EBU

OPERATING EUROVISION AND EURORADIO

TECH 3350

EBU-TT
PART 1
SUBTITLING FORMAT DEFINITION

VERSION 1.1

SOURCE: SP/MIM – XML SUBTITLES

Geneva
September 2015

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Conformance Notation

This document contains both normative text and informative text.

All text is normative except for that in the Introduction, Examples, any section explicitly labelled as ‘Informative’ or individual paragraphs which start with ‘Note:’.

Normative text describes indispensable or mandatory elements. It contains the conformance keywords ‘shall’, ‘should’ or ‘may’, defined as follows:

‘Shall’ and ‘shall not’:	Indicate requirements to be followed strictly and from which no deviation is permitted in order to conform to the document.
‘Should’ and ‘should not’:	Indicate that, among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others. OR indicate that a certain course of action is preferred but not necessarily required. OR indicate that (in the negative form) a certain possibility or course of action is deprecated but not prohibited.
‘May’ and ‘need not’:	Indicate a course of action permissible within the limits of the document.

Default identifies mandatory (in phrases containing “shall”) or recommended (in phrases containing “should”) presets that can, optionally, be overwritten by user action or supplemented with other options in advanced applications. Mandatory defaults must be supported. The support of recommended defaults is preferred, but not necessarily required.

Informative text is potentially helpful to the user, but it is not indispensable and it does not affect the normative text. Informative text does not contain any conformance keywords.

A conformant implementation is one which includes all mandatory provisions (‘shall’) and, if implemented, all recommended provisions (‘should’) as described. A conformant implementation need not implement optional provisions (‘may’) and need not implement them as described.

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Contents

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Status of this document (Informative)

This document is a stable document and may be used as reference material or cited from another document.

This document is part of a series of EBU-TT (EBU Timed Text) documents. The full list of published and planned EBU-TT documents is given below.

Part 1: EBU-TT Subtitling format definition (EBU Tech 3350)

Introduction to EBU-TT and definition of the XML based format.

Part 2: STL (Tech 3264) Mapping to EBU-TT (EBU Tech 3360)

How EBU-TT provides backwards compatibility with EBU STL.

Part 3: EBU-TT in Live Subtitling applications: system model and content profile for authoring and contributions (EBU Tech 3370)

How to use EBU-TT for the production and contribution of live subtitles.

EBU-TT Annotation

How EBU-TT can be used in future scenarios for 'authoring of intent'.

EBU-TT User Guide

General guide ('How to use EBU-TT').

EBU-TT-D (EBU Tech 3380)

EBU-TT content profile for TTML that can be used for the distribution of subtitles over IP based networks.

Carriage of EBU-TT-D in ISOBMFF (EBU Tech 3381)

How EBU-TT-D can be stored using the storage format of the ISO Base Media File Format (ISO/IEC 14496-12).

XML Schema (Informative)

An example of an XML Schema will be available for free download from the following web page - http://tech.ebu.ch/ebu-tt.

Editor's note: *Exceptionally, for consistency throughout this document the American English spellings 'color' and 'center' have been used.*

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EBU-TT Part 1
Subtitling Format Definition

EBU Committee	*First Issued*	*Revised*	*Re-issued*
TC	Jan. 2012	September 2012	

Keywords: subtitling, STL, XML, W3C, TTML, DFXP, captions, EBU Timed Text.

Scope (Informative)

Subtitles are created, edited, exchanged and archived in many different ways. At one extreme subtitles may be closely linked to the video, e.g. as burned-in (so-called open, or forced) subtitles in the video, at the other extreme they may be loosely coupled to the audio/video essence (e.g. stored on an external storage medium and associated with the video at the moment of playout/viewing).

The aim of this publication is to specify an XML based archiving and interchange format for subtitles as follow-up to the currently widely used EBU STL format (EBU Tech 3264) [1]. The EBU has developed a recommendation on transport of subtitles using MXF in an IT-Based Television Production Environment (EBU R 133) [2] and has been investigating implementations that are in use today. Harmonization is needed to obtain predictable and reliable results when interchanging subtitle files and when integrating new products into TV production environments.

Version 1.1 of EBU Tech 3350 (EBU-TT Part 1) is the first update since the Version 1.0 publication in August 2012. The main requirements that have been resolved by this revision are:

- Alignment with the specification EBU Tech 3380 (EBU-TT-D) that was published in January 2014 for the distribution of subtitles over IP based networks, so that EBU-TT-D documents are now EBU-TT Part 1 conformant.
- Integration of Errata for issues identified in Version 1.0.
- Definition of new metadata, including support for usage requirements submitted by the Digital Production Partnership (DPP).

This update keeps backward compatibility with the previous version 1.0:

Every document that is valid against the Version 1.0 specification is also valid against the Version 1.1 specification, however the reverse may not be true.

Please note the following semantic changes between Version 1.0 and Version 1.1:

- The initial values of four elements have been changed (see § 2.3 and Annex C).
- For the mapping of an EBU-STL file into an EBU-TT Part 1 file three new Elements have been added for date and version information (see §§ 3.1.1.1.41, 3.1.1.1.42 and 3.1.1.1.43).

This update also makes Version 1.1 a superset of EBU-TT-D; all conformant EBU-TT-D documents are now by definition conformant against EBU-TT Part 1 Version 1.1.

However be aware that some information may have a different meaning or presentation according to the semantics of Version 1.1 compared to EBU-TT-D. (see for example, the term "Active Video" in the Definition of terms).

A more detailed changelog for this publication, and related versions of this specification can be found via: https://tech.ebu.ch/publications/tech3350

Definition of terms

Captions and subtitles

The term “captions” describes on screen text for use by deaf and hard of hearing audiences. Captions include indications of the speakers and relevant sound effects.

The term “subtitles” describes on screen text for translation purposes.

For easier reading only the term “subtitles” is used in this specification as the EBU-TT file representation for captions and subtitles is identical.

In this specification the term “captions” may be used interchangeably for the term “subtitles” (except where noted).

Active video

The term “active video” (known alias: Production Aperture) refers to the portion of the video signal that is used to carry picture information, as specified in SMPTE ST 2016-1:2009 Chapter 4 [10].[1]

Active image

The term “active image” refers to the portion of the video picture area that is being utilized for programme content, as specified in SMPTE ST 2016-1:2009 Chapter 4. The active image excludes letter-box bars and pillar-box bars.

1. Introduction

1.1 Background

The introduction of higher resolution television formats (HDTV), user demands for improved presentation, the switch to file-based production workflows and the multiplication of web-based distribution mechanisms, require a new XML based subtitling format that can retain its timing characteristics during the creation and transport of subtitles.

The introduction of HDTV has created new expectations, including displaying subtitles in different and more user-friendly ways. This recommendation aims to support these new requirements.

To enhance the quality of the subtitler’s work more efficient automation processes are needed, allowing a subtitler to add value to the subtitles by using his contextual knowledge, cultural awareness and special skills.

[1] Note that in EBU Tech 3380 (EBU-TT-D) [13] the reference for calculation of spatial values when rendering over a related video media object is not the active video but the rendering plane of the video object.

Reliable exchange mechanisms are especially important for the creation of subtitles, which often takes place in external production houses or at home using a wide variety of different platforms and applications.

1.2 EBU-TT as exchange format

EBU-TT is intended as general purpose exchange format for subtitles and supports Unicode characters. As an exchange format EBU-TT intrinsically also is an archiving format (see Figure 1). EBU-TT can also be used as a production format. Whilst it is good practice to validate EBU-TT documents for their conformance against this specification, especially at interchange points, it is likely that additional validation requirements will be needed for specific workflows.

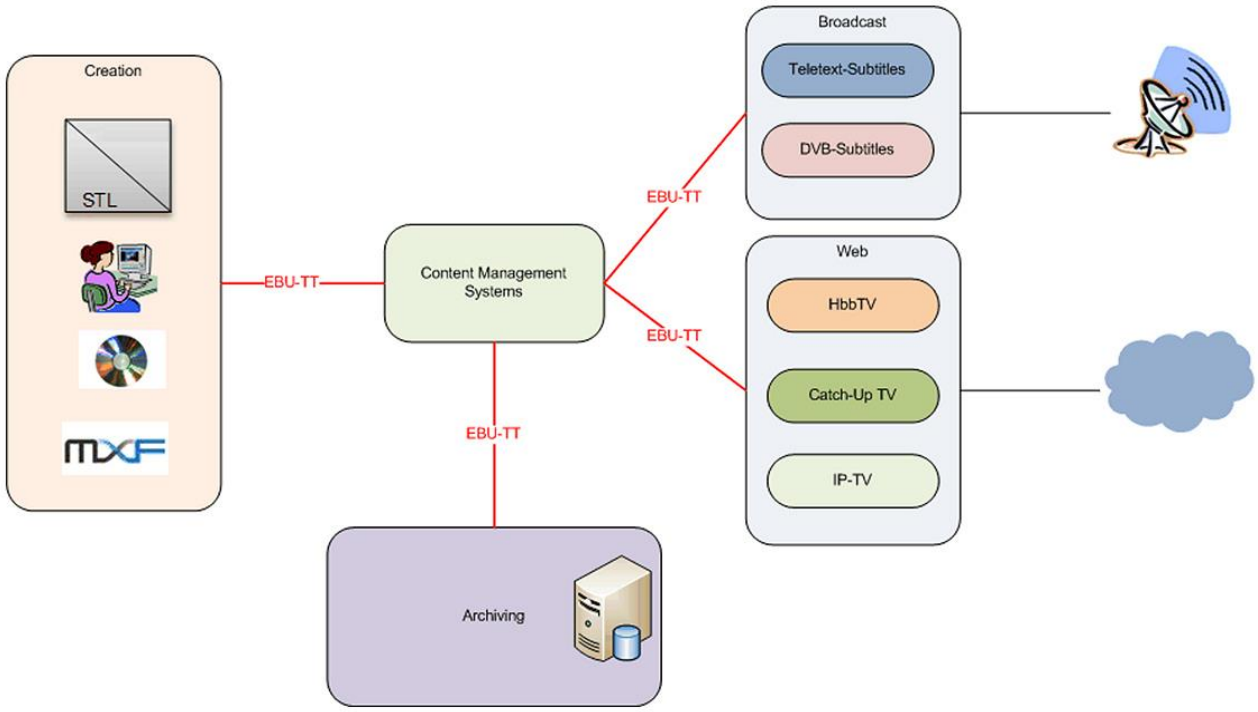

Figure 1: Subtitle workflow with EBU-TT

1.3 Relation to other specifications

EBU-TT uses a subset of the vocabulary provided by the W3C Timed Text Markup Language 1 (TTML1) (Second Edition) [3], hereafter referred to as TTML 1.0. This W3C standard was formerly known as “Timed Text (TT) Authoring Format 1.0 – Distribution Format Exchange Profile (DFXP)”.

The EBU-TT format is intended to constrain the features provided by TTML1.0, especially to make EBU-TT more suitable for the use with broadcast video and web video applications.

Valid EBU-TT documents are, by definition of TTML 1.0, valid W3C TTML documents. Note however that it is possible to construct valid W3C TTML documents that are not valid EBU-TT documents.

Like the EBU-TT specification, the SMPTE Standard ST 2052-1:2010 (SMPTE-TT) [4] is derived from TTML too. Valid EBU-TT documents are, by the definition of the SMPTE-Standard, valid SMPTE-TT documents but it is possible to construct valid SMPTE-TT documents that are not valid EBU-TT documents.

2. Generic constraints

The EBU-TT format defines constraints for an XML document instance. A valid EBU-TT XML document has to comply with the generic constraints in § 2 and the document structure defined in § 3.

TTML elements and attributes shall be defined by TTML 1.0 subject to any constraints specified within this document.

Note: To facilitate the implementation of EBU-TT, a W3C XML Schema (in the following XML Schema) is published together with the EBU-TT specification.

Although all efforts have been made to ensure that the XML Schema reflects the generic constraints and that the document structure detailed in this specification is as good as it can be, it is informative, not normative. This is not an error in design but a result of the limitation of XML Schema 1.0 in the expression of XML document constraints. Because of this limitation the automatic validation with an EBU-TT XML Schema can produce 'false positive validations', which means that an XML document can validate against the EBU-TT XML Schema even if it does not comply with a certain constraint or constraints in the EBU-TT specification.

One example of a constraint that cannot be expressed in an XML Schema is the dependency between a value that uses a pixel-based length expression and the requirement to use the `tts:extent` attribute on the `tt:tt` root element (see `tts:extent (attribute)` in § 3).

2.1 Namespaces

The following namespaces from TTML 1.0 shall be used for the TTML elements and attributes in EBU-TT:

Name	Prefix	Value
TT	tt:	http://www.w3.org/ns/ttml
TT Parameter	ttp:	http://www.w3.org/ns/ttml#parameter
TT Style	tts:	http://www.w3.org/ns/ttml#styling
TT Metadata	ttm:	http://www.w3.org/ns/ttml#metadata

The following namespaces shall be used for the assignment of XML Schema datatypes:

Name	Prefix	Value
XML Schema	xs:	http://www.w3.org/2001/XMLSchema

The following namespaces shall be used for the EBU-TT specific vocabulary:

Name	Prefix	Value
EBU-TT Metadata	ebuttm:	urn:ebu:tt:metadata
EBU-TT Styling	ebutts:	urn:ebu:tt:style
EBU-TT Datatypes	ebuttdt:	urn:ebu:tt:datatypes

Note: Although any prefix can be used to bind the namespaces in an XML document the use of the prefixes listed above is recommended. If attributes in this document are defined without prefix they are not in any namespace.

2.2 Extensibility

If an element has a `tt:metadata` as child element, `tt:metadata` shall appear before all other child elements that are defined for this element by EBU-TT (see § 3 "Document Structure").

Every `tt:metadata` element may be extended by zero or more elements as children. These extension elements, their attributes and their XML Content shall neither be in a namespace defined by the TTML 1.0 specification nor in a namespace defined in a valid (not deprecated) version of an EBU-TT specification.

Elements or attributes from the TTML or EBU-TT namespace shall appear only as descendants or attributes of descendants of the `tt:metadata` element if they are explicitly permitted as such in an EBU-TT specification.

2.3 Initial values

TTML 1.0 defines initial values for certain attributes that act as fallback values in case a value cannot be computed from a specified value in the document. The EBU-TT specification does not override these initial values and for any TTML 1.0 attribute that is used in an EBU-TT document the initial value as specified in TTML 1.0 shall apply.

For completeness, all initial values that are used by EBU-TT are listed in **Annex C** "Initial Values of TTML 1.0 and EBU-TT attributes".

Note: A document wide override can be achieved through the specification of a default style that is applied to a `tt:body` element.

Note: To clarify the intention of the author of an EBU-TT document it is recommended that attributes and their values be explicitly specified rather than relying on their initial values.

Note: Version 1.0 of EBU-TT Part 1 overrides the initial values for the following TTML attributes:`ttp:cellResolution`, `tts:fontSize`,`tts:displayAlign` and `tts:textAlign`. To achieve better interoperability with other TTML profiles in Version 1.1 of EBU-TT Part 1 the initial values from TTML 1.0 apply for these attributes. Users are advised that documents that rely on initial values can appear differently when presented according to Version 1.0 vs Version 1.1.

2.4 Compatibility with TTML 1.0 timing model

With the constraints defined in EBU-TT the time containers `tt:body` and `tt:div` have, according to the TTML 1.0 event based timing model, no specified duration. However, in EBU-TT the time expressions in the `begin` and `end` attributes of their children elements (`tt:p` and `tt:span`) may nonetheless activate and deactivate the enclosed subtitle content.

2.5 Unicode support

EBU-TT processing and transformation engines should support Unicode characters and the Unicode bidirectional algorithm (UAX9) [6].

2.6 White space handling

To indicate the authors' intent in the use of white space (spaces, tabs, and blank lines) the `xml:space` attribute may be added to a `tt:tt`, `tt:p` or `tt:span` element.

In accordance with the W3C XML 1.0 Specification [7], the value "default" signals that the default white-space processing modes of the processing application are acceptable for this element; the value "preserve" indicates the intent that applications preserve all the white space.

This declared intent is considered to apply to all elements within the content of the element where it is specified, unless overridden with another instance of the `xml:space` attribute.

2.7 Fonts (Informative)

The correct, or expected, rendering of text is dependent on several factors, including the display resolution, the font layout algorithm and the font selected, for example. It is not always reasonable to expect that all presentation processors will find the same glyph for every Unicode code point in content with a given value of `tts:fontFamily`, and that any particular line of text will always occupy the same size block of pixels.

However it is important that the author's intent in the presentation of a specific piece of subtitle text is honoured as closely as possible. In particular, text ought not to occupy more space than has been allocated, lest there be unwanted line breaks or overflows, and all glyphs should be presented accurately.

In a broadcast context the creation point of an EBU-TT Part 1 document is likely to be an authoring station of some sort, and the primary consumption point is typically an encoder, for example a processor that creates an EBU-TT-D output, or one that rasterises the input into a bitmap graphic. To varied extents, the organisations involved can arrange some shared resources or knowledge to minimise the differences in behaviour between author and encoder. They may for example agree a specific font or set of fonts in which the output is permitted to be presented.

Put simply, each font resource (which could be stored as a font 'file') describes a set of glyphs, each corresponding to a code point, with instructions on how to draw each glyph and metrics such as size and spacing. Different variants of font can exist, each with a different font resource for different font weights (normal or bold), or for different font styles (normal, italic). The font therefore defines a substantial set of the information that could usefully be shared between author and encoder to minimise those differences in behaviour.

When rendering an EBU-TT document every implementation needs to map the processed set of styles for any content, including `tts:fontFamily`, `tts:fontWeight`, `tts:fontStyle` and the computed font size into a set of glyphs and metrics obtained from an appropriate font resource. The `tts:fontFamily` name does not have to map directly to the file name of an installed font, for example. EBU-TT Part 1 does not specify an executive mechanism to direct processors in exactly how they must do this. However it does offer some metadata that can be used to identify when there is a mismatch between author and processor in which font resources are to be, or have been, used.

The `ebuttm:font` element can be used to specify a URI to indicate which font resource was used when authoring the document, for a given combination of font family name, weight and style, and for bitmap fonts, size. This URI could be a filename, an address on a local server, or perhaps a URL pointing to a globally available resource. If a downstream processor needs to render the content and is not able to recognise or dereference that URI, it could present a warning that there is a potential problem that needs to be addressed. This therefore can be used operationally as a check to help ensure that authored documents are likely to be presented correctly.

Of course there remain other variables that could differ, and that have an impact here, such as the text layout algorithm, however those variables are likely to remain static for any particular chain of equipment and can therefore be managed at setup time rather than on a document by document basis.

2.8 Document Structure

The order of content in this specification of the EBU-TT format follows the structure of an EBU-TT document instance. The levels within this specification document reflect the nested structure of an EBU-TT document.

The formal definition of how the EBU-TT specification uses EBU-TT- ,TTML- and XML- vocabulary is presented in tabular form. When using this specification, the definition of the use of an element or attribute shall be interpreted relative to the position in the document instance.

Example:

The definition of `xml:id` attribute in § 3.1.3.2 "`tt:style`" only specifies the use of the `xml:id` attribute on the `tt:style` element.

Definitions used within this specification:

Type:	Constraints of the information structure of an XML element or XML attribute. The type can be further constrained through Enumerations and normative text in the description.
Enumeration:	Enumerated values that shall be used for certain elements or attributes of type `xs:string`.
Cardinality:	How often an element or attribute may be used inside the corresponding parent element. If the lower bound is greater than 0 (e.g. "1..1" or "1..*") the element or attribute is mandatory at this position of the document structure. If the lower bound is equal to 0 (e.g. "0..1" or "0..*") the element or attribute is optional at this position in the document structure.
Position	The position of an element or attribute in an EBU-TT Document as XPATH expression starting with the document root "/". A default namespace of "http://www.w3.org/ns/ttml" is assumed and the prefix "tt" is omitted in the XPATH expression.
TTML	The URL to the specific chapter in the TTML 1.0 specification where the attribute or element is defined. The normative constraints of TTML 1.0 apply unless they are further constrained by this specification.[1]

[1] At time of publication the links are based on the TTML version specified at [3].

3. tt:tt

Type	Element content
Cardinality	1..1
Position	/
TTML	http://www.w3.org/TR/ttml1/#document-structure-vocabulary-tt
Description	Root element. Every EBU-TT document instance shall start with the `tt:tt` element. In XML terms this element is the root element of the document.

xml:space (attribute)

Type	`xs:string`
Enumeration	"default" | "preserve"
Cardinality	0..1
Position	/tt
TTML	http://www.w3.org/TR/ttml1/#content-attribute-space
Description	Indicates the author's intent in the handling of white space (spaces, tabs, and blank lines) within the content of the EBU-TT document.

ttp:timeBase (attribute)

Type	`xs:string`
Enumeration	"smpte" | "media" | "clock"
Cardinality	1..1
Position	/tt
TTML	http://www.w3.org/TR/ttml1/#parameter-attribute-timeBase
Description	The timebase defines the time coordinate system for all time expressions in EBU-TT. If the timebase is "smpte" time expressions of `begin` and `end` attributes of the subtitle content shall be interpreted in the time coordinate system of SMPTE 12M-1-2008 and shall be of type `ebuttdt:smpteTimingType`. Additionally if the timebase is "smpte" the attributes `ttp:markerMode` and `ttp:dropMode` shall be specified on the `tt:element`. If the timebase is "media" then all time expressions of `begin` and `end` attributes of the subtitle content shall denote a coordinate on the time line of a media object and shall be of type `ebuttdt:mediaTimingType`. Note: The timebase "media" is intended to use the playtime of any associated video or other related media object as a synchronisation reference. If the timebase is "clock" then all `begin` and `end` attributes of the subtitle content shall denote a coordinate in some real-world time line and shall be of type `ebuttdt:clockTimingType`.

ttp:frameRate (attribute)

Type	`xs:positiveInteger`
Cardinality	0..1
Position	/tt
TTML	http://www.w3.org/TR/ttml1/#parameter-attribute-frameRate
Description	The frame rate used to interpret time expressions of type `ebuttdt:smpteTimingType` . The frame rate applies to the entire document instance. The positive sign ("+") shall not be used. If the timebase is "smpte" the `ttp:frameRate` shall be specified. Sample Value: "25"

ttp:frameRateMultiplier (attribute)

Type	`ebuttdt:frameRateMultiplierType`
Cardinality	0..1
Position	/tt
TTML	http://www.w3.org/TR/ttml1/#parameter-attribute-frameRateMultiplier
Description	Multiplier that shall be applied to the frame rate specified by a `ttp:frameRate` attribute in order to compute the effective frame rate. If the frame rate is a whole number of frames per second the value for the `ttp:frameRateMultiplier` attribute shall be "1 1". If the timebase is "smpte" the `ttp:frameRateMultiplier` shall be specified. Example: The frame rate multiplier used for synchronizing with video objects at 30 frames per second is nominally 1000:1001. The value for the `ttp:frameRateMultiplier` attribute would accordingly be "1000 1001".

ttp:markerMode (attribute)

Type	`xs:string`
Enumeration	"discontinuous"
Cardinality	0..1
Position	/tt
TTML	http://www.w3.org/TR/ttml1/#parameter-attribute-markerMode
Description	If the timebase is "smpte" `ttp:markerMode` shall be specified and shall have the value "discontinuous". The value "discontinuous" implies that this EBU-TT document is using the marker mode of operation and no assumption may be made regarding linearity or monotonicity of time coordinates. Note: The value "discontinuous" does not necessarily imply non-linearities in the timeline of the associated video. It is meant as a reminder that, in general, time expressions must be understood as markers and that there are no guarantees that calculations of duration and intervals between markers based on the timecode values alone are correct.

ttp:dropMode (attribute)

Type	`xs:string`
Enumeration	"nonDrop" | "dropNTSC" | "dropPAL"
Cardinality	0..1
Position	/tt
TTML	http://www.w3.org/TR/ttml1/#parameter-attribute-dropMode
Description	`ttp:dropMode` specifies constraints on the interpretation and use of frame counts that correspond with time expressions of type `ebuttdt:smpteTimingType`. The attribute shall be specified when the value of the `ttp:timebase` attribute is "smpte". When the timebase is "smpte" and the calculation of the framerate from the `ttp:frameRate` and `ttp:frameRateMultiplier` results in an integer framerate then `ttp:dropMode` shall always be "nonDrop". The semantics of the values "nonDrop", "dropNTSC" and "dropPAL" are defined in the W3C Timed Text Markup Language (TTML) 1.0.

ttp:clockMode (attribute)

Type	`xs:string`
Enumeration	"local" | "gps" | "utc"
Cardinality	0..1
Position	/tt
TTML	http://www.w3.org/TR/ttml1/#parameter-attribute-clockMode
Description	`ttp:clockMode` specifies the interpretation of time expressions when `ttp:timebase` is set to clock. The attribute shall be specified when the value of the `ttp:timebase` attribute is "clock". The semantics of the values "local", "gps" and "utc" are defined in TTML 1.0.

ttp:cellResolution (attribute)

Type	`ebuttdt:cellResolutionType`
Cardinality	0..1
Position	/tt
TTML	http://www.w3.org/TR/ttml1/#parameter-attribute-cellResolution
Description	Expresses a virtual visual grid composed of horizontal and vertical cells. This grid divides the active video (see "Definition of terms") in rows and columns. The first value defines the number of columns and the second value defines the number of rows. The `ttp:cellResolution` should be set explicitly. Otherwise the default value of "32 15" shall apply. If an EBU-TT document instance uses the 'cell' measurement unit (e.g. as part of a `tts:fontsize` attribute value) then the `ttp:cellResolution` attribute shall be specified. Note: The resulting grid is intended for the purpose of measuring length and expressing coordinates. It does not imply a "pigeonhole" grid where one character is placed into one cell. This is possible but would require the use of a monospaced font and a font size that exactly matches the cell size. Note: The initial value of `ttp:cellResolution` was "40 24" in EBU-TT Part 1 v1.0 and has been changed for better interoperability with TTML 1.0.

tts:extent (attribute)

Type	`ebuttdt:extentType`
Cardinality	0..1
Position	/tt
TTML	http://www.w3.org/TR/ttml1/#style-attribute-extent
Description	Defines the width and height of the active video (see "Definition of terms") the subtitles were authored for. Only length expressions in pixels shall be used. If an EBU-TT document instance uses the 'pixel' measurement unit (e.g. as part of a `tts:fontsize` attribute value) then the `tts:extent` attribute shall be specified on the `tt:tt` element. Sample Value: "1280px 720px"

xml:lang (attribute)

Type	`xs:language | ""`
Cardinality	1..1
STL mapping	Language Code (LC)
Position	/tt
TTML	http://www.w3.org/TR/ttml1/#content-attribute-lang
Description	The language for which the EBU-TT document is prepared unless specified more locally within the document. The empty string may be used to indicate that no language information is available. The `xml:lang` attribute shall be used as defined in XML 1.0 § 2.12, "Language Identification" [7]. Sample Values: "en", "en-US" or "de". xml:lang should not be used by a mechanism in the external context to identify the purpose or role of the document. For example a different mechanism would be required to distinguish between a "hard of hearing" and a "translation" subtitle document in the same language. [1] Note: The principal discussion of internationalization is out of scope of this specification but it is recommended that authors follow the internationalization recommendation by the W3C.[2]

3.1 tt:head

Type	Element content
Cardinality	1..1
Position	/tt
TTML	http://www.w3.org/TR/ttml1/#document-structure-vocabulary-head
Description	Container element that groups styling, layout and metadata information. The head section of an EBU-TT document carries information needed by an implementation to correctly present or render the contained subtitles. Specific layout and styling information shall be defined in the head of an EBU-TT document. The content elements in the body reference this information.

[1] See http://www.w3.org/International/questions/qa-when-xmllang.en

[2] See http://www.w3.org/TR/xml-i18n-bp/, "Best Practice 1: Defining markup for natural language labelling"

3.1.1 tt:metadata

Type	Element content
Cardinality	0..1
Position	/tt/head
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-metadata
Description	Generic metadata container. The `tt:metadata` element inside the `tt:head` element is used as a generic container for metadata information that applies to the whole document. tt:metadata may have user defined XML vocabulary as defined in § 2.2.

3.1.1.1 ebuttm:documentMetadata

Type	Element content
Cardinality	0..1
Position	/tt/head/metadata
Description	The `ebuttm:documentMetadata` element is used for EBU-TT specific metadata that applies to the whole EBU-TT document.

3.1.1.1.1 ebuttm:conformsToStandard

Type	`xs:anyURI`
Cardinality	0..*
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	Indicates the conformance with a specific standard that is derived from TTML 1.0. For EBU-TT Part 1 version 1.1 the following URI shall be used: "urn:ebu:tt:exchange:2015-09"

3.1.1.1.2 ebuttm:documentEbuttVersion

Type	`xs:string`
Enumeration	"v1.0"
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	The element `ebuttm:documentEbuttVersion` is deprecated and SHALL only be used to indicate conformance to EBU-TT Part 1 version 1.0. Note: Documents that conform simultaneously to EBU-TT Part 1 version 1.0 and later versions can include this element to facilitate processing by implementations that are only able to handle version 1.0 documents.

3.1.1.1.3 ebuttm:documentIdentifier

Type	`xs:string`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	Identifier for an EBU-TT document that may be used as external reference to an EBU-TT document. The format of the identifier may be an URI.

3.1.1.1.4 ebuttm:documentOriginatingSystem

Type	`xs:string`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	Software and version used to create the EBU-TT document.

3.1.1.1.5 ebuttm:documentCopyright

Type	`xs:string`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	The copyright of the document. Sample Value: "© EBU 2011" The use of `ebuttm:documentCopyright` is deprecated and `ttm:copyright` as defined in TTML 1.0 shall be used instead (see §3.1.1).

3.1.1.1.6 ebuttm:documentReadingSpeed

Type	`xs:positiveInteger`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	The intended reading speed for the subtitles in words per minute.

3.1.1.1.7 ebuttm:documentTargetAspectRatio

Type	`xs:string`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata
TTML	
Description	The aspect ratio of the active video the EBU-TT document was authored for, in width by height. Sample Value: "4:3" Note: It is common practice to author documents so that text is carefully placed spatially with respect to content within the video to achieve editorial goals such as avoiding the occlusion of in-video text, faces etc. A single EBU-TT document could be created for re-use to support different renditions of a video asset, where those renditions can themselves have different active video aspect ratios, calculated by multiplying the Storage Aspect Ratio (SAR) by the pixel aspect ratio. If preservation of the relative spatial positioning of text against the video contents is required care must be taken to manage the tts:origin and tts:extent values within the document, which are likely to need to be modified. In some scenarios strict preservation is not possible, for example if the active video width is reduced by a “centre cut-out” or “pan and scan” system. The `ebuttm:documentTargetAspectRatio` element can be used in such a transformation context to deduce if the coordinates need to be modified. It can also be used to deduce the intended pixel aspect ratio for a given root container extent expressed in pixels, however the `ttp:pixelAspectRatio` parameter is not used in EBU-TT.

3.1.1.1.8 ebuttm:documentTargetActiveFormatDescriptor

Type	`xs:string`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	The code for the Active Format Descriptor (AFD) that specifies the active image in the active video (see “Definition of terms”). The code shall be one of the AFD codes specified in SMPTE ST 2016-1:2009 “Format for Active Format Description and Bar Data” Table 1. [10] If the AFD code is specified the `ebuttm:documentTargetAspectRatio` element shall be specified and shall have the value "4:3" or "16:9". Sample Value: "0010" for full frame 16:9 image.

3.1.1.1.9 ebuttm:documentIntendedTargetBarData

Type	`xs:string`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	When an `ebuttm:documentTargetActiveFormatDescriptor` element is used in an EBU-TT document, an `ebuttm:documentIntendedTargetBarData` element may be used whenever the AFD alone is insufficient to describe the extent of the image (i.e. AFD values 0000 and 0100). The Bar Data shall be specified in accordance with SMPTE ST 2016-1:2009 “Format for Active Format Description and Bar Data” Table 3.

position (attribute)

Type	`xs:string`
Enumeration	`"topBottom" | "leftRight"`
Cardinality	1..1
Position	/tt/head/metadata/ebuttm:documentMetadata/ ebuttm:documentIntendedTargetBarData
Description	Bar Data shall be defined in pairs, either top and bottom bars or left and right bars, but not both pairs at once. Bars may be unequal in size. One bar of a pair may be zero width or height. If the position attribute has the value "topBottom" then the `ebuttm:documentIntendedTargetBarData` element shall also contain the `lineNumberEndOfTopBar` and `lineNumberStartOfBottomBar` attributes. If the position attribute has the value "leftRight" then the `ebuttm:documentIntendedTargetBarData` element shall also contain the `pixelNumberEndOfLeftBar` and `pixelNumberStartOfRightBar` attributes.

lineNumberEndOfTopBar (attribute)

Type	`xs:nonNegativeInteger`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata/ ebuttm:documentIntendedTargetBarData
Description	Last line of a horizontal letter-box bar area at the top of the reconstructed frame. Designation of line numbers shall be based on the video standards and information specified in accordance with SMPTE ST 2016-1:2009. All Bar_Data values shall be stated in values appropriate to a progressive frame system.

lineNumberStartOfBottomBar (attribute)

Type	`xs:nonNegativeInteger`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata/ ebuttm:documentIntendedTargetBarData
Description	First line of a horizontal letter-box bar area at the bottom of the reconstructed frame. Designation of line numbers shall be based on the video standards and information specified in accordance with SMPTE ST 2016-1:2009. All Bar Data values shall be stated in values appropriate to a progressive frame system.

pixelNumberEndOfLeftBar (attribute)

Type	`xs:nonNegativeInteger`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata/ ebuttm:documentIntendedTargetBarData
Description	Last horizontal luminance sample of a vertical pillar-box bar area at the left side of the reconstructed frame. Pixels shall be numbered from zero, starting with the leftmost pixel, based on the video standards and information specified in accordance with SMPTE ST 2016-1:2009.

pixelNumberStartOfRightBar (attribute)

Type	`xs:nonNegativeInteger`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata/ ebuttm:documentIntendedTargetBarData
Description	First horizontal luminance sample of a vertical pillar-box bar area at the right side of the reconstructed frame. Pixels shall be numbered from zero, starting with the leftmost pixel, based on the video standards and information specified in accordance with SMPTE ST 2016-1:2009.

3.1.1.1.10 ebuttm:documentIntendedTargetFormat

Type	`xs:string`
Cardinality	0..*
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	Indicates the format to whose constraints the EBU-TT document is intended to conform. This may be used to indicate that the document contents are suitable for conversion to the referenced format. The EBU publishes a Classification Schema (CS) that may be used for values of `ebuttm:documentIntendedTargetFormat` . The classification schema is available at: http://www.ebu.ch/metadata/cs/EBU-TTSubtitleTargetFormatCodeCS.xml If the above EBU CS is used the value of `ebuttm:documentIntendedTargetFormat` should be the English name of the term in that classification scheme. The URI to the term should be specified by using the link attribute. Note: See https://tech.ebu.ch/MetadataReferenceData for more information how a classification scheme is referenced. Sample Value: "Enhanced Teletext Level 1.5" or "DVBBitmapSubtitles"

link (attribute)

Type	`xs:anyURI`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata/ ebuttm:documentIntendedTargetFormat
Description	Reference to a term in a classification scheme. The `ebuttm:documentIntendedTargetFormat` element may have a `link` attribute to reference a term in a classification scheme. Note: It is recommended to use the CS published at: http://www.ebu.ch/metadata/cs/EBU-TTSubtitleTargetFormatCodeCS.xml Sample Value: http://www.ebu.ch/metadata/cs/EBU-TTSubtitleTargetFormatCodeCS.xml#1.1

3.1.1.1.11 ebuttm:documentCreationMode

Type	`xs:string`
Enumeration	`"live" | "prepared"`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	The `ebuttm:documentCreationMode` identifies the overall workflow used to create the content in the document. The value "live" is intended to signify content that was originated out in real-time at the time of transmission. The value "prepared" is intended to signify content that has been prepared prior to transmission.

3.1.1.1.12 ebuttm:documentContentType

Type	`xs:string`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	The `ebuttm:documentContentType` element may be used to classify the document content by its intended presentation usage. The EBU publishes a Classification Schema (CS) that may be used for values of `ebuttm:documentContentType`. The classification schema is available at: http://www.ebu.ch/metadata/cs/EBU-TTContentTypeCS.xml If the above EBU CS is used the value of `ebuttm:documentContentType` should be the English name of the term in that classification scheme. The URI to the term should be specified by using the link attribute. Note: See https://tech.ebu.ch/MetadataReferenceData for more information how a classification scheme is referenced. Sample Value: "audio description" or "hard of hearing subtitles"

link (attribute)

Type	`xs:anyURI`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata/ebuttm:documentContentType
Description	Reference to a term in a classification scheme. The `ebuttm:documentIntendedTargetFormat` element may have a `link` attribute to reference a term in a classification scheme. Note: It is recommended to use the CS published at: http://www.ebu.ch/metadata/cs/EBU-TTContentTypeCS.xml Sample Value: http://www.ebu.ch/metadata/cs/EBU-TTContentTypeCS.xml#1.1

3.1.1.1.13 ebuttm:sourceMediaIdentifier

Type	`xs:string`
Cardinality	0..*
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	Identifier to be used as an external reference to the source media used to author the EBU TT document, e.g. a video file or tape. The source media can be a proxy (e.g. a low resolution version of the program the subtitles are created for). Any format identifier may be used and no requirement or recommendation is made that a particular type of identifier be used. However the type of each identifier provided shall be described by use of the type attribute of `ebuttm:sourceMediaIdentifier`. Where multiple identifiers are required multiple elements should be included.

type (attribute)

Type	`xs:string`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata/ebuttm:sourceMediaIdentifier
Description	The type of identifier carried. The value of this attribute should be defined with reference to the external context of the authoring system and media asset management in use.

3.1.1.1.14 ebuttm:relatedMediaIdentifier

Type	`xs:string`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	Identifier of the related media for which the EBU-TT document was created. This identifier may be a production number.

3.1.1.1.15 ebuttm:relatedObjectIdentifier

Type	`xs:string`
Cardinality	0..*
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	Identifier for an object (e.g.another media object or documentation) that is associated with the EBU-TT document.

type (attribute)

Type	`xs:string`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata/ebuttm:relatedObjectIdentifier
Description	Type of the identifier.

3.1.1.1.16 ebuttm:appliedProcessing

Type	Mixed content.
Cardinality	0..*
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	Label or identifier for a specific processing step that has been applied to the EBU-TT document. If more than one `ebuttm:appliedProcessing element` is specified in an EBU-TT document their order does not apply any meaning. The applied `ebuttm:appliedProcessing` element may have zero or more elements as children. These elements, their attributes and their XML Content shall not be in a namespace defined by TTML 1.0 or in a namespace defined in the EBU-TT specification.

appliedDateTime (attribute)

Type	`xs:dateTime`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata/ebuttm:appliedProcessing
Description	Date and time the processing step has been applied to the EBU-TT document.

3.1.1.1.17 ebuttm:relatedMediaDuration

Type	`ebuttdt:mediaTimingType`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	Playtime of the related media.

3.1.1.1.18 ebuttm:documentBeginDate

Type	`ebuttdt:noTimezoneDateType`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	The value of `ebuttm:documentBeginDate` shall be the corresponding date of creation of the earliest begin time expression (i.e. the begin time expression that is the first coordinate in the document time line). The `ebuttm:documentBeginDate` may be used to establish a synchronisation point between the document timeline and a referenced real world time line (as may be identified by `ebuttm:localTimeOffset` and `ebuttm:clockIdentifier`) for documents that typically represent recordings of real world subtitles. The timezone shall not be specified. The timezone of `ebuttm:documentBeginDate` is the same timezone that is applied to the the earliest begin time expression in the document. Note: When `ttp:timebase` is "clock" the `ebuttm:documentBeginDate` would typically contain a date in the past, but could also be used to establish a synchronisation point between the document contents and a real world time and date that lies in the 'future'.

3.1.1.1.19 ebuttm:localTimeOffset

Type	`xs:string`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	Specifies the timezone when `ttp:timebase` is "clock" and `ttp:clockmode` is "local". When `ttp:timebase` is "clock" and `ttp:clockmode` is "local" the `ebuttm:localTimeOffset` is optional and may be present in an EBU-TT document. The timezone is specified as defined in ISO 8601. Examples: "Z" - Universal Time (UTC) +hh:mm (e.g. +01:00) – local time zone is hh hours and mm minutes ahead of UTC -hh:mm (e.g. -08:00) – local time zone is hh hours and mm minutes behind UTC

3.1.1.1.20 ebuttm:referenceClockIdentifier

Type	`xs:string`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	Allows the reference clock source to be identified. Permitted only when `ttp:timeBase="clock"` AND `ttp:clockMode="local"` OR when `ttp:timeBase="smpte"`.

3.1.1.1.21 ebuttm:broadcastServiceIdentifier

Type	`xs:string`
Cardinality	0..*
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	Identifier for a broadcast service the subtitles of an EBU-TT document were distributed to, or intended for. Note: A broadcast service is a TV channel, transmission or other distribution of AV content. Identical content (e.g. a live event) may be distributed on multiple services simultaneously. There exists a requirement to identify the service(s) that a captured archive (as an EBU-TT document) of live authored subtitles were distributed to, or are intended to be used for. The services associated with a stream of subtitles may change over the duration of the recorded archive.

serviceBegin (attribute)

Type	`xs:dateTime`
Cardinality	1..1
Position	/tt/head/metadata/ebuttm:documentMetadata/ ebuttm:broadcastServiceIdentifier
Description	Start of the period (expressed as a time of day) for which subtitles within the document have been distributed or targeted to the identified service.

serviceEnd (attribute)

Type	`xs:dateTime`
Cardinality	1..1
Position	/tt/head/metadata/ebuttm:documentMetadata/ ebuttm:broadcastServiceIdentifier
Description	End of the period (expressed as a time of day) for which subtitles within the document have been distributed or targeted to the identified service.

3.1.1.1.22 ebuttm:documentTransitionStyle

Type	`Empty Element`
Cardinality	0..*
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	A summary of the style of transition between successive subtitles or parts of subtitle within the document. The transition style is defined by the units of content that are added to the display and removed from it on each transition, specified by the attributes inUnit and outUnit. No content is defined for this element. Note: This attribute could be calculated by a suitable algorithm based on `ebuttm:transitionStyle` metadata if present within the document, for example the value that has the largest count of `tt:p` elements to which it applies. Note In some regulatory environments `ebuttm:documentTransitionStyle` can be used for reporting the presentation style of the document as a whole, noting that it is possible that it does not accurately reflect all of the contents of the document.

inUnit (attribute)

Type	`xs:string`
Cardinality	1..1
Enumeration	"block" | "line" | "word" | "partOfWord" | "groupOfWords"
Position	/tt/head/metadata/ebuttm:documentMetadata/ ebuttm:documentTransitionStyle
Description	Unit of removal. • "block": "Multiple lines" • "line": "a single line" • "word": "a single semantic unit" • "partOfWord": "a sub-part of a semantic unit" • "groupOfWords": "more than one semantic unit"

outUnit (attribute)

Type	`xs:string`
Cardinality	1..1
Enumeration	"block" | "line" | "word" | "partOfWord" | "groupOfWords"
Position	/tt/head/metadata/ebuttm:documentMetadata/ ebuttm:documentTransitionStyle
Description	Unit of removal. • "block": "Multiple lines" • "line": "a single line" • "word": "a single semantic unit" • "partOfWord": "a sub-part of a semantic unit" • "groupOfWords": "more than one semantic unit"

The following metadata elements support the information that is present in the GSI block of the EBU-STL specification (EBU Tech 3264). EBU-TT has adopted the semantics from EBU Tech 3264.

If more than one STL source file is used to generate an EBU-TT document the GSI metadata shall not be mapped into `ebuttm:documentMetadata` unless the value of a GSI field is the same across all STL documents. Note that there is the possibility to preserve the GSI data from all source files by tunneling the STL files as binary data.

3.1.1.1.23 ebuttm:documentOriginalProgrammeTitle

Type	`xs:string`
Cardinality	0..1
STL mapping	Original Programme Title (OPT)
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	The programme title in the original language.

3.1.1.1.24 ebuttm:documentOriginalEpisodeTitle

Type	`xs:string`
Cardinality	0..1
STL mapping	Original Episode Title (OET)
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	The title of the episode of the programme in the original language.

3.1.1.1.25 ebuttm:documentTranslatedProgrammeTitle

Type	`xs:string`
Cardinality	0..1
STL mapping	Translated Programme Title (TPT)
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	The programme title in the local language.

3.1.1.1.26 ebuttm:documentTranslatedEpisodeTitle

Type	`xs:string`
Cardinality	0..1
STL mapping	Translated Episode Title (TET)
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	The title of the episode of the programme in the local language.

3.1.1.1.27 ebuttm:documentTranslatorsName

Type	`xs:string`
Multiplicity	0..1
STL mapping	Translator's Name (TN)
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	Name of the translator.

3.1.1.1.28 ebuttm:documentTranslatorsContactDetails

Type	`xs:string`
Cardinality	0..1
STL mapping	Translator's Contact Details (TCD)
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	The translator's contact details.

3.1.1.1.29 ebuttm:documentSubtitleListReferenceCode

Type	`xs:string`
Cardinality	0..1
STL mapping	Subtitle List Reference Code (SLR)
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	Free-format character string which may be used to provide an additional reference for the subtitle list. Note: This attribute is provided to support conversion of STL subtitle files and to retain the metadata from the GSI block.

3.1.1.1.30 ebuttm:documentCreationDate

Type	`xs:date`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	The date of creation of the EBU-TT document. The value of `ebuttm:documentCreationDate` shall not change for subsequent revisions of the EBU-TT document. `ebuttm:documentCreationDate` should not be used for the date of creation of the STL file the EBU-TT document was created from. For this purpose `ebuttm:stlCreationDate` should be used (see 3.1.2.1.40). Note: The `ebuttm:documentCreationDate` value can differ from the `ebuttm:documentBeginDate` value (if present), as the earliest begin time expression in the document can occur before or after the creation date and time of the document. Sample Value: "2012-06-30"

3.1.1.1.31 ebuttm:documentRevisionDate

Type	`xs:date`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	The date of the most-recent modifications to the EBU-TT document. The value of `ebuttm:documentRevisionDate` shall reflect the date of a published revision. The revision date of the first version shall be the same as the `ebuttm:documentCreationDate`. `ebuttm:documentRevisionDate` should only be used if the metadata element `ebuttm:documentRevisionNumber` is also present. `ebuttm:documentRevisionDate` should not be used for the revision date of the STL file the EBU-TT document was created from. For this purpose `ebuttm:stlRevisionDate` should be used (see 3.1.2.1.41).

3.1.1.1.32 ebuttm:documentRevisionNumber

Type	`xs:nonNegativeInteger`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	The revision number of the EBU-TT document may be used to specify a particular version of the subtitle list. The value `ebuttm:documentRevisionNumber` shall be different for each published revision of the document. `ebuttm: documentRevisionNumber` should not be used for the revision number of the STL file the EBU-TT document was created from. For this purpose `ebuttm:stlRevisionNumber` should be used (see 3.1.2.1.42). Note: It is recommended that the revision number starts from 0 and 0 is the first version of the EBU-TT document.

3.1.1.1.33 ebuttm:documentTotalNumberOfSubtitles

Type	`xs:nonNegativeInteger`
Cardinality	0..1
STL mapping	Total Number of Subtitles (TNS)
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	The number of subtitles.

3.1.1.1.34 ebuttm:documentMaximumNumberOfDisplayableCharacterInAnyRow

Type	`xs:nonNegativeInteger`
Cardinality	0..1
STL mapping	Maximum Number of Displayable Characters in any text row (MNC)
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	Maximum number of characters in any row.

3.1.1.1.35 ebuttm:documentStartOfProgramme

Type	`ebuttdt:smpteTimingType | ebuttdt:clockTimingType`
Cardinality	0..1
STL mapping	Timecode: Start-of-Programme (TCP)
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	If `ttp:timebase` has the value "smpte" `ebuttm:documentStartOfProgramme` may be used to record the SMPTE timecode value for the start of the related media object. Note: It is recommended to specify `ebuttm:documentStartOfPrograme` when the referenced start timecode of the video material the subtitles were authored for is NOT 00:00:00:00 (e.g. 10:00:00:00). If `ttp:timebase` has the value "clock" then this `documentStartOfProgramme` element may be used to record the clock value for the 'start of the document'. For example, in the case of an archive recording of live subtitles, this element could be used to store the 'start of recording' time. Note: If `ttp:timebase` has the value "clock", it is recommended to specify `ebuttm:documentStartOfPrograme` to establish a synchronisation point between the timecode values within the document and the 'real world'.

3.1.1.1.36 ebuttm:documentCountryOfOrigin

Type	`xs:string`
Cardinality	0..1
STL mapping	Country of Origin (CO)
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	The country of origin of the subtitle list. The `ebuttm:documentCountryOfOrigin` element shall not be used as a substitute for the `xml:lang` attribute of the `tt:tt` element. Note: Although three letter country codes must be supported to be compatible with STL the use of two letter country codes is recommended. The use of ISO3166 country codes "Codes for the representation of names of countries and their subdivisions" [11] is also recommended.

3.1.1.1.37 ebuttm:documentPublisher

Type	`xs:string`
Cardinality	0..1
STL mapping	Publisher (PUB)
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	Name of the publisher of the subtitle list.

3.1.1.1.38 ebuttm:documentEditorsName

Type	`xs:string`
Cardinality	0..1
STL mapping	Editor's Name (EN)
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	Name of the editor of the subtitle list.

3.1.1.1.39 ebuttm:documentEditorsContactDetails

Type	`xs:string`
Cardinality	0..1
STL mapping	Editor's Contact Details (ECD)
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	Information about the editor named in the metadata element `ebuttm:documentEditorsName`.

3.1.1.1.40 ebuttm:documentUserDefinedArea

Type	`xs:string`
Cardinality	0..1
STL mapping	User-Defined Area (UDA)
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	This field may be used to carry information about the programme or subtitle list, or other relevant details.

3.1.1.1.41 ebuttm:stlCreationDate

Type	`xs:date`
Cardinality	0..1
STL mapping	Creation Date (CD)
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	The date of creation of the STL file the EBU-TT document was created from. If a STL file is tunneled in the EBU-TT document using the `ebuttm:binaryData` element this element shall not be used and the attribute `creationDate` of the `ebuttm:binaryDataElement` shall be used instead.

3.1.1.1.42 ebuttm:stlRevisionDate

Type	`xs:date`
Cardinality	0..1
STL mapping	Revision Date (RD)
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	The date of the most-recent modifications to the STL file the EBU-TT document was created from. If a STL file is tunneled in the EBU-TT document using the `ebuttm:binaryData` element this element shall not be used and the attribute `revisonDate` of the `ebuttm:binaryDataElement` shall be used instead.

3.1.1.1.43 ebuttm:stlRevisionNumber

Type	`xs:nonNegativeInteger`
Cardinality	0..1
STL mapping	Revision Number (RN)
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	The revision number of the STL file the EBU-TT document was created from. If a STL file is tunneled in the EBU-TT document using the `ebuttm:binaryData` element this element shall not be used and the attribute `revisonNumber` of the `ebuttm:binaryDataElement` shall be used instead.

3.1.1.1.44 ebuttm:subtitleZero

Type	`xs:string`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:documentMetadata
Description	A convention exists within the subtitling industry to use the first subtitle of a subtitle file for programme related metadata. This first subtitle is typically known as “subtitle zero” and is used operationally for example within play-out services to check that the correct subtitles have been loaded during pre-roll. The convention arose because the (non-EBU-TT) file formats in use do not support all the metadata that users wish to convey and information stored can be displayed and edited by all systems. A ‘subtitle zero’ is not intended to be broadcast, and this is achieved by ensuring that the presentation timing values (‘incue’ and ‘outcue’ times) for the subtitle are deliberately set outside of the SMPTE timecode values that occur in the corresponding media. This ‘subtitle zero’ information cannot automatically be mapped into structured metadata fields without knowledge of the labelling and formatting conventions used for “subtitle-zero” content. To allow this metadata to be persisted the content of a “subtitle zero” subtitle may be placed into an `ebuttm:subtitleZero` element within the `tt:head` metadata. For example this element can be populated with the text content of a ‘subtitle zero’ subtitle from a non EBU-TT source subtitle file during a conversion into an EBU-TT document. This element should not be used as a generic metadata mechanism for directly created EBU-TT files and is intended only for the preservation of ‘legacy’ data. Note: It is recommended that an implementation, that is able to correctly identify subtitle zero content, moves this information into the head of an EBU TT file as metadata, because it is possible that some processors and display renderers of EBU TT documents do not respect the ‘do not display’ convention of a ‘subtitle zero’ that is placed in the body of the document.

3.1.1.2 ebuttm:binaryData

Type	`xs:string`
Cardinality	0..*
Position	/tt/head/metadata
Description	Container for transporting binary data. The binary data is encoded in one text string. The `ebuttm:binaryData` element may be used to transport binary data of the input formats or associated documents used to generate an EBU-TT document. Where a sequence of source documents has been used to generate an EBU-TT document, multiple `ebuttm:binaryData` elements should be in the same order as the sources were processed.

textEncoding (attribute)

Type	`xs:string`
Enumeration	"BASE64"
Cardinality	1..1
Position	/tt/head/metadata/ebuttm:binaryData
Description	Text encoding of the binary data. The text-encoding shall have the value "BASE64".

binaryDataType (attribute)

Type	`xs:string`
Cardinality	1..1
Position	/tt/head/metadata/ebuttm:binaryData
Description	Internal format of the binary data. Any format that is not defined by this document or another EBU Specification shall be prefixed with "x-". To indicate that the binary data sent in a document is an STL file, the value "EBU Tech 3264" shall be used.

fileName (attribute)

Type	`xs:string`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:binaryData
Description	A filename that may be used to identify the original filename of the tunnelled binary data.

creationDate (attribute)

Type	`xs:date`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:binaryData
Description	The date of creation of the tunneled data. If the tunneled data is a STL file this attribute shall be used to store the value of the GSI field Creation Date (CD) of the tunneled STL file. The metatada element `ebuttm:stlCreationDate` shall not be used in this case.

revisionDate (attribute)

Type	`xs:date`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:binaryData
Description	The date of the most-recent modifications of the tunneled data. If the tunneled data is a STL file this attribute shall be used to store the value of the GSI field Revision Date (RD) of the tunneled STL file. The metatada element `ebuttm:stlRevisionDate` shall not be used in this case.

revisionNumber (attribute)

Type	`xs:nonNegativeInteger`
Cardinality	0..1
Position	/tt/head/metadata/ebuttm:binaryData
Description	The revision number of the tunneled data. If the tunneled data is a STL file this attribute shall be used to store the value of the GSI field Revision Number (RN) of the tunneled STL file. The metatada element `ebuttm:stlRevisionNumber` shall not be used in this case.

3.1.1.3 ttm:title

Type	`xs:string`
Cardinality	0..1
Position	/tt/head/metadata
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-title
Description	The semantics, content model and the use of the `ttm:title` element shall be as defined in TTML 1.0.

3.1.1.4 ttm:desc

Type	`xs:string`
Cardinality	0..1
Position	/tt/head/metadata
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-desc
Description	The semantics, content model and the use of the `ttm:desc` element shall be as defined in TTML 1.0.

3.1.1.5 ttm:agent

Type	`Element Content`
Cardinality	0..1
Position	/tt/head/metadata
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-agent
Description	The semantics, content model and the use of the `ttm:agent` element shall be as defined in TTML 1.0.

3.1.2 ttm:copyright

Type	xs:string
Cardinality	0..1
Position	/tt/head
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-copyright
Description	The copyright of the document. Sample Value: "© EBU 2015". The use of the metadata element `ebuttm:documentCopyright` (see § 3.1.1.1) is deprecated and `ttm:copyright` as defined in TTML 1.0 shall be used instead.

3.1.3 tt:styling

Type	Element content
Cardinality	1..1
Position	/tt/head
TTML	http://www.w3.org/TR/ttml1/#styling-vocabulary-styling
Description	Container for styling information.

3.1.3.1 tt:metadata

Type	Element content
Cardinality	0..1
Position	/tt/head/styling
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-metadata
Description	Generic metadata container. `tt:metadata` may have user defined XML vocabulary as defined in § 2.2.

3.1.3.1.1 ebuttm:font

Type	Element content
Cardinality	0..*
Position	/tt/head/styling/metadata
Description	The `ebuttm:font` element allows the author to identify which font was used for authoring text with a particular fontFamily. See also §2.7 for further background on the need to do this. The algorithm for matching text content with an indicated font as specified by `ebuttm:font` is as follows: 1. Compute the values of tts:fontFamily, tts:fontSize, tts:fontStyle, tts:fontWeight for the text content. 2. Find the set of `ebuttm:font` elements whose specified attributes match the computed values (where unspecified attributes are not used in matching), using a case-insensitive comparison of the `tts:fontFamily` value. 3. If the set has zero entries, exit: no font that was used when the content was authored is indicated. 4. If the set has one entry, exit: this is the font that was used when the content was authored. 5. The set has more than one entry. Narrow the set to a single font using the attributes `fontStyle`, `fontWeight` and `fontSize` in that order. For each attribute in turn, if one or more `ebuttm:font` element specifies an exactly matching attribute, exclude the remaining `ebuttm:font` elements, stopping if the set has one entry: that is the font that was used when the content was authored. 6. Any of the remaining `ebuttm:font` entries in the set are considered acceptable for this content. Note: This algorithm does not automatically replace generic font family names, which can therefore be matched directly.

fontFamilyName (attribute)

Type	`ebuttdt:fontFamilyType`
Cardinality	1..1
Position	/tt/head/styling/metadata/ebuttm:font
Description	The font family name that the font element should be matched against. The value should be exactly equal (case sensitively) to the value of a `tts:fontFamily` attribute in the `tt:style` elements intended to match this font. The font family name may be a generic name or a specific one.

src (attribute)

Type	`xs:anyUri`
Cardinality	1..1
Position	/tt/head/styling/metadata/ebuttm:font
Description	The identifier for a suitable resource that corresponds to this `ebuttm:font` element. Note: It is recommended that a registered media type extension for a font resource is appended to the identifier, for example `.woff` for a Web Open Font Format. No other mechanism for identifying the font format is provided.

fontStyle (attribute)

Type	`xs:string`
Enumeration	"italic" | "normal"
Cardinality	0..1
Position	/tt/head/styling/metadata/ebuttm:font
Description	The font style that this `ebuttm:font` element should be matched against. If present, only fonts with the specified value of `tts:fontStyle` will be matched against this font element; if absent, fonts that match the other attributes of `ebuttm:font` regardless of the value of `tts:fontStyle` will be matched.

fontWeight (attribute)

Type	`xs:string`
Enumeration	"bold" | "normal"
Cardinality	0..1
Position	/tt/head/styling/metadata/ebuttm:font
Description	The font weight that the font element should be matched against. If present, only fonts with the specified value of `tts:fontWeight` will be matched against this font element; if absent, fonts that match the other attributes of ebuttm:font regardless of the value of `tts:fontWeight` will be matched.

fontSize (attribute)

Type	ebuttdt:fontSizeType
Cardinality	0..1
Position	/tt/head/styling/metadata/ebuttm:font
Description	This attribute shall apply only when the source font is a bitmap font. The percentage metric shall not be used for fontSize. The font size that the font element should be matched against. If present, only fonts with the specified value of `tts:fontSize` will be matched against this font element; if absent, fonts that match the other attributes of `ebuttm:font` regardless of the value of `tts:fontSize` will be matched. Note: The initial value of `tts:fontSize` was "1c 2c" in EBU-TT Part 1 v1.0 and has been changed to "1c" for better interoperability with TTML.

3.1.3.1.2 ttm:title

Type	`xs:string`
Cardinality	0..1
Position	/tt/head/styling/metadata
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-title
Description	The semantics, content model and the use of the `ttm:title` element shall be as defined in TTML 1.0.

3.1.3.1.3 ttm:desc

Type	`xs:string`
Cardinality	0..1
Position	/tt/head/styling/metadata
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-desc
Description	The semantics, content model and the use of the `ttm:desc` element shall be as defined in TTML 1.0.

3.1.3.2 tt:style

Type	Element content
Cardinality	1..*
Position	/tt/head/styling
TTML	http://www.w3.org/TR/ttml1/#styling-vocabulary-style
Description	Set of style information. A `tt:style` element defines a set of style information through style attributes. The `tt:div`, `tt:p` and `tt:span` elements in the body section, that enclose subtitle content, shall only use references to these specific style definitions. Note: EBU-TT uses referenced styling. EBU-TT does not use the direct specification of style attributes in the subtitle content elements (also known as inline styling).

xml:id (attribute)

Type	`xs:ID`
Cardinality	1..1
Position	/tt/head/styling/style
TTML	http://www.w3.org/TR/ttml1/#content-attribute-id
Description	*ID* of a `tt:style` element. The *ID* shall be unique in the entire document instance. It is used by tt:body, tt:div, tt:p and tt:span elements to reference the style element. Note: The XML attribute `xml:id` (type `xs:ID`) is not only used by the `tt:style` element, but also by the `tt:region`, `tt:div`, `tt:p` and `tt:span` elements. By definition, a value of type `xs:ID` must be unique in the entire document. (See the W3C Specification Extensible Markup Language (XML) 1.0 and XML Schema Part 2: Datatypes [9]). This means, for example, that a `tt:style` element and a `tt:region` element must not have the same `xml:id` attribute value (e.g. "id1").

style (attribute)

Type	`xs:IDREFS`
Cardinality	0..1
Position	/tt/head/styling/style
TTML	http://www.w3.org/TR/ttml1/#style-attribute-style
Description	*ID*(s) of other style element(s). To "inherit" style information the `tt:style` element may itself reference one or more other `tt:style` elements. Style information from the referenced styles shall be inherited. If multiple styles are referenced the *ID*s shall be delimited by space characters (e.g. "styleId1 styleId2 styleId3").

Note: The style attributes used in EBU-TT are a limited subset of TTML 1.0. An EBU-TT processor is not required to support TTML 1.0 style attributes that are not used in the EBU-TT specification.

Style attributes that are not used in EBU-TT are amongst others `tts:display`, `tts:opacity`, `tts:visibility`, `tts:textOutline` and `tts:zIndex`.

In addition to the TTML 1.0 style attributes listed below, EBU-TT also defines style attributes for the `tt:region` element (see § 3.1.3.1 “Region”). The style attributes of the `tt:style` element as well as the style attributes of the `tt:region` element shall only appear inside the parent element they are defined for. This means that a style attribute that is defined for the `tt:style` element shall not appear in a `tt:region` element and vice versa. The only exception from this rule is the `tts:padding` attribute. `tts:padding` may appear both in the `tt:style` and `tt:region element`.

Note: See Annex F for an overview which style attributes are allowed on the `tt:style` and which are allowed on the `tt:region` element.

tts:direction (attribute)

Type	`xs:string`
Enumeration	"ltr" | "rtl"
Cardinality	0..1
Position	/tt/head/styling/style
TTML	http://www.w3.org/TR/ttml1/#style-attribute-direction
Description	Directionality if bi-directional text is used. Note: Bi-directional text is text containing text in both text directions, right-to-left ("rtl") and left-to-right ("ltr"). The Arabic and Hebrew scripts, notably, are written in a form known as right-to-left ("rtl"), in which writing begins at the right-hand side of a page and concludes at the left-hand side. This is different from the left-to-right ("ltr") direction used by most languages in the world.

tts:fontFamily (attribute)

Type	`ebuttdt:fontFamilyType`
Cardinality	0..1
Position	/tt/head/styling/style
TTML	http://www.w3.org/TR/ttml1/#style-attribute-fontFamily
Description	Font-family from which glyphs are selected.

tts:fontSize (attribute)

Type	`ebuttdt:fontSizeType`
Cardinality	0..1
Position	/tt/head/styling/style
TTML	http://www.w3.org/TR/ttml1/#style-attribute-fontSize
Description	The font-size of a glyph.

tts:lineHeight (attribute)

Type	`ebuttdt:lineHeightType`
Cardinality	0..1
Position	/tt/head/styling/style
TTML	http://www.w3.org/TR/ttml1/#style-attribute-lineHeight
Description	Inter-baseline separation between line areas. If the value is "normal" then the line height shall be the same as the largest font size that applies to any descendent element.

tts:textAlign (attribute)

Type	`xs:string`
Enumeration	"left" | "center" | "right"| "start" |"end"
Cardinality	0..1
Position	/tt/head/styling/style
TTML	http://www.w3.org/TR/ttml1/#style-attribute-textAlign
Description	Alignment of inline areas in a containing block. The alignment values "start" and "end" depend on the writing direction of the text which may be specified on a `tt:region` element with the attribute `tts:writingMode`. Note: The initial value of `tts:textAlign` was "center" in EBU-TT Part 1 v1.0 and has been changed to "start" for better interoperability with TTML 1.0. Example: In a left-to-right inline writing direction "start" has the same meaning as “left” alignment while in the top-to-bottom inline writing direction the alignment value "start" expresses “top-alignment”.

tts:color (attribute)

Type	`ebuttdt:colorType`
Cardinality	0..1
Position	/tt/head/styling/style
TTML	http://www.w3.org/TR/ttml1/#style-attribute-color
Description	Foreground color of an area. Note: In TTML 1.0 the initial value for `tts:color` is implementation dependent.

tts:backgroundColor (attribute)

Type	`ebuttdt:colorType`
Cardinality	0..1
Position	/tt/head/styling/style
TTML	http://www.w3.org/TR/ttml1/#style-attribute-backgroundColor
Description	Background color of a region, a block area generated by a `tt:p` element or an inline area generated by a `tt:span` element.

tts:fontStyle (attribute)

Type	`xs:string`
Enumeration	"normal" | "italic"
Cardinality	0..1
Position	/tt/head/styling/style
TTML	http://www.w3.org/TR/ttml1/#style-attribute-fontStyle
Description	Font style that applies to glyphs.

tts:fontWeight (attribute)

Type	`xs:string`
Enumeration	"normal" | "bold"
Cardinality	0..1
Position	/tt/head/styling/style
TTML	http://www.w3.org/TR/ttml1/#style-attribute-fontWeight
Description	Font weight that applies to glyphs.

tts:textDecoration (attribute)

Type	`xs:string`
Enumeration	"none" | "underline"
Cardinality	0..1
Position	/tt/head/styling/style
TTML	http://www.w3.org/TR/ttml1/#style-attribute-textDecoration
Description	Whether a glyph is underlined.

tts:unicodeBidi (attribute)

Type	`xs:string`
Enumeration	"normal" | "embed" | "bidiOverride"
Cardinality	0..1
Position	/tt/head/styling/style
TTML	http://www.w3.org/TR/ttml1/#style-attribute-unicodeBidi
Description	Directional embedding or override according to the Unicode bidirectional algorithm. (see [6])

tts:wrapOption (attribute)

Type	`xs:string`
Enumeration	"wrap" | "noWrap"
Cardinality	0..1
Position	/tt/head/styling/style
TTML	http://www.w3.org/TR/ttml1/#style-attribute-wrapOption
Description	Defines whether or not automatic line wrapping (breaking) applies within the context of the affected element. If the value is "wrap" automated line-breaking shall occur if the line overflows the extent of the region that contains the corresponding content. If the value is "noWrap" no automated line-breaking shall occur. In the case when lines are longer than the available width of the region and "noWrap" is set, the overflow shall be treated in accordance with the specified value of the `tts:overflow` attribute of the corresponding region. If the value of the `tts:wrapOption` is set to "noWrap" the region that corresponds to the affected content should have the attribute `tts:overflow` set to "visible".

tts:padding (attribute)

Type	`ebuttdt:paddingType`
Cardinality	0..1
Position	/tt/head/styling/style
TTML	http://www.w3.org/TR/ttml1/#style-attribute-padding
Description	Padding (or inset) space on all sides of a block area generated by a `tt:p` element or an inline area generated by a `tt:span` element. The padding property shall not be inherited. To apply padding to `tt:p` and `tt:span` elements, a `tt:style` element shall be referenced by `tt:p` or `tt:span`. Note: As the padding property cannot be inherited it applies only to a `tt:p` or a `tt:span` element if these element directly reference a style set with a corresponding padding attribute. The application of padding to the `tt:p` and `tt:span` elements is different to TTML 1.0, where padding applies just to the `tt:region`. So although this difference does not create any syntatic incompabilities TTML 1.0 processors may ignore the application of padding to `tt:p` and `tt:span` elements.

ebutts:multiRowAlign (attribute)

Type	`xs:string`
Enumeration	"star" | "center" | "end" | "auto"
Initial	"auto"
Applies to	`tt:p`
Inherited:	Yes
Cardinality	0..1
Position	/tt/head/styling/style
Description	Alignment of multiple 'rows' of inline areas within a containing block area. Note: `ebutts:multiRowAlign` is a new style attribute defined In addition to the style attributes from TTML. See **Annex A** for a detailed description of how the attribute can be used.

ebutts:linePadding (attribute)

Type	`ebuttdt:linePaddingType`
Cardinality	0..1
Initial	"0c"
Applies to	`tt:body`, `tt:div`, `tt:p`
Inherited	Yes
Position	/tt/head/styling/style
Description	Padding (or inset) space on the start and end edges of each rendered line-area. Background color applies to the area including the line padding. Note: The application of padding affects the layout of text, for example by reducing the maximum width available in which to render text on a single line. It is recommended that document authors ensure that this is taken into account when calculating how much text can fit horizontally and vertically within a region. Note: `ebutts:linePadding attribute` is a new style attribute defined In addition to the style attributes from TTML. See **Annex D** for a detailed description of how the attribute can be used.

3.1.3.2.1 tt:metadata

Type	Element content
Cardinality	0..1
Position	/tt/head/styling/style
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-metadata
Description	Generic metadata container. `tt:metadata` may have user defined XML vocabulary as defined in § 2.2.

3.1.3.2.1.1 ttm:title

Type	`xs:string`
Cardinality	0..1
Position	/tt/head/styling/style/metadata
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-title
Description	The semantics, content model and the use of the `ttm:title` element shall be as defined in TTML 1.0.

3.1.3.2.1.2 ttm:desc

Type	`xs:string`
Cardinality	0..1
Position	/tt/head/styling/style/metadata
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-desc
Description	The semantics, content model and the use of the `ttm:desc` element shall be as defined in TTML 1.0.

3.1.4 tt:layout

Type	Element content
Cardinality	1..1
Position	/tt/head
TTML	http://www.w3.org/TR/ttml1/#layout-vocabulary-layout
Description	Container for region elements.

3.1.4.1 tt:metadata

Type	Element content
Cardinality	0..1
Position	/tt/head/layout
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-metadata
Description	Generic metadata container. `tt:metadata` may have user defined XML vocabulary as defined in § 2.2.

3.1.4.1.1 ttm:title

Type	`xs:string`
Cardinality	0..1
Position	/tt/head/layout/metadata
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-title
Description	The semantics, content model and the use of the `ttm:title` element shall be as defined in TTML 1.0.

3.1.4.1.2 ttm:desc

Type	`xs:string`
Cardinality	0..1
Position	/tt/head/layout/metadata
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-desc
Description	The semantics, content model and the use of the `ttm:desc` element shall be as defined in TTML 1.0.

3.1.4.2 tt:region

Type	Element content
Cardinality	1..*
Position	/tt/head/layout
TTML	http://www.w3.org/TR/ttml1/#layout-vocabulary-region
Description	Defines a space or area for the display of subtitle content. A `tt:region` element defines a space or an area in which subtitle content is to be placed. It specifies a set of layout information through attributes. To apply this layout information, `tt:div` and `tt:p` elements may reference a region. The position and size of the region shall be set through the attributes `tts:extent` and `tts:origin`. The reference for `tts:extent` and `tts:origin` shall be the active video (see "Definition of terms"). If the region exceeds the boundary of the active video the display of the region shall be clipped accordingly. Note: The term "root container region" in TTML 1.0 defines a region that establishes a coordinate system into which content regions are placed. In EBU-TT the root container region is the active video (see "Definition of terms").

xml:id (attribute)

Type	`xs:ID`
Cardinality	1..1
Position	/tt/head/layout/region
TTML	http://www.w3.org/TR/ttml1/#content-attribute-id
Description	*ID* of a region. This *ID* is used by `tt:div` and `tt:p` elements to reference a region. Layout and style information of the referenced region shall be applied to these elements. The ID shall be unique in the entire document.

tts:origin (attribute)

Type	`ebuttdt:originType`
Cardinality	1..1
Position	/tt/head/layout/region
TTML	http://www.w3.org/TR/ttml1/#style-attribute-origin
Description	The x and y coordinates of the top left corner of a region with respect to the active video the document was authored for. The (0, 0) coordinate shall be assumed to be the top left corner of the active video. Values in percentage shall be relative to the width and height of the active video. Example: With `tts:origin`="20% 80%" the top left corner of the region is shifted 20% of the active video width to the right and 80% of the active video height to the bottom.

tts:extent (attribute)

Type	`ebuttdt:extentType`
Cardinality	1..1
Position	/tt/head/layout/region
TTML	http://www.w3.org/TR/ttml1/#style-attribute-extent
Description	Width and height of a region area. Values in percentage shall be relative to the width and height of the active video. Example: With `tts:extent`="100% 20%" the width of the region is 100% of the width of the active video and the height of the region is 20% of the height of the active video.

style (attribute)

Type	`xs:IDREFS`
Cardinality	0..1
Position	/tt/head/layout/region
TTML	http://www.w3.org/TR/ttml1/#style-attribute-style
Description	*ID*(s) of one or more style element(s). The inheritable style information shall be inherited by content in that region. Note that the tts:backgroundColor is not inheritable. The value of a `tts:backgroundColor` attribute in a referenced style shall be applied to the region element. If multiple styles are referenced the *ID*s shall be delimited by space characters (e.g. "styleId1 styleId2 styleId3").

The `tt:region` element may also specify some layout-specific style information with TTML style attributes.

A style attribute that is defined for the `tt:region` element shall not appear in a `tt:style` element and vice versa. The only exception from this rule is the `tts:padding` attribute. `tts:padding` may appear both in the `tt:style` and `tt:region element`.

Note: See Annex F for an overview which style attributes are allowed on the `tt:style` and which are allowed on the `tt:region` element.

tts:displayAlign (attribute)

Type	`xs:string`
Enumeration	"before" | "center" | "after"
Cardinality	0..1
Position	/tt/head/layout/region
TTML	http://www.w3.org/TR/ttml1/#style-attribute-displayAlign
Description	Alignment in the block progression direction. Note: In the writing mode "Left to Right Top to Bottom" this would result in the vertical alignment of lines of text. The value "before" would result in "top" alignment and the value "after" would result in "bottom" alignment. Note: The initial value of `tts:displayAlign` was "after" in EBU-TT Part 1 v1.0 and has been changed to "before" for better interoperability with TTML 1.0.

tts:padding (attribute)

Type	`ebuttdt:paddingType`
Cardinality	0..1
Position	/tt/head/layout/region
TTML	http://www.w3.org/TR/ttml1/#style-attribute-padding
Description	Padding (or inset) space on all sides of a region area.

tts:writingMode (attribute)

Type	`xs:string`
Enumeration	"lrtb" | "rltb" | "tbrl" | "tblr" | "lr" | "rl" | "tb"
Cardinality	0..1
Position	/tt/head/layout/region
TTML	http://www.w3.org/TR/ttml1/#style-attribute-writingMode
Description	Writing mode of subtitle content. • "lrtb": “Left to Right Top to Bottom” • "rltb": “Right to Left Top to Bottom” • "tbrl": “Top to Bottom Right to Left” • "tblr": “Top to Bottom Left to Right” • "lr": Shorthand for “Left to Right Top to Bottom” • "rl": Shorthand for “Right to Left Top to Bottom” • "tb": Shorthand for “Top to Bottom Right to Left”

tts:showBackground (attribute)

Type	`xs:string`
Enumeration	"always" | "whenActive"
Cardinality	0..1
Position	/tt/head/layout/region
TTML	http://www.w3.org/TR/ttml1/#style-attribute-showBackground
Description	Constraints on when the background color of a region is intended to be presented. If the value of this attribute is "always", then the background color of a region is always rendered when performing presentation processing on a visual medium; if the value is "whenActive", then the background color of a region is rendered only when some content is flowed into the region. Note: This attribute only needs to be specified if a non-transparent background color is applied to the region and the initial value of "always" needs to be overwritten. This attribute does not have an effect on the background color that is applied to a `tt:p` or a `tt:span` element. The background-color of these content elements is only rendered if the enclosed content is active.

tts:overflow (attribute)

Type	`xs:string`
Enumeration	"visible" | "hidden"
Cardinality	0..1
Position	/tt/head/layout/region
TTML	http://www.w3.org/TR/ttml1/#style-attribute-overflow
Description	Defines whether a region area is clipped if the content of the region overflows the specified extent of the region. If the value of this attribute is “visible", then content should not be clipped. If the value is hidden, then content that goes outside of the affected region should be clipped and is not visible. If the author intents to avoid truncated content the `tts:overflow` attribute should always be specified and be set to "visible". Note: Setting the feature to "visible" does not guarantee that content that overflows the region will be presented, e.g. if the content would need to overflow the root container region.

3.1.4.2.1 tt:metadata

Type	Element content
Cardinality	0..1
Position	/tt/head/layout/region
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-metadata
Description	Generic metadata container. `tt:metadata` may have user defined XML vocabulary as defined in § 2.2.

3.1.4.2.1.1 ttm:title

Type	`xs:string`
Cardinality	0..1
Position	/tt/head/layout/region/metadata
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-title
Description	The semantics, content model and the use of the `ttm:title` element shall be as defined in TTML 1.0.

3.1.4.2.1.2 ttm:desc

Type	`xs:string`
Cardinality	0..1
Position	/tt/head/layout/region/metadata
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-desc
Description	The semantics, content model and the use of the `ttm:desc` element shall be as defined in TTML 1.0.

3.2 tt:body

Type	Element content
Cardinality	0..1
Position	/tt
TTML	http://www.w3.org/TR/ttml1/#document-structure-vocabulary-body
Description	Container for subtitle and timing information. The body section of an EBU-TT document carries the content of the subtitle and the timing information. Styling and layout shall be applied through references to `tt:style` and `tt:region` elements defined in the header section. Note: An EBU TT Part 1 document with no body element could be used to transport just metadata, style or layout information without subtitle content. Note: An EBU TT Part 1 document with no body element can be considered as a TTML 1.0 document with no content. Note: It is expected that EBU-TT documents intended to represent subtitles for archive and exchange will always have a `tt:body` element present; where that is the case it would be good practice to verify this is the case with an additional validation rule.

style (attribute)

Type	`xs:IDREFS`
Cardinality	0..1
Position	/tt/body
TTML	http://www.w3.org/TR/ttml1/#style-attribute-style
Description	*ID*(s) of one or more style element(s). The style information shall be applied to the enclosed content of the `tt:body` element. If multiple styles are referenced the *ID*s shall be delimited by space characters (e.g. "styleId1 styleId2 styleId3").

agent (attribute)

Cardinality	0..1
Position	/tt/body
TTML	http://www.w3.org/TR/ttml1/#metadata-attribute-agent
Description	The type, semantics and the use of the ttm:agent attribute shall be as defined in TTML 1.0.

role (attribute)

Cardinality	0..1
Position	/tt/body
TTML	http://www.w3.org/TR/ttml1/#metadata-attribute-role
Description	The type, semantics and the use of the ttm:role attribute shall be as defined in TTML 1.0.

3.2.1 tt:metadata

Type	Element content
Cardinality	0..1
Position	/tt/body
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-metadata
Description	Generic metadata container. `tt:metadata` may have user defined XML vocabulary as defined in § 2.2.

3.2.1.1 ebuttm:authoringTechnique

Type	`xs:string`
Cardinality	0..*
Position	/tt/body/metadata
Description	The `ebuttm:documentAuthoringTechnique` identifies tools and techniques used to create the content in the document. The value applies to the element that it is present on and all of its descendants except those that specify a different `ebuttm:transitionStyle` element. It overwrites the value of an `ebuttm:authoringTechnique` element that was specified on an ancestor element. The EBU publishes a Classification Schema (CS) that may be used for values of `ebuttm:authoringTechnique`. The classification schema is available at: http://www.ebu.ch/metadata/cs/EBU-TTAuthoringTechniqueCS.xml If the above EBU CS is used the value of `ebuttm:authoringTechnique` should be the English name of the term in that classification scheme. The URI to the term should be specified by using the link attribute. Note: See https://tech.ebu.ch/MetadataReferenceData for more information how a classification scheme is referenced. Sample Value: "typing" or "respeaking"

link (attribute)

Type	`xs:anyURI`
Cardinality	0..1
Position	/tt/body/metadata/ebuttm:authoringTechnique
Description	Reference to a term in a classification scheme. The `ebuttm:authoringTechnique` element may have a `link` attribute to reference a term in a classification scheme. Note: It is recommended to use the CS published at http://www.ebu.ch/metadata/cs/EBU-TTAuthoringTechniqueCS.xml Sample Value: http://www.ebu.ch/metadata/cs/EBU-TTAuthoringTechniqueCS.xml#1.1

3.2.1.2 ebuttm:transitionStyle

Type	`Empty Element`
Cardinality	0..*
Position	/tt/body/metadata
Description	A description of the style of transition between successive subtitles or parts of subtitle within the element. The transition style is defined by the units of content that are added to the display and removed from it on each transition, specified by the attributes `inUnit` and `outUnit`. No content is defined for this element.

inUnit (attribute)

Type	`xs:string`
Cardinality	1..1
Enumeration	"block" | "line" | "word" | "partOfWord" | "groupOfWords"
Position	/tt/body/metadata/ebuttm:transitionStyle
Description	Unit of removal. • “block": "Multiple lines" • "line": "a single line" • "word": "a single semantic unit" • "partOfWord": "a sub-part of a semantic unit" • "groupOfWords": "more than one semantic unit"

outUnit (attribute)

Type	`xs:string`
Cardinality	1..1
Enumeration	"block" | "line" | "word" | "partOfWord" | "groupOfWords"
Position	/tt/body/metadata/ebuttm:transitionStyle
Description	Unit of removal. • “block": "Multiple lines" • "line": "a single line" • "word": "a single semantic unit" • "partOfWord": "a sub-part of a semantic unit" • "groupOfWords": "more than one semantic unit"

3.2.1.3 ttm:title

Type	`xs:string`
Cardinality	0..1
Position	/tt/body/metadata
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-title
Description	The semantics, content model and the use of the `ttm:title` element shall be as defined in TTML 1.0.

3.2.1.4 ttm:desc

Type	`xs:string`
Cardinality	0..1
Position	/tt/body/metadata
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-desc
Description	The semantics, content model and the use of the `ttm:desc` element shall be as defined in TTML 1.0.

3.2.2 tt:div

Type	Element content
Cardinality	1..*
Position	/tt/body
TTML	http://www.w3.org/TR/ttml1/#content-vocabulary-div
Description	Container for textual content. Note: Nesting of `tt:div` elements are permitted (see § 3.2.2.2)

xml:id (attribute)

Type	`xs:ID`
Cardinality	0..1
Position	/tt/body//div
TTML	http://www.w3.org/TR/ttml1/#content-attribute-id
Description	*ID* of a `tt:div` element that may be used by an external application.

region (attribute)

Type	`xs:IDREF`
Cardinality	0..1
Position	/tt/body//div
TTML	http://www.w3.org/TR/ttml1/#layout-attribute-region
Description	Application of layout and style information through reference of a region. Note: If you intend to transform an EBU-TT Part 1 document to EBU-TT-D please note that in EBU-TT-D a `tt:p` element shall not reference a region if its parent `tt:div` element references a region and (vice versa) a region shall not be referenced by a `tt:div` element if a `tt:p` child of that `tt:div` references a region. Be also aware that strictly compliant TTML 1 parsers prune content elements if p or div elements refer to a different region to one of their ancestor div elements; this behaviour may not be intuitive to or desired by the document author.

style (attribute)

Type	`xs:IDREFS`
Cardinality	0..1
Position	/tt/body//div
TTML	http://www.w3.org/TR/ttml1/#style-attribute-style
Description	*ID*(s) of one or more style element(s). The style information shall be applied to the enclosed content of the `tt:div` element. If multiple styles are referenced the *ID*s shall be delimited by space characters (e.g. "styleId1 styleId2 styleId3").

xml:lang (attribute)

Type	`xs:language	""`
Cardinality	0..1
Position	/tt/body//div
TTML	http://www.w3.org/TR/ttml1/#content-attribute-lang
Description	Language identifier for the enclosed subtitle content. The `xml:lang` attribute in the `tt:div` element may be specified to overwrite the language identification of the enclosed subtitle content. The empty string may be used to indicate that no language information is available. The `xml:lang` attribute shall be used as defined in XML 1.0 § 2.12, Language Identification (both values and semantics) [7]. Sample Values: "en", "en-US" or "de". Presentation processors should apply appropriate rendering for text that is identified as belonging to specific languages or language groups. Consequently authors should correctly identify the language of the text at all places in the document when it is known.

agent (attribute)

Cardinality	0..1
Position	/tt/body//div
TTML	http://www.w3.org/TR/ttml1/#metadata-attribute-agent
Description	The type, semantics and the use of the ttm:agent attribute shall be as defined in TTML 1.0.

role (attribute)

Cardinality	0..1
Position	/tt/body//div
TTML	http://www.w3.org/TR/ttml1/#metadata-attribute-role
Description	The type, semantics and the use of the ttm:role attribute shall be as defined in TTML 1.0.

3.2.2.1 tt:metadata

Type	Element content
Cardinality	0..1
Position	/tt/body//div
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-metadata
Description	Generic metadata container. `tt:metadata` may have user defined XML vocabulary as defined in § 2.2.

3.2.2.1.1 ebuttm:authoringTechnique

Cardinality	0..*
Position	/tt/body//div/metadata
Description	The type, content model, use and semantics shall be as defined in § 3.2.1.1.

3.2.2.1.2 ebuttm:transitionStyle

Cardinality	0..*
Position	/tt/body//div/metadata
Description	The type, content model, use and semantics shall be as defined in § 3.2.1.2.

3.2.2.1.3 ebuttm:binaryData

Cardinality	0..*
Position	/tt/body//div/metadata
Description	The type, content model and semantics shall be as defined in § 3.1.2.2. Note: Placing the binary data at the end of the document reduces the data that needs to be read before accessing subtitle data, when processing the EBU TT document using an event-based sequential access parser.

3.2.2.1.4 ttm:title

Type	`xs:string`
Cardinality	0..1
Position	/tt/body//div/metadata
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-title
Description	The semantics, content model and the use of the `ttm:title` element shall be as defined in TTML 1.0.

3.2.2.1.5 ttm:desc

Type	`xs:string`
Cardinality	0..1
Position	/tt/body//div/metadata
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-desc
Description	The semantics, content model and the use of the `ttm:desc` element shall be as defined in TTML 1.0.

3.2.2.2 tt:div

Type	Element content
Cardinality	0..*
Position	/tt/body//div
TTML	http://www.w3.org/TR/ttml1/#content-vocabulary-div
Description	Container for textual content. A `tt:div` element may be a child of another `tt:div` element. The content model shall be the same as described in § 3.2.2.

3.2.2.3 tt:p

Type	Mixed content.
Cardinality	0..*
Position	/tt/body//div
TTML	http://www.w3.org/TR/ttml1/#content-vocabulary-p
Description	Logical paragraph.

xml:id (attribute)

Type	`xs:ID`
Cardinality	1..1
Position	/tt/body//div/p
TTML	http://www.w3.org/TR/ttml1/#content-attribute-id
Description	Unique *ID* of a subtitle. The `tt:p` element shall have an *ID* that is unique in the entire document. This *ID* shall represent the unique *ID* of a subtitle. No meaningful subtitle sequence should be inferred from the value of this *ID*. Note: Typically this ID will be a monotonically (logically) increasing value through the EBU-TT document (e.g. sub1, sub2, sub3 or sub1, sub2, sub2a, sub2b, sub3).

xml:space (attribute)

Type	`xs:string`
Enumeration	"default" | "preserve"
Cardinality	0..1
Position	/tt/body//div/p
TTML	http://www.w3.org/TR/ttml1/#content-attribute-space
Description	Indicates the author's intention of white space handling within the content of the `tt:p` element.

xml:lang (attribute)

Type	`xs:language | ""`
Cardinality	0..1
Position	/tt/body//div/p
TTML	http://www.w3.org/TR/ttml1/#content-attribute-lang
Description	Language identifier for the enclosed subtitle content. To overwrite the language identification of the enclosed subtitle content the `xml:lang` attribute may be specified on the `tt:p` element. The empty string maybe used to indicate that no language information is available. The `xml:lang` attribute shall be used as defined in XML 1.0 §2.12, Language Identification [7]. Sample Values: "en", "en-US" or "de". Presentation processors should apply appropriate rendering for text that is identified as belonging to specific languages or language groups. Consequently authors should correctly identify the language of the text at all places in the document when it is known.

region (attribute)

Type	`xs:IDREF`
Cardinality	0..1
Position	/tt/body//div/p
TTML	http://www.w3.org/TR/ttml1/#layout-attribute-region
Description	Application of layout information through reference of a region. Note: If you intent to transform an EBU-TT Part 1 document to EBU-TT-D please note that in EBU-TT-D a `tt:p` element must not reference a region if it's parent `tt:div` element references a region and (vice versa) a region shall not be referenced by a `tt:div` element if a `tt:p` child of that `tt:div` references a region. Be also aware that strictly compliant TTML 1 parsers prune content elements if p or div elements refer to a different region to one of their ancestor div elements. It is possible that this behaviour is not intuitive to or desired by the document author.

style (attribute)

Type	`xs:IDREFS`
Cardinality	0..1
Position	/tt/body//div/p
TTML	http://www.w3.org/TR/ttml1/#style-attribute-style
Description	*ID*(s) of one or more style element(s). The style information shall be applied to the enclosed content of the `tt:p` element. If multiple styles are referenced the *ID*s shall be delimited by space characters (e.g. "styleId1 styleId2 styleId3").

begin (attribute)

Type	`ebuttdt:smpteTimingType` | `ebuttdt:mediaTimingType` | `ebuttdt:clockTimingType`
Cardinality	1..1
Position	/tt/body//div/p
TTML	http://www.w3.org/TR/ttml1/#timing-attribute-begin
Description	Start point of a temporal interval associated with a `tt:p` element. If the timebase is "smpte" the type shall be `ebuttdt:smpteTimingType`. If the timebase is "media" the type shall be `ebuttdt:mediaTimingType`. If the timebase is "media" the time expression should be the offset from a syncbase of "00:00:00.0". If the timebase is "clock" the type shall be `ebuttdt:clockTimingType`.

end (attribute)

Type	`ebuttdt:smpteTimingType` | `ebuttdt:mediaTimingType` | `ebuttdt:clockTimingType`
Cardinality	1..1
Position	/tt/body//div/p
TTML	http://www.w3.org/TR/ttml1/#timing-attribute-end
Description	End point of a temporal interval associated with a `tt:p` element. If the timebase is "smpte" the type shall be `ebuttdt:smpteTimingType`. If the timebase is "media" the type shall be `ebuttdt:mediaTimingType`. If the timebase is "media" the time expression should be the offset from a syncbase of "00:00:00.0". If the timebase is "clock" the type shall be `ebuttdt:clockTimingType`.

agent (attribute)

Cardinality	0..1
Position	/tt/body//div/p
TTML	http://www.w3.org/TR/ttml1/#metadata-attribute-agent
Description	The type, semantics and the use of the ttm:agent attribute shall be as defined in TTML 1.0.

role (attribute)

Cardinality	0..1
Position	/tt/body//div/p
TTML	http://www.w3.org/TR/ttml1/#metadata-attribute-role
Description	The type, semantics and the use of the ttm:role attribute shall be as defined in TTML 1.0.

3.2.2.3.1 tt:metadata

Type	Element content
Cardinality	0..1
Position	/tt/body//div/p
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-metadata
Description	Generic metadata container. `tt:metadata` may have user defined XML vocabulary as defined in § 2.2.

3.2.2.3.1.1 ebuttm:authoringTechnique

Cardinality	0..*
Position	/tt/body//div/p/metadata
Description	The type, content model, use and semantics shall be as defined in § 3.2.1.1.

3.2.2.3.1.2 ebuttm:transitionStyle

Cardinality	0..*
Position	/tt/body//div/p/metadata
Description	The type, content model and semantics shall be as defined in § 3.2.1.2.

3.2.2.3.1.3 ttm:title

Type	`xs:string`
Cardinality	0..1
Position	/tt/body//div/p/metadata
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-title
Description	The semantics, content model and the use of the `ttm:title` element shall be as defined in TTML 1.0.

3.2.2.3.1.4 ttm:desc

Type	`xs:string`
Cardinality	0..1
Position	/tt/body//div/p/metadata
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-desc
Description	The semantics, content model and the use of the `ttm:desc` element shall be as defined in TTML 1.0.

3.2.2.3.2 tt:br

Type	Element content
Cardinality	0..*
Position	/tt/body//div/p
TTML	http://www.w3.org/TR/ttml1/#content-vocabulary-br
Description	Forced line break.

agent (attribute)

Cardinality	0..1
Position	/tt/body//div/p/br
TTML	http://www.w3.org/TR/ttml1/#metadata-attribute-agent
Description	The type, semantics and the use of the ttm:agent attribute shall be as defined in TTML 1.0.

role (attribute)

Cardinality	0..1
Position	/tt/body//div/p/br
TTML	http://www.w3.org/TR/ttml1/#metadata-attribute-role
Description	The type, semantics and the use of the ttm:role attribute shall be as defined in TTML 1.0.

3.2.2.3.2.1 tt:metadata

Type	Element content
Cardinality	0..1
Position	/tt/body//div/p/br
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-metadata
Description	Generic metadata container. `tt:metadata` may have user defined XML vocabulary as defined in § 2.2.

3.2.2.3.2.1.1 ttm:title

Type	`xs:string`
Cardinality	0..1
Position	/tt/body//div/p/br/metadata
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-title
Description	The semantics, content model and the use of the `ttm:title` element shall be as defined in TTML 1.0.

3.2.2.3.2.1.2 ttm:desc

Type	`xs:string`
Cardinality	0..1
Position	/tt/body//div/p/br/metadata
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-desc
Description	The semantics, content model and the use of the `ttm:desc` element shall be as defined in TTML 1.0.

3.2.2.3.3 tt:span

Type	Mixed content.
Cardinality	0..*
Position	/tt/body//div/p
TTML	http://www.w3.org/TR/ttml1/#content-vocabulary-span
Description	Inline element that encloses textual content. The `tt:span` element may be used to apply style information to the enclosed textual content. This style information is added to or overwrites style information from the currently active context. The `tt:span` element may also be used to apply annotation or metadata.

xml:id (attribute)

Type	`xs:ID`
Cardinality	0..1
Position	/tt/body//div/p//span
TTML	http://www.w3.org/TR/ttml1/#content-attribute-id
Description	*ID* of a `tt:span` element that may be used by an external application.

xml:space (attribute)

Type	`xs:string`
Enumeration	"default" | "preserve"
Cardinality	0..1
Position	/tt/body//div/p//span
TTML	http://www.w3.org/TR/ttml1/#content-attribute-space
Description	Indicates the authors' intention for white space handling within the content of the `tt:span` element.

xml:lang (attribute)

Type	`xs:language | ""`
Cardinality	0..1
Position	/tt/body//div/p//span
TTML	http://www.w3.org/TR/ttml1/#content-attribute-lang
Description	Language identifier for the enclosed subtitle content. To overwrite the language identification of the enclosed subtitle content the `xml:lang` attribute may be specified in the `tt:span` element. The empty string maybe used to indicate that no language information is available. The xml:lang attribute shall be used as defined in XML 1.0 §2.12, Language Identification [7]. Sample Values: "en", "en-US" or "de". Presentation processors should apply appropriate rendering for text that is identified as belonging to specific languages or language groups. Consequently authors should correctly identify the language of the text at all places in the document when it is known.

style (attribute)

Type	`xs:IDREFS`
Cardinality	0..1
Position	/tt/body//div/p//span
TTML	http://www.w3.org/TR/ttml1/#style-attribute-style
Description	*ID*(s) of one or more style element(s). The style information shall be applied to the enclosed content of the `tt:span` element. If multiple styles are referenced the *ID*s shall be delimited by space characters (e.g. "styleId1 styleId2 styleId3").

begin (attribute)

Type	`ebuttdt:smpteTimingType` | `ebuttdt:mediaTimingType` | `ebuttdt:clockTimingType`
Cardinality	0..1
Position	/tt/body//div/p//span
TTML	http://www.w3.org/TR/ttml1/#timing-attribute-begin
Description	Start point of a temporal interval associated with a `tt:span` element. If the value of `ttp:timebase` is "smpte" the type shall be `ebuttdt:smpteTimingType`. If the timebase is "media" the type shall be `ebuttdt:mediaTimingType` and the value shall express the offset to the begin time of the parent element. If the timebase is "clock" the type shall be `ebuttdt:clockTimingType`. Note: Although it is not restricted by this specification, it is anticipated that the begin values for a `tt:span` element will logically fall inside the timecode values defined by a parent `tt:p` element.

end (attribute)

Type	`ebuttdt:smpteTimingType` | `ebuttdt:mediaTimingType` | `ebuttdt:clockTimingType`
Cardinality	0..1
Position	/tt/body//div/p//span
TTML	http://www.w3.org/TR/ttml1/#timing-attribute-end
Description	End point of a temporal interval associated with a `tt:span` element. If the value of `ttp:timebase` is "smpte" the type shall be `ebuttdt:smpteTimingType`. If the timebase is "media" the type shall be `ebuttdt:mediaTimingType` and the value shall express the offset to the begin time of the parent element. If the timebase is "clock" the type shall be `ebuttdt:clockTimingType`. Note: Although it is not restricted by this specification, it is anticipated that the begin and end timecode values for a `tt:span` element will logically fall inside the timecode values defined by a parent `tt:p` element.

agent (attribute)

Cardinality	0..1
Position	/tt/body//div/p//span
TTML	http://www.w3.org/TR/ttml1/#metadata-attribute-agent
Description	The type, semantics and the use of the ttm:agent attribute shall be as defined in TTML 1.0.

role (attribute)

Cardinality	0..1
Position	/tt/body//div/p//span
TTML	http://www.w3.org/TR/ttml1/#metadata-attribute-role
Description	The type, semantics and the use of the ttm:role attribute shall be as defined in TTML 1.0.

3.2.2.3.3.1 tt:metadata

Type	Element content
Cardinality	0..1
Position	/tt/body//div/p//span
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-metadata
Description	Generic metadata container. `tt:metadata` may have user defined XML vocabulary as defined in § 2.2.

3.2.2.3.3.1.1 ttm:title

Type	`xs:string`
Cardinality	0..1
Position	/tt/body//div/p//span/metadata
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-title
Description	The semantics, content model and the use of the `ttm:title` element shall be as defined in TTML 1.0.

3.2.2.3.3.1.1 ttm:desc

Type	`xs:string`
Cardinality	0..1
Position	/tt/body//div/p//span/metadata
TTML	http://www.w3.org/TR/ttml1/#metadata-vocabulary-desc
Description	The semantics, content model and the use of the `ttm:desc` element shall be as defined in TTML 1.0.

3.2.2.3.3.2 tt:br

Cardinality	0..*
Position	/tt/body//div/p//span
TTML	http://www.w3.org/TR/ttml1/#content-vocabulary-br
Description	Forced line break. Content model and usage are as defined in § 3.2.2.3.2.

3.2.2.3.3.3 tt:span

Cardinality	0..*
Position	/tt/body//div/p//span
TTML	http://www.w3.org/TR/ttml1/#content-vocabulary-span
Description	Inline element that encloses textual content. A `tt:span` element may be a child of another `tt:span` element. The content model and semantics shall be the same as described in 3.2.2.3.3.

4. Datatypes

EBU-TT defines specific datatypes to restrict the content of attributes or textual Element content.

Note: If a datatype is applied to an attribute or element that was taken from TTML 1.0 the restriction of the datatype is equal to the definition in TTML 1.0 or it is a further restriction of the content as defined in TTML 1.0. Therefore all values that conform to the EBU-TT datatypes also conform to the values allowed in TTML 1.0. However it is possible that a value conforms to the TTML definitions but does not conform to the EBU-TT datatypes.

4.1 ebuttdt:cellResolutionType

The content shall be constrained to two numbers of type `xs:positiveInteger` delimited by a whitespace. The first value shall define the number of columns and the second value shall define the number of rows. For both values the positive sign ("+") shall not be used.

4.2 ebuttdt:colorType

Note: The constraints are the same as those defined by the <color> expression in TTML 1.0.

The content shall be constrained to a named color string, a RGB color triple, RGBA color tuple, a hex notated RGB color triple or a hex notated RGBA color tuple.

Although different formats may be used in an EBU-TT document the value should be expressed in RGB or RGBA.

Named colors shall be:

- "transparent"
- "maroon"
- "green"
- "blue"

- "black"
- "silver"
- " gray"
- "white"
- "red"
- "purple"
- "fuchsia"
- "magenta"
- "lime"
- "olive"
- "yellow"
- "navy"
- "teal"
- "aqua"
- "cyan"

Note: The color black can, for example, be expressed as:

- "black" (named color)
- "rgb(0, 0, 0)" (RGB color triple)
- "rgba(0, 0, 0, 255)" (RGBA color tuple)
- "#000000" (RGB color triple in hex notation)
- "#000000FF" (RGBA color tuple in hex notation)

4.3 ebuttdt:extentType

The content shall be constrained to two values of type `ebuttdt:lengthType` delimited by a space. The first value shall express the width and the second value the height.

4.4 ebuttdt:fontFamilyType

Note: The constraints of the `ebuttdt:fontFamilyType` are the same as the constraints defined by the TTML 1.0 style value expressions <familyName> and <genericFamilyName>.

The content shall be constrained to one or more font family- and/or generic family-names.

Any name may be used for a font family name (e.g. "Arial" or "Verdana").

Generic family names shall be:

- "default"
- "monospace"
- "sanSerif"
- "serif"
- "monospaceSansSerif"
- "monospaceSerif"
- "proportionalSansSerif"
- "proportionalSerif"

The typographic characteristics of the generic family name "default" may be implementation dependent; however the default generic font family should be mapped to a monospaced, sans-serif font.

4.5 ebuttdt:fontSizeType

The content is constrained to one or two non-negative values of type `ebuttdt:lengthType`.

If a single value is specified, then this length applies equally to horizontal and vertical scaling of a glyph's square; if two values are specified, then the first expresses the horizontal scaling and the second expresses vertical scaling.

Note: Use of independent horizontal and vertical font sizes is expected to be used with cell based metrics in order to denote fonts that are two rows in height and one column in width.

4.6 ebuttdt:framerateMultiplierType

The content shall be constrained to two numbers of type `xs:positiveInteger` delimited by a space. The value shall represent a fraction. The first number shall be the numerator and the second number shall be the denominator. For both values the positive sign ("+") shall not be used.

4.7 ebuttdt:lengthType

Note: The `ebuttdt:lengthType` is equal to the <length> expression defined in TTML1.0 except that the measurement parameter *em* is not allowed.

The content shall be constrained to a number of type `xs:decimal` appended either by the percentage sign "%" or the measurement units "px" (for video pixel) or "c" (for cell).

If an EBU-TT document instance uses the 'cell' measurement unit (e.g. as part of a `tts:fontsize` attribute value) then the `ttp:cellResolution` attribute shall be specified on the `tt:tt` element.

If an EBU-TT document instance uses the 'pixel' measurement unit (e.g. as part of a `tts:fontsize` attribute value) then the `tts:extent` attribute of the `tt:tt` element shall be specified.

4.8 ebuttdt:linePaddingType

The content shall be constrained to one non-negative number of type `xs:decimal` appended by the metric "c".

The reference for the metric "c" (for cells) is the virtual grid that is defined by `ttp:cellResolution`. 1c corresponds to one cell in this grid.

The value shall apply to the start and end edges of each rendered line area.

Example

Padding on the start and end edges of line-areas can be expressed as:

"0.5c"

4.9 ebuttdt:lineHeightType

The value shall be the string "normal" or shall be a non-negative value of type `ebuttdt:lengthType`.

4.10 ebuttdt:originType

The content shall be constrained to two values of type `ebuttdt:lengthType` delimited by a space. The first value shall express a x-coordinate and the second value a y-coordinate.

4.11 ebuttdt:paddingType

The content shall be constrained to one, two, three or four values of type `ebuttdt:lengthType` delimited by a space.

If only one value is specified the value shall apply to all four edges of an area.

If two values are specified, the first value applies to the before and after edges and the second applies to the start and end edges.

If three values are specified, the first value applies to the before edge, the second value applies to the start and end edges, and the third value applies to the after edge.

If four values are specified, the first value shall apply to the “before” edges, the second value to the “end” edges, the third value to the “after” edges and the fourth value to the “start” edges of an area.

Example

Padding on the start and end edges of a region can be expressed as:

- "0% 1%"
- "0% 1% 0%"
- "0% 1% 0% 1%"

4.12 ebuttdt:smpteTimingType

A value of type `ebuttdt:smpteTimingType` shall conform to the time coordinate defined by SMPTE 12M-1-2008 [5] and shall have the format:

hh:mm:ss:ff

Where *hh* is hours, *mm* is minutes, *ss* is seconds and *ff* is frames.

4.13 ebuttdt:mediaTimingType

The value of type `ebuttdt:mediaTimingType` shall be a **Full-Clock-value** or a **Timecount-value**.

A Full-Clock-Value shall have the format hh:mm:ss and may be followed by an optional decimal fraction to denote fractional seconds as in the examples below. Values of hours, minutes and seconds less than 10 shall be padded to two digits with a leading zero.

Examples for Full-Clock-values

- 02:30:03 = 2 hours, 30 minutes and 3 seconds
- 01:00:10.25 = 1 hour, 10 seconds and 250 milliseconds
- 00:13:43.0001 = 13 minutes, 43 seconds and 100 microseconds

A **Timecount-value** shall have the format:

Non-negative number with an optional decimal *fraction* followed by a *symbol for the time metric*.

A *symbol for time metric* shall be one of the following:

- "h" for hours
- "m" for minutes
- "s" for seconds
- "ms" for milliseconds

Examples for Timecount values:

3.2h = 3.2 hours = 3 hours and 12 minutes

45m = 45 minutes

30s = 30 seconds

30.0001s = 30 seconds and 100 microseconds

5ms = 5 milliseconds

"frame" and "tick" based metrics shall not be used in a time expression of `ebuttdt:mediaTimingType`.

4.14 ebuttdt:clockTimingType

The value of ebuttdt:clockTimingType shall be a Full-Clock clock -value or a Timecount-value.

A Full-Clock-Value shall have the format hh:mm:ss and may be followed by an optional decimal fraction to denote fractional seconds.

hh shall be a two digit zero padded integer in the range 0-23.

mm shall be a two digit zero padded integer in the range 0-59.

ss shall be a two digit zero padded integer in the range 0-60 where the value 60 applies only to leap seconds.

A **Timecount-value** shall have the format:

Non-negative number with an optional *fraction* followed by a *symbol for the time metric*.

A *symbol for time metric* shall be one of the following:

- "h" for hours
- "m" for minutes
- "s" for seconds
- "ms" for milliseconds

Examples for Timecount values:

3.2h = 3.2 hours = 3 hours and 12 minutes

45m = 45 minutes

30s = 30 seconds

30.0001s = 30 seconds and 100 microseconds

5ms = 5 milliseconds

"frame" and "tick" based metrics shall not be used in a time expression of `ebuttdt:mediaTimingType`.

4.15 ebuttdt:noTimezoneDateType

The value of ebuttdt:noTimezoneDateType shall be of type xs:date without the specification of the timezone.

Note: The XML schema type xs:date allows the optional specification of a timezone. Therefore ebuttdt:noTimezoneDateType is a restriction of the type xs:date.

5. Bibliography

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Annex A: Use of ebutts:multiRowAlign

The `ebutts:multiRowAlign` attribute may be used to specify a style property that defines how multiple 'rows' of inline are aligned within a containing block area. This attribute acts as a 'modifier' to the action defined by the `tts:textAlign` attribute value, whether that value is explicitly or implicitly defined. This attribute effectively creates additional alignment points for multiple rows of text, thus it has no effect if only a single row of text is present.

This modifier acts as follows: For multiple 'rows' of inline blocks, 3 additional multi-row alignment points ("start", "center", "end") are created by the rendered dimensions of the longest row within the p element. 'Rows' that are shorter than the longest row shall be each aligned against the longest row using the multi-row alignment point identified by the `ebutts:multiRowAlign` attribute value. The longest 'row' shall always be aligned within the region in accordance with the value of the `tts:textAlign` attribute.

Note: The combination of `tts:textAlign="start"` with `ebutts:multiRowAlign="start"` acts identically to the use of `tts:textAlign="start"` without the `ebutts:multiRowAlign` attribute.

Or more simply, if the `ebutts:multiRowAlign` attribute has the same value as `tts:textAlign`, the `ebutts:multiRowAlign` attribute has no effect.

If the term "auto" is used the basic behaviour of `tts:textAlign` is maintained unmodified (i.e. the presentation is as if `ebutts:multiRowAlign` would have the same computed value as `tts:textAlign`).

The use of `tts:textAlign` together with `ebutts:multiRowAlign` provides for combinations of text alignment as tabled below, where the highlighted combinations may be specified by the use of just the `tts:textAlign` attribute fromTTML 1.0.

tts:textAlign	ebutts:multiRowAlign	Presentation
"start"	**"start"**	Start justified text. All 'rows' are aligned at start.
"start"	"center"	The longest 'row' is start aligned. Shorter 'rows' are center aligned against the center alignment point created by the longest 'row'.
"start"	"end"	The longest 'row' is start aligned. Shorter 'rows' are end aligned against the end alignment point created by the longest 'row'.
"left"	"start"	The longest 'row' is left aligned. Shorter 'rows' are start aligned against the start alignment point created by the longest 'row'.
"left"	"center"	The longest 'row' is left aligned. Shorter 'rows' are center aligned against the center alignment point created by the longest 'row'.
"left"	"end"	The longest 'row' is left aligned. Shorter 'rows' are end aligned against the end alignment point created by the longest 'row'.
"center"	"start"	The longest 'row' is center aligned.

tts:textAlign	ebutts:multiRowAlign	Presentation
		Shorter ‘rows’ are start aligned against the start alignment point created by the longest ‘row’.
"center"	**"center"**	Center justified text. All ‘rows’ are individually center aligned.
"center"	"end"	The longest ‘row’ is center aligned. Shorter ‘rows’ are end aligned against the end alignment point created by the longest ‘row’.
"right"	"start"	The longest ‘row’ is right aligned. Shorter ‘rows’ are start aligned against the start alignment point created by the longest ‘row’.
"right"	"center"	The longest ‘row’ is right aligned. Shorter ‘rows’ are center aligned against the center alignment point created by the longest ‘row’.
"right"	"end"	The longest ‘row’ is right aligned. Shorter ‘rows’ are end aligned against the end alignment point created by the longest ‘row’.
"end"	"start"	The longest ‘row’ is end aligned. Shorter ‘rows’ are start aligned against the start alignment point created by the longest ‘row’.
"end"	"center"	The longest ‘row’ is end aligned. Shorter ‘rows’ are center aligned against the center alignment point created by the longest ‘row’.
"end"	**"end"**	End justified text. All ‘rows’ are aligned at end.

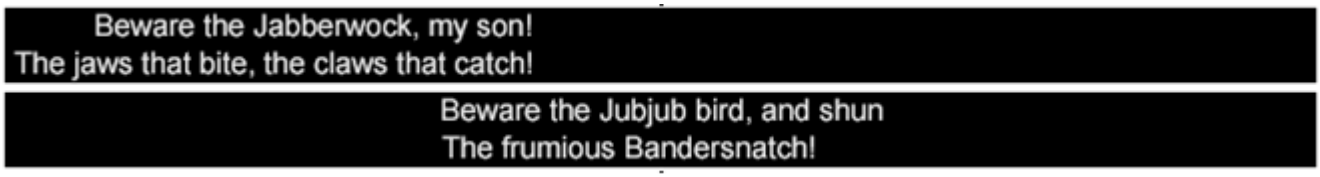
If a specified value of this attribute is not supported, then a presentation processor shall interpret the attribute as if the attribute has the value "auto" (i.e. the basic behaviour of `tts:textAlign` is maintained unmodified).

The `ebutts:multiRowAlign` style is illustrated by the following example.

```
 …
<tt:styling>
   <tt:style xml:id="baseStyle" tts:backgroundColor="black" tts:color="white" />
   <tt:style xml:id="startEnd" tts:textAlign="start" ebutts:multiRowAlign="end"/>
   <tt:style xml:id="centerStart" tts:textAlign="center" ebutts:multiRowAlign="start"/>
</tt:styling>

<tt:layout>
   <tt:region xml:id="regionTop" tts:extent="355px 43px" tts:origin="0px 0px"/>
   <tt:region xml:id="regionBottom" tts:extent="355px 43px" tts:origin="0px 47px"/>
</tt:layout>
 …
<tt:div style="baseStyle">
 …
  <tt:p xml:id="subtitle1" region="regionTop" style="startEnd" begin="00:00:00:00" end="00:00:03:00">
     Beware the Jabberwock, my son!<tt:br/>
     The jaws that bite, the claws that catch!
  </tt:p>
 <tt:p xml:id="subtitle2" region="regionBottom" style="centerStart" begin="00:00:00:00"
                                                                          end="00:00:03:00">
     Beware the Jubjub bird, and shun<tt:br/>
     The frumious Bandersnatch!
  </tt:p>
 …
</tt:div>
```

Produces:



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Annex B: Support of the STL GSI Block in EBU-TT

The following characters are used to indicate if an element or attribute was defined for the STL information in EBU-TT:

- \- No element or attribute defined
- X Supported (Element or attribute defined for the STL Information)

STL Information	Mnemonic	EBU-TT Support
Code Page Number	CPN	-
Disk Format Code	DFC	-
Display Standard Code	DSC	-
Character Code Table Number	CCT	-
Language Code	LC	X
Original Programme Title	OPT	X
Original Episode Title	OET	X
Translated Programme Title	TPT	X
Translated Episode Title	TET	X
Translator's Name	TN	X
Translator's Contact Details	TCD	X
Subtitle List Reference Code	SLR	X
Creation Date	CD	X
Revision Date	RD	X
Revision Number	RN	X
Total Number of Text Timing Information (TTI) blocks	TNB	-
Total Number of Subtitles	TNS	X
Total Number of Subtitle Groups	TNG	-
Maximum Number of Displayable Character in any text row	MNC	X
Maximum Number of Displayable Rows	MNR	-
Time Code: Status	TCS	-
Time Code: Start-of-Programme	TCP	X
Time Code: First In-Cue	TCF	-
Total Numbers of Disks	TND	-
Disk Sequence Number	DSN	-
Country of Origin	CO	X
Publisher	PUB	X
Editor's Name	EN	X
Editor's Contact Details	ECD	X
User-Defined Area	UDA	X

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Annex C: Initial Values of TTML 1.0 and EBU-TT attributes

Attribute Name	TTML Initial Value
tts:backgroundColor	"transparent"
tts:direction	"ltr"
ttp:cellResolution	"32 15"
tts:color	Implementation dependent
tts:displayAlign	"before"
tts:fontFamily	"default"
tts:fontSize	"1c"
tts:fontStyle	"normal"
tts:fontWeight	"normal"
tts:lineHeight	"normal"
tts:overflow	"hidden"
tts:padding	"0px"
tts:showBackground	"always"
tts:textAlign	"start"
tts:textDecoration	"none"
tts:unicodeBidi	"normal"
tts:wrapOption	"wrap"
tts:writingMode	"lrtb"

Note: Version 1.0 of EBU-TT Part 1 overrides the initial values for the following TTML attributes: ttp:cellResolution ("40 24"), tts:fontSize ("1c 2c"), tts:displayAlign ("after") and tts:textAlign ("center"). To achieve better interoperability with other TTML profiles in Version 1.1 of EBU-TT Part 1 the initial values from TTML 1.0 apply for these attributes.

Note: Some attributes in EBU-TT are mandatory or have to be explicitly specified whenever they apply (e.g. ttp:dropMode is mandatory when timebase is "smpte"). As the initial value of these attributes never applies, they are not listed in this section.

The following table lists the initial values of the attribute defined in the EBU-TT Style namespace.

Attribute Name	EBU-TT Initial Value
ebutts:multiRowAlign	"auto"
ebutts:linePadding	"0c"

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Annex D: Use of ebutts:linePadding

The `ebutts:linePadding` attribute extends the dimensions and therefore the 'background color' of a rendered line area. The 'line area' shall be a box that has boundaries set by the text rendered on one line (see rendered line area [foreground] in Figure 1).

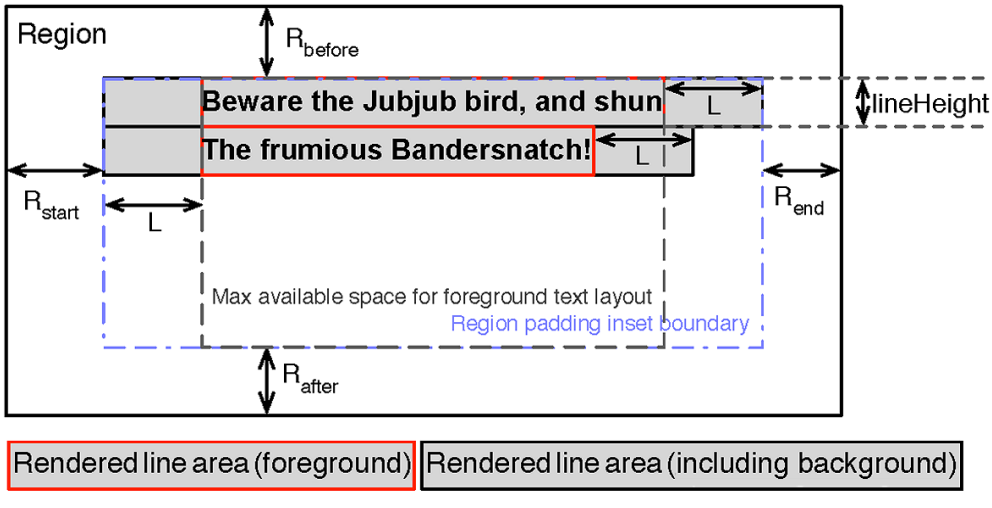
The `ebutts:linePadding` attribute may be used to define a desired effect as shown below:

The background color shall be rendered by a presentation processor behind the foreground text content of the target, and extended to either side, in the inline progression, by the extent defined by the line padding attribute. The 'background color' used is the effective background color that applies to the text at the adjacent edge of the 'line area'.

The line padding extends the computed dimensions of the target line area and therefore reduces the available maximum width in which foreground text may be rendered, in the inline progression.

Note: One strategy is to make the start and end padding values equivalent to the width or half the width of a space character from the largest font used in the p element on which padding is applied, according to stylistic preference[1].

The use of the `ebutts:linePadding` attribute shall not result in the background color extending beyond the boundaries of a region. It may conversely result in fewer characters fitting on each line; therefore authors should ensure that the region is sized appropriately to fit the text including any line padding.



`tts:padding` as applied to `<region>` defines the R_{before}, R_{after}, R_{start} and R_{end} values.

`ebutts:linePadding` as applied to line areas defines the value L.

Figure 1: The application of `tts:padding` to regions and `ebutts:linePadding` to rendered line areas.

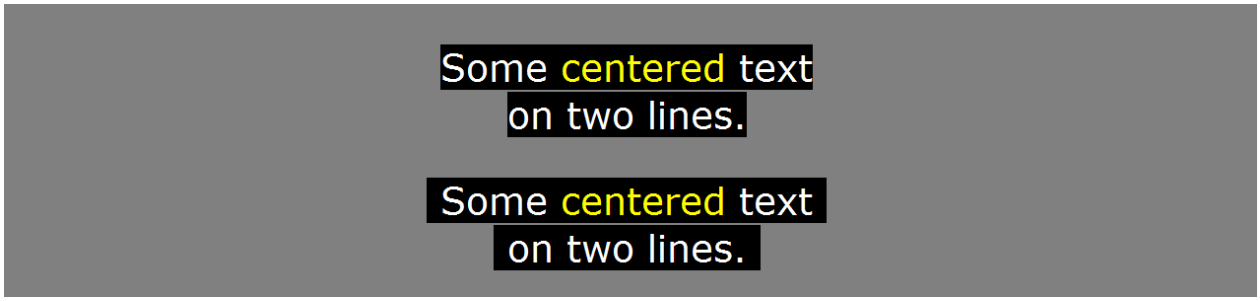
[1] For example the YouView specification requires that implementations add background of the width of one space character to the left and right of the subtitle text.

The use of `ebutts:linePadding` is illustrated by the following partial EBU-TT example.

```
<tt xmlns ="http://www.w3.org/ns/ttml">
 <head>
        <styling>
                <style xml:id="defaultStyle" tts:color="#FFFFFF" tts:textAlign="center"/>
                <style xml:id="noPadding" ebutts:linePadding="0c"/>
                <style xml:id="withLinePadding" ebutts:linePadding="0.5c"/>
                <style xml:id="bgBlack " tts:backgroundColor="#000000">
                <style xml:id="yellowText" tts:color="#FFFF00">
        </styling>
        <layout>
                <region xml:id="region1" tts:extent="100% 20%" …/>
                <region xml:id="region2" tts:extent="100% 20%" …/>
        </layout>
 </head>
 <body style="defaultStyle">
        <div>
                <p xml:id="sub1" region="region1" style="noPadding">
                        <span style="bgBlack">Some </span>
                        <span style="yellowText bgBlack">centered </span>
                        <span style="bgBlack">text</span>
                        <br/>
                        <span style="bgBlack">on two lines.</span>
                </p>

                <p xml:id="sub2" region="region2" style="withLinePadding">
                        <span style="bgBlack">Some </span>
                        <span style="yellowText bgBlack">centered </span>
                        <span style="bgBlack">text</span>
                        <br/>
                        <span style="bgBlack">on two lines.</span>
                 </p>
         </div>
  </body>
</tt>
```

Produces:



Annex E: List of supported TTML features (Informative)

Below is a list of TTML 1.0 features a processor needs to support. Please note that this listing is for informative use only and is intended to simplify the comparison of EBU-TT Part 1 with other specifications that are derived from TTML 1.0.

```
================================================================================
TTML Profile Summary
================================================================================
Full Name of Profile:
    EBU – TECH 3350 - EBU-TT Part 1 Subtitling format definition
Short Name of Profile: EBU-TT Part 1
Version: 1.1
================================================================================
Fully supported TTML features
================================================================================
#backgroundColor-block
#backgroundColor-inline
#backgroundColor-region
#backgroundColor
#bidi
#cellResolution
#clockMode-gps
#clockMode-local
#clockMode-utc
#clockMode
#color
#content
#direction
#displayAlign
#dropMode-dropNTSC
#dropMode-dropPAL
#dropMode-nonDrop
#dropMode
#extent-region
#extent-root
#extent
#fontFamily-generic
#fontFamily-non-generic
#fontFamily
#fontSize-anamorphic
#fontSize-isomorphic
#fontSize
#fontStyle-italic
#fontWeight-bold
#fontWeight
#frameRate
#frameRateMultiplier
#layout
#length-cell
#length-integer
#length-negative
#length-percentage
#length-pixel
#length-positive
#length-real
#lineHeight
#markerMode-discontinuous
#markerMode
#nested-div
#nested-span
```

```
#overflow-visible
#overflow
#padding-1
#padding-2
#padding-3
#padding-4
#padding
#showBackground
#structure
#styling-chained
#styling-inheritance-content
#styling-inheritance-region
#styling-nested
#styling-referential
#styling
#textAlign-absolute
#textAlign-relative
#textAlign
#time-clock
#time-offset
#timeBase-clock
#timeBase-media
#timeBase-smpte
#unicodeBidi
#wrapOption
#writingMode-horizontal-lr
#writingMode-horizontal-rl
#writingMode-horizontal
#writingMode-vertical
#writingMode

=====================================================================
Constrained TTML features
=====================================================================
#core
    Constraints:
        * The xml:lang attribute shall not be a child of an element other than tt,
div, p or span.
        * The xml:id attribute shall not be a child of an element other than
style, region, div, p or  span.
        * The xml:id attribute shall be mandatory for the elements style, region
and p.
        * The xml:space attribute shall not be a child of an element other than
tt, p and span.
#fontStyle
    Constraints:
        * The value oblique is not supported.
#metadata
    Constraints:
        * TTML metadata elements shall only be used as defined in this
specification.
#origin
    Constraints:
        * The tts:origin attribute shall not be child of an element other than
region.
        * The tts:origin attribute shall not have a value of 'auto'.
#presentation
    Constraints:
        * The feature 'profile' is not supported.
        * The attribute "dur" is not supported.
#textDecoration-under
    Constraints:
        * The value 'noUnderline' is not supported.
#textDecoration
```

```
    Constraints:
        * The values 'noUnderline', 'lineThrough', 'noLineThrough', 'overline' and
'noOverline' are not supported.
#time-clock-with-frames
    Constraints:
        * The feature '#subFrameRate' is not supported.
#timing
    Constraints:
        * The feature #subFrameRate is not supported.
        * The attribute "dur" is not supported.
#transformation
    Constraints:
        * The feature #profile is not supported.

=====================================================================
Extensions
=====================================================================
# ebu-tt-part-1-metadata-v1-1

* A transformation processor supports the #ebu-tt-part-1-metadata-v1-1 feature if
it recognises and is capable of transforming values in the namespace
urn:ebu:tt:metadata defined in EBU-TT Part 1 v1.1.

#multiRowAlign

* A transformation processor supports the #multiRowAlign feature if it recognizes
and is capable of transforming values of the ebutts:multiRowAlign attribute
specified in this specification.

* A presentation processor supports the #multiRowAlign feature if it implements
presentation semantic support for values of the ebutts:multiRowAlign attribute
specified in this specification.

#linePadding

* A transformation processor supports the #linePadding feature if it recognizes
and is capable of transforming values of the ebutts:linePadding attribute
specified in this specification.

* A presentation processor supports the #linePadding feature if it implements
presentation semantic support for values of the ebutts:linePadding attribute
specified in this specification.

Note that the #multiRowAlign and #linePadding features defined here may be used to
describe the processor capabilities for ebutts:multiRowAlign and
ebutts:linePadding as applied to EBU-TT-D processors.
```

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Annex F: Overview of style attributes on tt:style and tt:region

The following TTML style attributes are allowed on the `tt:style` element:

- `tts:backgroundColor`
- `tts:color`
- `tts:direction`
- `tts:fontFamily`
- `tts:fontSize`
- `tts:fontStyle`
- `tts:fontWeight`
- `tts:lineHeight`
- `tts:padding`
- `tts:textAlign`
- `tts:textDecoration`
- `tts:unicodeBidi`
- `tts:wrapOption`

The following EBU-TT style attributes are allowed on the `tt:style` element:

- `ebutts:linePadding`
- `ebutts:multiRowAlign`

The following TTML style attributes are allowed on the `tt:region` element:

- `tts:displayAlign`
- `tts:extent`
- `tts:origin`
- `tts:overflow`
- `tts:padding`
- `tts:showBackground`
- `tts:writingMode`

If a region element references one or more styles that define style attributes not permitted directly on region, they shall be processed as defined in TTML1. Note that the attributes `style` and `xml:id` may be specified on the `tt:style` element and the `tt:region` element.

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Annex G: Overview Document structure (Informative)

The following is a syntactic representation of the EBU-TT Part 1 document model. It is derived from the syntactic representation of TTML 1.0 and the definition of the reduced XML Infoset in TTML 1.0.

```
ELEMENT INFORMATION ITEMS

<tt:tt
    xml:space = ("default"|"preserve")>
    ttp:timeBase = ( "media" | "smpte" | "clock") #REQUIRED
    ttp:frameRate = <digit>* <digitGreaterZero> <digit>*
    ttp:frameRateMultiplier = <ebuttdt:frameRateMultiplierType>
    ttp:markerMode = ("discontinuous")
    ttp:dropMode = ("nonDrop" | "dropNTSC" | "dropPAL")
    ttp:clockMode = ( "local" | "gps" | "utc")
    ttp:cellResolution = <ebuttdt:cellResolutionType>
    tts:extent = <ebuttdt:extentType>  /* Restricted to length metric "px" */
    xml:lang = ("" | <xs:language>) #REQUIRED
    >
    Content: tt:head, tt:body?
</tt:tt>

<tt:head>
    Content:  tt:metadata?,  ttm:copyright?, tt:styling, tt:layout
</tt:head>

<ttm:copyright>
    Content: <xs:string>
</ttm:copyright>

<tt:metadata>
    Content:
        ebuttm:documentMetadata, /* Only permitted and required in
                                    '/tt/head/metadata' */
        ebuttm:binaryData*, /* Only permitted in '/tt/head/metadata' and
                             '/tt/body//div/metadata' */
        ebuttm:authoringTechnique*, /* Only permitted in 'tt:body/tt:metadata',
                                       'tt:div/tt:metadata' and 'tt:p/tt:metadata' */
        ebuttm:transitionStyle*, /* Only permitted in 'tt:body/tt:metadata',
                                    'tt:div/tt:metadata' and 'tt:p/tt:metadata' */
        ebuttm:font*, /* Only permitted in 'tt:styling/tt:metadata' */
        ttm:title?,
        ttm:desc?,
        ttm:agent* /* Only permitted in 'tt:head/metadata' */
                   {Extension with other elements as defined in § 2.2 }
</tt:metadata>

<ebuttm:documentMetadata>
    Content:
        ebuttm:conformsToStandard*,
        ebuttm:documentEbuttVersion?,
        ebuttm:documentIdentifier?,
        ebuttm:documentOriginatingSystem?,
        ebuttm:documentCopyright?,
        ebuttm:documentReadingSpeed?,
        ebuttm:documentTargetAspectRatio?,
        ebuttm:documentTargetActiveFormatDescriptor?,
        ebuttm:documentIntendedTargetBarData?,
        ebuttm:documentIntendedTargetFormat?,
        ebuttm:documentCreationMode?,
        ebuttm:documentContentType?,
```

```
        ebuttm:sourceMediaIdentifier*,
        ebuttm:relatedMediaIdentifier?,
        ebuttm:relatedObjectIdentifier*,
        ebuttm:appliedProcessing*,
        ebuttm:relatedMediaDuration?,
        ebuttm:documentBeginDate?,
        ebuttm:localTimeOffset?,
        ebuttm:clockIdentifier?,
        ebuttm:broadcastServiceIdentifier*,
        ebuttm:documentTransitionStyle*,
        ebuttm:documentOriginalProgrammeTitle?,
        ebuttm:documentOriginalEpisodeTitle?,
        ebuttm:documentTranslatedProgrammeTitle?,
        ebuttm:documentTranslatedEpisodeTitle?,
        ebuttm:documentTranslatorsName?,
        ebuttm:documentTranslatorsContactDetails?
        ebuttm:documentSubtitleListReferenceCode?,
        ebuttm:documentCreationDate?,
        ebuttm:documentRevisionDate?,
        ebuttm:documentRevisionNumber?,
        ebuttm:documentTotalNumberOfSubtitles?,
        ebuttm:documentMaximumNumberOfDisplayableCharacterInAnyRow?,
        ebuttm:documentStartOfProgramme?,
        ebuttm:documentCountryOfOrigin?,
        ebuttm:documentPublisher?,
        ebuttm:documentEditorsName?,
        ebuttm:documentEditorsContactDetails?,
        ebuttm:documentUserDefinedArea?,
        ebuttm:stlCreationDate?,
        ebuttm:stlRevisionDate?,
        ebuttm:stlRevisionNumber?
        ebuttm:subtitleZero>?
</ebuttm:documentMetadata>

<ebuttm:conformsToStandard>
    Content: <xs:anyURI>
</ebuttm:conformsToStandard>

<ebuttm:documentEbuttVersion>
    Content: "v1.0"
</ebuttm:documentEbuttVersion>

<ebuttm:documentIdentifier>
    Content: <xs:string>
</ebuttm:documentIdentifier>

<ebuttm:documentOriginatingSystem>
    Content: <xs:string>
</ebuttm:documentOriginatingSystem>

<ebuttm:documentCopyright>
    Content: <xs:string>
</ebuttm:documentCopyright>

<ebuttm:documentReadingSpeed>
    Content: <xs:positiveInteger>
</ebuttm:documentReadingSpeed>

<ebuttm:documentTargetAspectRatio>
    Content: <xs:string>
</ebuttm:documentTargetAspectRatio>
```

```
<ebuttm:documentTargetActiveFormatDescriptor>
    Content: <xs:string>
</ebuttm:documentTargetActiveFormatDescriptor>

<ebuttm:documentIntendedTargetBarData
    position = ("topBottom" | "leftRight") #REQUIRED
    lineNumberEndOfTopBar = <xs:nonNegativeInteger>
    lineNumberStartOfBottomBar = <xs:nonNegativeInteger>
    pixelNumberEndOfLeftBar = <xs:nonNegativeInteger>
    pixelNumberStartOfRightBar = <xs:nonNegativeInteger> >
    Content: <xs:string>
</ebuttm:documentIntendedTargetBarData>

<ebuttm:documentIntendedTargetFormat
    link = <xs:string> >
    Content: <xs:string>
</ebuttm:documentIntendedTargetFormat>

<ebuttm:documentCreationMode>
    Content: ("live" | "prepared")
</ebuttm:documentCreationMode>

<ebuttm:documentContentType
    link = <xs:anyURI> >
    Content: <xs:string>
</ebuttm:documentContentType>

<ebuttm:sourceMediaIdentifier
    type = <xs:string> >
    Content: <xs:string>
</ebuttm:sourceMediaIdentifier>

<ebuttm:relatedMediaIdentifier>
    Content: <xs:string>
</ebuttm:relatedMediaIdentifier>

<ebuttm:relatedObjectIdentifier
    type = <xs:string> >
    Content: <xs:string>
</ebuttm:relatedObjectIdentifier>

<ebuttm:appliedProcessing
    appliedDateTime = <xs:dateTime> >
    Content (Mixed)
</ebuttm:appliedProcessing>

<ebuttm:relatedMediaDuration>
    Content: <ebuttdt:mediaTimingType>
</ebuttm:relatedMediaDuration>

<ebuttm:documentBeginDate>
    Content: <ebuttdt:noTimezoneDateType>
</ebuttm:documentBeginDate>

<ebuttm:localTimeOffset>
    Content: <xs:string>
</ebuttm:localTimeOffset>

<ebuttm:referenceClockIdentifier>
    Content: <xs:string>
</ebuttm:referenceClockIdentifier>
```

```
<ebuttm:broadcastServiceIdentifier
    serviceBegin = <xs:dateTime>
    serviceEnd = <xs:dateTime> >
    Content: <xs:string>
</ebuttm:broadcastServiceIdentifier>

<ebuttm:documentTransitionStyle
  inUnit = ("block" | "line" | "word" | "partOfWord" | "groupOfWords") # REQUIRED
  outUnit = ("block" | "line" | "word" | "partOfWord" | "groupOfWords") # REQUIRED
/>

<ebuttm:documentOriginalProgrammeTitle>
    Content: <xs:string>
</ebuttm:documentOriginalProgrammeTitle>

<ebuttm:documentOriginalEpisodeTitle>
    Content: <xs:string>
</ebuttm:documentOriginalEpisodeTitle>

<ebuttm:documentTranslatedProgrammeTitle>
    Content: <xs:string>
</ebuttm:documentTranslatedProgrammeTitle>

<ebuttm:documentTranslatedEpisodeTitle>
    Content: <xs:string>
</ebuttm:documentTranslatedEpisodeTitle>

<ebuttm:documentTranslatorsName>
    Content: <xs:string>
</ebuttm:documentTranslatorsName>

<ebuttm:documentTranslatorsContactDetails>
    Content: <xs:string>
</ebuttm:documentTranslatorsContactDetails>

<ebuttm:documentSubtitleListReferenceCode>
    Content: <xs:string>
</ebuttm:documentSubtitleListReferenceCode>

<ebuttm:documentCreationDate>
    Content: <xs:date>
</ebuttm:documentCreationDate>

<ebuttm:documentRevisionDate>
    Content: <xs:date>
</ebuttm:documentRevisionDate>

<ebuttm:documentRevisionNumber>
    Content: <xs:nonNegativeInteger>
</ebuttm:documentRevisionNumber>

<ebuttm:documentTotalNumberOfSubtitles>
    Content: <xs:nonNegativeInteger>
</ebuttm:documentTotalNumberOfSubtitles>

<ebuttm:documentMaximumNumberOfDisplayableCharacterInAnyRow>
    Content: <xs:nonNegativeInteger>
</ebuttm:documentMaximumNumberOfDisplayableCharacterInAnyRow>

<ebuttm:documentStartOfProgramme>
    Content: ( <ebuttdt:smpteTimingType> | <ebuttdt:clockTimingType> )
</ebuttm:documentStartOfProgramme>
```

```
<ebuttm:documentCountryOfOrigin>
    Content: <xs:string>
</ebuttm:documentCountryOfOrigin>

<ebuttm:documentPublisher>
    Content: <xs:string>
</ebuttm:documentPublisher>

<ebuttm:documentEditorsName>
    Content: <xs:string>
</ebuttm:documentEditorsName>

<ebuttm:documentEditorsContactDetails>
    Content: <xs:string>
</ebuttm:documentEditorsContactDetails>

<ebuttm:documentUserDefinedArea>
    Content: <xs:string>
</ebuttm:documentUserDefinedArea>

<ebuttm:stlCreationDate>
    Content: <xs:date>
</ebuttm:stlCreationDate>

<ebuttm:stlRevisionDate>
    Content: <xs:date>
</ebuttm:stlRevisionDate>

<ebuttm:stlRevisionNumber>
    Content: <xs:nonNegativeInteger>
</ebuttm:stlRevisionNumber>

<ebuttm:authoringTechnique
    link = <xs:anyURI> >
    Content: <xs:string>
</ebuttm:authoringTechnique>

<ebuttm:subtitleZero>
   Content: <xs:string>
</ebuttm:subtitleZero>

<ebuttm:binaryData
    textEncoding = "BASE64" #REQUIRED
    binaryDataType = <xs:string> #REQUIRED
    fileName = <xs:string>
    creationDate = <xs:date>
    revisionDate = <xs:date>
    revisionNumber = <xs:nonNegativeInteger> >
    Content: <xs:string>
</ebuttm:binaryData>

<ebuttm:font
  fontFamilyName = <ebuttdt:fontFamilyType>  #REQUIRED
  src = <xs:anyUri> #REQUIRED
  fontStyle = ("italic" | "normal")
  fontWeight = ("bold" | "normal")
  fontSize = <ebuttdt:fontSizeType> > /* The metric '%' shall not be used */
/>

<tt:styling>
    Content: tt:metadata?, tt:style+
</tt:styling>
```

```
<tt:style
    xml:id = <xs:ID> #REQUIRED
    style = <xs:IDREFS>
    tts:direction = ( "ltr" | "rtl" )
    tts:fontFamily = <ebuttdt:fontFamilyType>
    tts:fontSize = <ebuttdt:fontSizeType>
    tts:lineHeight = ("normal" | <ebuttdt:lengthType>)
    tts:textAlign = ( "left" | "center" | "right" | "start" | "end" )
    tts:color = <ebuttdt:colorType>
    tts:backgroundColor = <ebuttdt:colorType>
    tts:fontStyle = ( "normal" | "italic" )
    tts:fontWeight = ( "normal" | "bold" )
    tts:textDecoration = ( "none" | "underline" )
    tts:unicodeBidi = ( "normal" | "embed" | "bidiOverride" )
    tts:wrapOption = ( "wrap" | "noWrap" )
    tts:padding = <ebuttdt:paddingType>
    ebutts:multiRowAlign = ("start" | "center" | "end" | "auto")
    ebutts:linePadding = <ebuttdt:linePaddingType> >
    Content: tt:metadata?
</tt:style>

<tt:layout>
    Content: tt:metadata?, tt:region+
</tt:layout>

<tt:region
    xml:id = <xs:ID> #REQUIRED
    tts:origin = <ebuttd:originType> #REQUIRED
    tts:extent = <ebuttd:extentType> #REQUIRED
    style = <xs:IDREFS>
    tts:displayAlign = ( "before" | "center" | "after" )
    tts:padding = <ebuttdt:paddingType>
    tts:writingMode = ("lrtb"| "rltb" | "tbrl" | "tblr" | "lr" | "rl" | "tb")
    tts:showBackground = ("always" | "whenActive")
    tts:overflow = ("visibile" | "hidden") >
    Content: tt:metadata?
</tt:region>

<tt:body
    style = <xs:IDREFS>
    ttm:agent = <xs:IDREFS>
    ttm:role = As defined in TTML 1.0 [3], § 12.2.2>
    Content: tt:metadata?, tt:div+
</tt:body>

<tt:div
    xml:id = <xs:ID>
    region = <xs:IDREF>
    style =  <xs:IDREFS>
    xml:lang = ("" | <xs:language>)
    ttm:agent = <xs:IDREFS>
    ttm:role = As defined in TTML 1.0 [3], § 12.2.2 >
    Content: tt:metadata?, tt:div*, tt:p*
</tt:div>

<tt:p
    xml:id = <xs:ID> #REQUIRED
    xml:space = ("default"|"preserve")
    xml:lang = ("" | <xs:language>)
    region = <xs:IDREF>
    style = <xs:IDREFS>
    begin = (<ebuttd:smpteTimingType> | <ebuttdt:mediaTimingType> |
<ebuttdt:clockTimingType>) #REQUIRED
    end = (<ebuttd:smpteTimingType> | <ebuttdt:mediaTimingType> |
```

```
<ebuttdt:clockTimingType>) #REQUIRED
    ttm:agent = <xs:IDREFS>
    ttm:role = As defined in TTML 1.0 [3], § 12.2.2>
    Content (Mixed): tt:metadata?, (tt:span|tt:br)*
</tt:p>

<tt:span
    xml:id = <xs:ID>
    xml:space = ("default"|"preserve")
    xml:lang = ("" | <xs:language>)
    style = <xs:IDREFS>
    begin = (<ebuttd:smpteTimingType> | <ebuttdt:mediaTimingType> |
<ebuttdt:clockTimingType>)
    end = (<ebuttd:smpteTimingType> | <ebuttdt:mediaTimingType> |
<ebuttdt:clockTimingType>)
    ttm:agent = <xs:IDREFS>
    ttm:role = As defined in TTML 1.0 [3], § 12.2.2>
    Content (Mixed): tt:metadata?, tt:span*, tt:br*
</tt:span>

<tt:br
    ttm:agent = <xs:IDREFS>
    ttm:role = As defined in TTML 1.0 [3], § 12.2.2>
    Content: tt:metadata?
</tt:br>



EXPRESSIONS

<ebuttdt:cellResolutionType>
    : <columns> <whiteSpace> <rows>

<columns> | <rows>
    : <digit>* <digitGreaterZero> <digit>*

<ebuttdt:colorType>
    : <color> as defined in TTML 1

<ebuttdt:extentType>
    : <width> <whiteSpace> <height>

<width> | <height>
    : <ebuttdt:lengthType>

<ebuttdt:fontFamilyType>
    : <familyName> | <genericFamilyName> as defined in TTML 1

<ebuttdt:fontSizeType>
    : <ebuttdt:lengthType> <whiteSpace> <ebuttdt:lengthType>?

<ebuttdt:frameRateMultiplierType>
    : <numerator> <whiteSpace> <denominator>

<numerator> | <denominator>
    : <digit>* <digitGreaterZero> <digit>*

<ebuttdt:lengthType>
    : <scalar>
    | <percentage>

<scalar>
    : <number> <units>
```

```
<percentage>
    : <number> "%"

<number>
    : <sign>? <non-negative-number>

<sign>
    : "+" | "-"

<non-negative-number>
    : <non-negative-integer>
    | <non-negative-real>

<non-negative-integer>
    : <digit>+

<non-negative-real>
    : <digit>* "." <digit>+

<units>
    : "px"    /* abbreviation of "pixel" */
    | "c"     /* abbreviation of "cell" */

<ebuttdt:lineHeightType>
    : "normal" | <ebuttdt:lengthType>           /* length >= 0 */

<ebuttdt:originType>
    : <x-coord> <whiteSpace> <y-coord>

<x-coord> | <y-coord>
    : <ebuttdt:lengthType>

<ebuttdt:paddingType>
    : <all-edges>
    | <beforeAndAfter> <whiteSpace> <startAndEnd>
    | <before> <whiteSpace> <startAndEnd> <whiteSpace> <after>
    | <before> <whiteSpace> <end> <whiteSpace> <after> <whiteSpace> <start>

<all-edges> | <before> | <end> | <after> | <start> | <beforeAndAfter> |
<startAndEnd>
    : <ebuttdt:lengthType>

<ebuttdt:linePaddingType>
    : <non-negative-number> "c"

<ebuttdt:noTimezoneDateType>
    : <xs:date> with no timezone specified

<ebuttdt:smpteTimingType>
    : <hh> ":" <mm> ":" <ss> ":" <ff>

<hh> | <mm> | <ss> | <ff>
    : <digit> <digit>

<ebuttdt:mediaTimingType>
    : <full-clock-value>
    | <timecount-value>

<ebuttdt:clockTimingType>
    : <full-clock-value>
    | <timecount-value>

<full-clock-value>
    : <hh> ":" <mm> ":" <ss> ("." <digit>+)?
```

```
<timecount-value>
    : <digit>+ ("." <digit>+)? <metric>

<metric>
    : "h"   /* hours */
    | "m"   /* minutes */
    | "s"   /* seconds */
    | "ms"  /* milliseconds */

<digit>
    : "0" | "1" | "2" | "3" | "4" | "5" | "6" | "7" | "8" | "9"

<digitGreaterZero>
    : "1" | "2" | "3" | "4" | "5" | "6" | "7" | "8" | "9"

<whiteSpace> /*(space, carriage return, line feed, tab)*/
      : (#x20 | #x9 | #xD | #xA)+
```