the 'subs' and that will be the index used to form the URI.

Reference the same object can be made multiple times within an XML document. In such cases, there will be only one sub-sample entry in the Sub-Sample Information Box for that object, and the URNs used to reference the object each time will be identical.

An example construction of the sample with images is shown in Figure 2.

NOTE The text in the images is just an example and not meant to constrain or imply anything about what is encoded in the images.

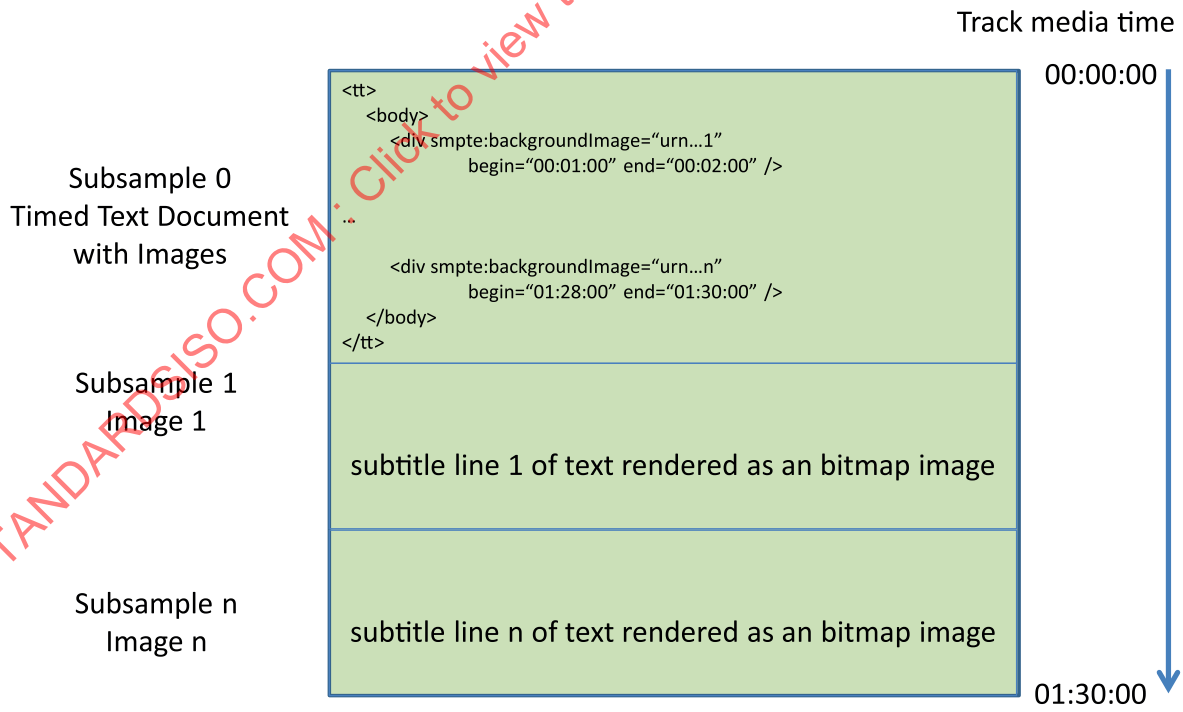

Figure 2 — Subtitle sample structure when using subsamples

5.7 Additional considerations

The following additional considerations should be addressed by users of this carriage:

— Unicode character codes allowed;

— fonts and styles allowed.

5.8 Codecs parameter

The '`codecs`' parameter for TTML tracks is as defined in RFC 6381 with the following specifics. The first element is the four-character code of the sample description entry of the XML Subtitle Sample Entry of the track, i.e. '`stpp`'. Additional optional elements are as follows.

When the `namespace` field of the `XMLSubtitleSampleEntry` contains any namespace value from the namespace table in W3C Recommendation, Timed Text Markup Language 1.0, Section 5.1, the second element is the four-character code '`ttml`'. If this element is omitted, then a client should download the track sample description information to examine the track header `namespace` field and confirm the presence of the TTML namespace.

When the second element is present and set to '`ttml`', then a third element may be present that describes the profile(s) that the presentation processor needs to support in order to process the document. Its value may either be a single four-character code, referred to as profile identifier, in the TTML Profile Registry maintained by the W3C or as a combination of profile identifiers, using the '+' and '|' operators, as defined in the registry.

NOTE 1 The process to derive the profile identifier(s) from the TTML documents stored in the samples of a track is implementation-specific. Such process can use the ttp:profile attribute or elements, or the ttp: processorProfiles attribute or any other information.

NOTE 2 The TTML profile can be documented in the TTML document or as a parameter to the MIME type in the MIME box as defined in ISO/IEC 14496-12:2015 Amd 2:2018.

5.9 Document temporal boundaries

1. The earliest computed begin time of an element in a TTML document can be non-coincident (earlier or later) with the composition time of the containing sample; and the latest computed end time of an element in the TTML document can be non-coincident (earlier or later) with the end of the sample, which is equal to its composition time plus sample duration.

2. If the same timed content element, for example a <p> element, is present in adjacent documents in adjacent samples, the begin times and end times of the element can result in the same computed earliest and latest composition time in every document in which it appears.

3. TTML content that falls partially or wholly within the duration of a sample can be present (duplicated) in adjacent samples. If a sample contains the identical document to the prior sample, it may be marked as redundant.

4. Only one sample and document within a Timed Text Track can be active at any moment in the presentation. The presentation of every document is constrained in time to the period beginning at the composition time of the containing sample with the duration of that sample. As a consequence, any timed content within a document that extends outside of that period is expected to be temporally clipped and not to result in any impact on presentation prior to or later than the sample's composition time and duration.

6 Web Video Text Tracks (WebVTT)

6.1 General

This clause defines how documents based on W3C Community Group Report, *WebVTT* are carried in files based on the ISO base media file format.

WebVTT text content in tracks is encoded using UTF-8, and the data-type `boxstring` indicates an array of UTF-8 bytes, to fill the enclosing box, with neither a leading character count nor a trailing null terminator.

Each WebVTT cue, as defined in W3C Community Group Report, *WebVTT*, is stored deconstructed, partly to emphasize that the textual timestamps one would normally find in a WebVTT file do *not* determine presentation timing; the ISO file structures do. It also separates the text of the actual cue from the structural information that the WebVTT file carries (positioning, timing, and so on). WebVTT cues are stored in a typical ISO boxed structured approach to enable interfacing an ISO file reader with a WebVTT renderer without the need to serialize the sample content as WebVTT text and to parse it again.

Boxes shall not contain trailing CR or LF characters, or trailing CRLF sequences (where 'trailing' means that they occur last in the payload of the box).

6.2 Layout

Subclause 4.1 defines the general layout behaviour for timed text and subtitle tracks, which is applicable to WebVTT tracks.

6.3 Timing

Following the general timing processing defined in 4.2, each cue shall be passed to the WebVTT renderer at the time from the time-to-sample table, as mapped by the edit list (if any). The times derived for a sample from the durations in the time-to-sample table reflect the start and end-time of all cues in that sample. All samples are sync samples; the sync sample table is not used.

If there is internal timing value in a cue, each sample must be labelled with the VTT time that corresponds to the sample start time on the VTT time line.

NOTE 1 This enables reconstructing a correct internal timing value, when the time-to-sample table is edited.

NOTE 2 Internal timestamps within the cue that precede this current time would be already ":past" at the start of the sample, for example.

6.4 Track format

WebVTT streams shall be carried as timed text tracks, and as a consequence according to ISOBMFF, use the '`text`' media handler type, and the associated media header, sample entry, and sample group base class.

6.5 Sample entry format

WebVTT streams shall use the WVTTSampleEntry format.

In the sample entry, a WebVTT configuration box must occur, carrying exactly the lines of the WebVTT file header, i.e. all text lines up to but excluding the 'two or more line terminators' that end the header.

NOTE Other boxes may be defined for the sample entry in future revisions of this document (e.g. carrying optional CSS style sheets, font information, and so on).

A WebVTT source label box should occur in the sample entry. It contains a suitable string identifier of the 'source' of this WebVTT content, such that if a file is made by editing together two pieces of content, the timed text track would need two sample entries because this source label differs. A URI is

recommended for the source label; however, the URI is not interpreted and it is not required there be a resource at the indicated location when a URL form is used.

NOTE The 'codecs' parameter for WebVTT streams as defined in RFC 6381 uses only one element, the four-character code of the sample description entry for the stream, i.e. 'wvtt'.

```
class WebVTTConfigurationBox extends Box('vttC') {
   boxstring   config;
}
class WebVTTSourceLabelBox extends Box('vlab') {
   boxstring   source_label;
}
class WVTTSampleEntry() extends PlainTextSampleEntry ('wvtt'){
   WebVTTConfigurationBox   config;
   WebVTTSourceLabelBox     label;   // recommended
   MPEG4BitRateBox ();               // optional
}
```

6.6 Sample format

The character replacements as specified in step 1 of the WebVTT parsing algorithm, may be applied before VTT data is stored in this format. Readers should be prepared to apply these replacements if integrated directly with a WebVTT renderer.

Each sample is either

a) exactly one VTTEmptyCueBox box (representing a period of non-zero duration in which there is no cue data), or

b) one or more VTTCueBox boxes that share the same start time and end time, each containing the following boxes. Only the CuePayloadBox is mandatory, all others are optional. A sample containing cue boxes may also contain zero or more VTTAdditionalTextBox boxes, interleaved between VTTCueBox boxes and carrying any other text in between cues, in the order required by the processing of the additional text, if any.

The VTTCueBox boxes must be in presentation order, i.e. if imported from a WebVTT file, the cues in any given sample must be in the order they were in the WebVTT file.

It is recommended that the contents of the VTTCueBox boxes occur in the order shown in the syntax, but the order is not mandatory.

If a cue has WebVTT Cue Settings, they are placed into a CueSettingsBox without the leading space that separates timing and settings.

When a WebVTT source label box is present in the sample entry and a cue is written into multiple samples, it must be represented in a set of VTTCueBoxes all containing the same source_ID. All VTTCueBoxes that originate from the same VTT cue must have the same source_ID, and that source_ID must be unique within the set of cues that share the same source_label. This means that when stepping from one sample to another (possibly after a seek, as well as during sequential play), a match of source_ID under the same source_label is diagnostic that the same cue is still active. Cues with no CueSourceIDBox are independent from all other cues; a source ID may be assigned to all cues.

When there is no WebVTT source label in the sample entry, there must be no CueSourceIDBox in the associated samples. In this way the presence of the WebVTT source label indicates whether source IDs are assigned to cues split over several samples, or not.

When a cue has internal timing values (i.e. WebVTT cue timestamp as defined in W3C Community Group Report, *WebVTT*) then each VTTCueBox must contain a CueTimeBox which gives the VTT timestamp associated with the start time of sample. When the cue content of a sample is passed to a VTT renderer, timestamps within the cues in the sample must be interpreted relative to the time given in this box, or adjusted considering this time and the sample start time.

The CuePayloadBox must contain exactly one WebVTT Cue. Other text, such as WebVTT Comments are placed into VTTAdditionalText boxes.

NOTE The sample entry code is 'vttC'; in contrast the VTTCueBox is 'vttc' and their container is also different.

In the CuePayloadBox there must be no blank lines (but there may be multiple lines).

```
aligned(8) class VTTCueBox extends Box('vttc') {
   CueSourceIDBox()    // optional source ID
   CueIDBox();         // optional
   CueTimeBox();       // optional current time indication
   CueSettingsBox();   // optional, cue settings
   CuePayloadBox();    // the (mandatory) cue payload lines
};
class CueSourceIDBox extends Box('vsid') {
   int(32)    source_ID;    // when absent, takes a special 'always unique' value
}
class CueTimeBox extends Box('ctim') {
   boxstring    cue_current_time;
}
class CueIDBox extends Box('iden') {
   boxstring    cue_id;
}
class CueSettingsBox extends Box('sttg') {
   boxstring    settings;
}
class CuePayloadBox extends Box('payl') {
   boxstring    cue_text;
}
// These next two are peers to the VTTCueBox
aligned(8) class VTTEmptyCueBox extends Box('vtte') {
   // currently no defined contents, box must be empty
};
class VTTAdditionalTextBox extends Box('vtta') {
   boxstring    cue_additional_text;
}
```

Free space boxes and unrecognized boxes in any sample, or within the VTTCueBox or VTTEmptyCueBox may be present and should be ignored.

6.7 Converting to or from a WebVTT text file

6.7.1 General

This subclause connects the box structure to the parsing process for a WebVTT file as defined in W3C Community Group Report, *WebVTT*, Section 5. Underlined terms here correspond to defined terms in that report.

6.7.2 Importing a WebVTT file into the ISO base media file format

Prior to import, the character replacements as specified in step 1 of the WebVTT parsing algorithm, may be applied.

The initial part of the file, from the first characters (the string 'WEBVTT'), up to but not including the 'two or more line terminators' are placed into the WebVTTConfigurationBox.

The WebVTT Cue Timings of each WebVTT Cue are processed to form a set of samples that are contiguous and non-overlapping in time as follows:

1) The start time offset of the cue sets the sample decode time. The end time offset of the cue is used to set the sample duration.