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(Rev. AES60-2011)



AES Information Document for audio metadata— Core audio metadata

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AES Information Document for audio metadata - Core audio metadata

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Abstract

This specification addresses the creation, management and preservation of material that can be re-used as originally produced, or may provide input material for new production projects. Material is expected to be exchanged between various organisations or between production facilities in a distributed environment.

The core set of metadata presented in this specification is a co-publication of EBU Tech3293-2019 EBUCore, itself an extension to and a refinement of the Dublin Core. EBUCore is a minimum list of attributes characterizing video and / or audio media resources. An XML representation is used as this is the likely method that metadata would be implemented, for example in archive exchange projects using the Open Archive Initiative's Protocol for Metadata Harvesting (OAI-PMH).

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Foreword to AES60-2011

This foreword is not part of the AES60-2011 *AES standard for audio metadata - Core audio metadata*.

This document has its roots in the AES project X098A where the concept of providing a core administrative metadata set for audio exchange explored. This metadata set was based on Dublin Core and expanded to meet the basic requirements of the audio industry. It was well ahead of its time and as a result did not attract sufficient industry traction to complete until comparatively recently where similar work covering both audio and video was carried out within the EBU. The decision was eventually taken to base the AES core descriptive metadata on the EBU core and co-publish this under the auspices of EBU and AES, which is expected to have a greater impact on the industry as a whole.

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Foreword to AES60id-2020

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Tormod Værvågen
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Note on normative language

In AES standards documents, sentences containing the word “shall” are requirements for compliance with the document. Sentences containing the verb “should” are strong suggestions (recommendations). Sentences giving permission use the verb “may”. Sentences expressing a possibility use the verb “can”.

AES Information document for audio metadata - Core audio metadata

Introduction

The core set of metadata presented in this specification is a co-publication of EBU Tech3293 v. 1.9 EBUCore Metadata Set.

EBUCore has been designed over the last ten years to describe audio, video and other resources for a wide range of broadcasting applications including archives, exchange and production in the context of a Service-Oriented Architecture. EBUCore is based on the Dublin Core to maximise interoperability with the community of Dublin Core users such as the European Digital Library 'Europeana'.

EBUCore 1.9 have several serialisations, and this issue uses the XML-schema serialisation, well suited for use in the AXML chunk of BWF. It takes into account the latest developments in the Semantic Web and Linked Open Data communities. A link to EBUCore RDF ontology and its documentation is provided in Annex E. The EBUCore RDF ontology has been updated to match EBU's CCDM (Tech 3351) needs and improve mapping with other ontologies. EBUCore RDF is listed as Linked Open Vocabulary as well as RDF-Vocab for Ruby developers.

This document has one of its roots in the AES project X098A where the concept of providing a core administrative metadata set for audio exchange explored. This metadata set was based on Dublin Core and expanded to meet the basic requirements of the audio industry. At the same time, there was similar work covering both audio and video was carried out within the EBU. The decision was eventually to base the AES core descriptive metadata on the EBUCore and co-publish this under the auspices of EBU and AES, which was expected to have a greater impact on the industry as a whole.

EBUCore 1.9 provides a solution for dynamic acquisition metadata, a unique representation of the ITU BS2076 Audio Data Model (ADM). Now 'props', 'costumes', 'timed text', 'actions' and 'emotions' (among others) can be associated to scenes, persons or character. High Dynamic Range static technical metadata and Virtual Reality flags have been added to the videoFormat element.

This document replaces AES60, and ensures total compatibility between AES and EBU specifications. It provides links to the EBUCore schema and its HTML documentation. It also provides guidelines on how to use EBUCore to implement a variety of features.

More information on EBU metadata activities is provided on the EBU TECHNICAL website (<http://tech.ebu.ch/metadata>).

Modern IT-based production environments need metadata to identify and retrieve content correctly and efficiently. Metadata provides an essential link between various production operations and the following core set of information is a minimum requirement for practical operations. Content archives provide a common basis to describe content in a way that supports other processes in the production chain.

The decision to issue AES Core as a co-publication with the EBUCore is seen as an important factor in maintaining interoperability between the audio and video industries. For this reason, this specification includes elements that may seldom be used in a purely audio context. However, much audio material is destined to coexist with video and other media at some point during its life, so these additional elements may not be superfluous. It is not expected that the AES will actively develop the non-audio aspects of this standard but instead rely on active cooperation with EBU to co-maintain the AES and EBU cores.

This "AES Core" metadata set is primarily a minimum list of elements and attributes for which an XML representation is also proposed. Being based on the EBUCore, it follows that it is also an extension to the Dublin

Core metadata set. The Dublin Core is being used as a core metadata set by librarians and in cultural heritage projects. The AES Core and EBUCore, used for radio and television archives, offer a bridge between cultural-heritage databases, broadcasting production systems and broadcasting archive repositories.

0 Preamble

0.1 Documentation conventions

A mono-spaced typeface is used to identify computer code expressions to distinguish them from regular text. Examples are shown using XML structural conventions.

1 Scope

The core set of metadata presented in this specification is based on the EBUCore, itself an extension to the Dublin Core. It is a minimum list of attributes characterizing audio and / or video media resources. The set of metadata defined in this specification has been identified as being the minimum information needed to describe radio and television content.

An XML representation is used as this is the likely method that metadata would be implemented, for example in archive exchange projects using the Open Archive Initiative's Protocol for Metadata Harvesting (OAI-PMH).

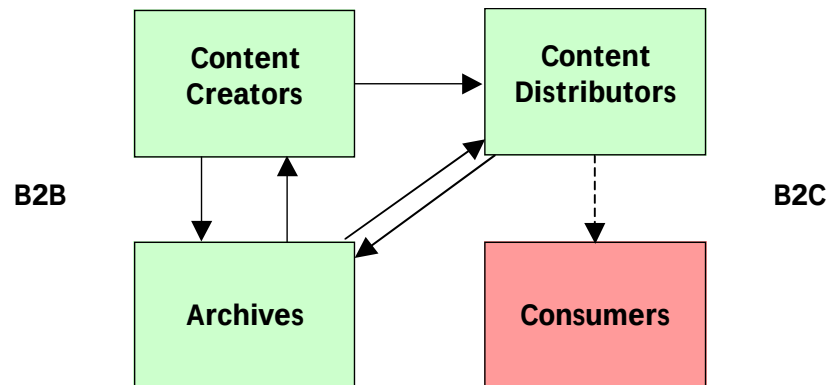


Figure 1: Archiving - a core process to define metadata

"If you can't find it, you don't have it!" This should not happen in modern IT-based production environments. Metadata is the glue between production operations in particular moving towards Service Oriented Architecture and file-based production. Documenting audiovisual resources with EBUCore information is a minimum requirement corresponding to fundamental investment with guaranteed return.

This specification addresses the creation, management and preservation of audiovisual material. EBUCore facilitates program exchanges between broadcasters or between production facilities in distributed and cloud environments. Beyond production, EBUCore can be used to describe content for distribution (broadcast, broadband Internet, mobile or hybrid delivery). EBUCore is also the default set of technical and descriptive metadata used by FIMS, the Framework of Interoperable Media Services (<http://fims.tv>).

The core set of metadata presented in EBUCore is the Dublin Core for media. The Dublin Core is being used as a core metadata set by librarians and museums in cultural heritage projects. The EBUCore is recommended when describing and providing access to audiovisual content and is not limited to archives.

EBUCore takes into account latest developments in the Semantic Web and Linked Open Data communities. EBUCore is available as an RDF ontology entirely compatible with the W3C Media Annotation Working Group ontology, which model is common and based on the EBU Class Conceptual Data Model (Tech.3351). A RDF representation of the EBUCore schema is referenced in Annex E.

2 References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EBU Tech 3293-v1.9-2019 - EBU Core Metadata Set (EBUCore)

EBU Tech 3295 - P-META Metadata Library

EBU Tech 3364 – Audio Definition Model (ADM)

ISO 15836, *Dublin Core Metadata Element Set*, International Standards Organisation, Geneva, Switzerland.

XML schema, World Wide Web Consortium, <https://www.w3.org/XML/Schema>

Namespaces in XML, World Wide Web Consortium, <https://www.w3.org/Press/1999/XML-Namespaces-REC>

RFC 2045 *Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies*, The Internet Society, <https://tools.ietf.org/html/rfc2045.html>

RFC 3339 *Date and Time on the Internet: Timestamps*, The Internet Society, <https://tools.ietf.org/html/rfc3339>

RFC 5174 *A Uniform Resource Name (URN) Namespace for the European Broadcasting Union (EBU)*, The Internet Society, <https://tools.ietf.org/html/rfc5174.html>

3 Definitions and abbreviations

3.1

Unique Resource Identifier

URI

<http://tools.ietf.org/html/rfc3986>

3.2

Unique Resource Namespace

URN

<http://tools.ietf.org/html/rfc3986>

3.3

Unique Resource Locator

URL

<http://tools.ietf.org/html/rfc3986>

4 Core Metadata Set

4.1 General

EBUCore is a collection of basic descriptive and technical/structural metadata elements used to describe audiovisual content as an extension of the Dublin Core. It is fully compatible for use in Semantic Web and Service Oriented Architectures.

EBUCore is the Dublin Core for media.

The EBUCore is a living specification. It is actively maintained and enriched.

4.2 Documentation

Following best practice, the documentation has been generated from the schema.

The documentation can be summarized as follows:

- It looks very similar to what was provided in previous versions of the specification, incl. uml-like diagrams, the semantics of each element and attribute, their cardinality and associated complex types, the localization of the element in the schema, etc.
- The documentation includes the schemas imported by EBUCore i.e. the xml stub and Dublin Core.
- The documentation is constructed around dynamic links that allow easily navigating through the schema.
- Each user can decide on the level of information detail to be displayed.

This html-based documentation is attached to the specification as a zip archive to be extracted in the directory of the user's choice.

It can also be downloaded from the link provided in Annex E.

4.3 Audio Definition Model (ADM)

The EBUcore uses a new definition model that addresses all the richness of audio including 3D binaural and object audio.

The model is divided into two sections, the content part, and the format part. The content part describes what is contained in the audio (music, program, accompanying sound tracks and their respective purpose), and will also describe things like the language of any dialogue, the loudness and so on. The format part describes the technical nature of the audio, so it can be decoded or rendered correctly. Some of the format parts may exist before we have any audio signals, whereas the content is only completed after all the signals that form it have been generated.

While this model is based around BWF, it is not intended to be solely used for BWF files, but as a more general model. Mappings to MXF streams have also been developed and tested.

This model initially uses XML as its specification language with the EBUCore as the target schema. When it is used with BWF files, the XML can be embedded in the <axml> chunk of the file. When used with MXF, the XML can also be embedded in the header or footer partition of an MXF file. ADM metadata can also be provided in IMF as sidecar metadata.

The new model has been implemented in EBUCore as a new audioFormatExtended element in complement of the audioFormat element previously provided in earlier versions of the schema. This allows maintaining backward compatibility and graceful deprecation of the audioFormat element in favor of the new audioFormatExtended element.

The overall diagram of the model is given in Figure 2. This shows how the elements relate to each other and illustrates the split between its content and format parts.

The model has been adopted by ITU now leading its maintenance. The EBUCore schema is kept strictly aligned with approved ITU BS2076-1 changes.

Several example files are available from the EBUCore ADM example repository. These files explore the main ADM configurations, with or without complementary embedded editorial metadata.

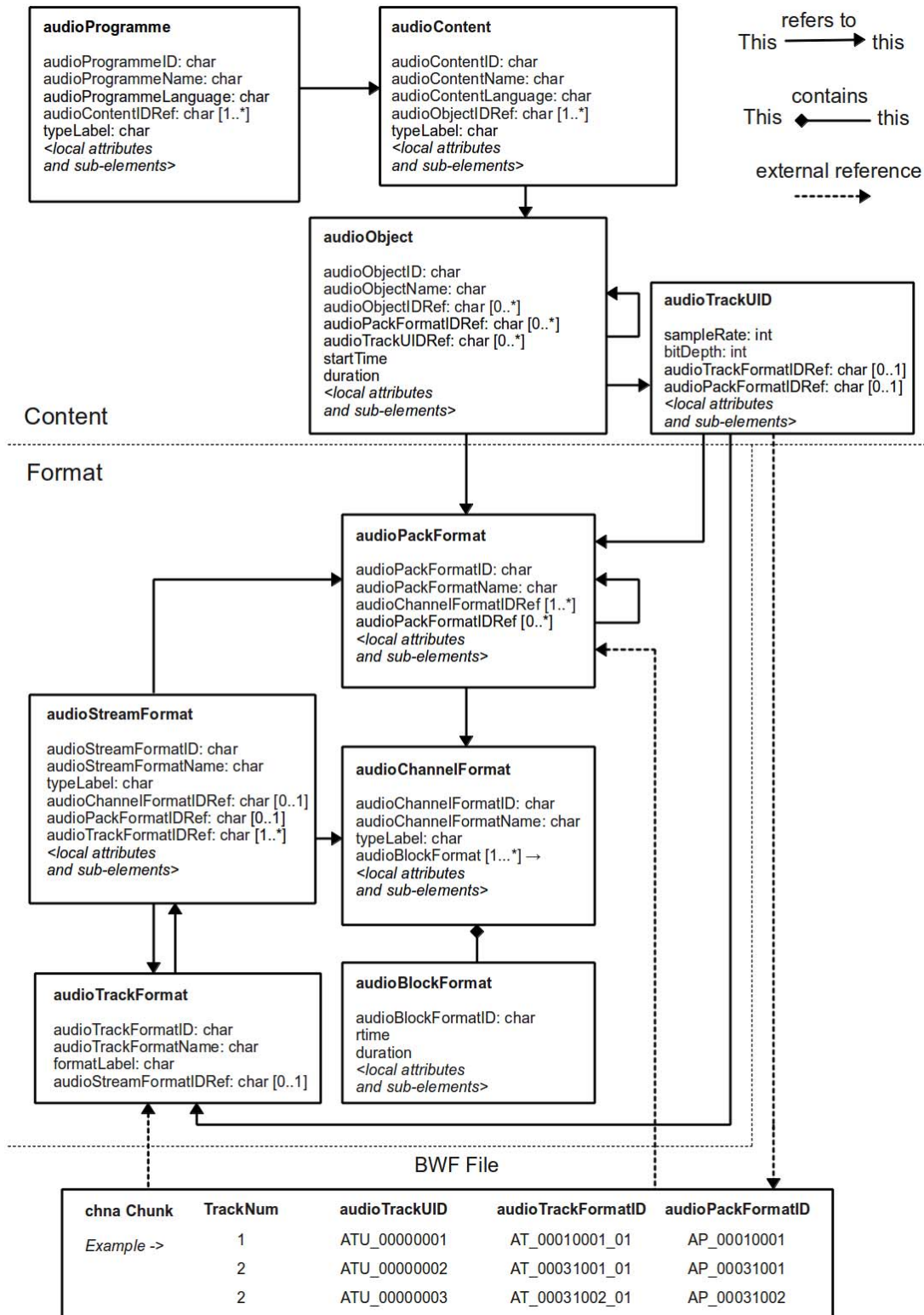


Figure 2: Audio Definition Model

5 Implementation Guidelines

5.1 General

EBUCore has been developed in mind of users with different needs. EBUCore has been designed to support customization in many different ways:

EBUCore makes an extensive use of "type" and "format" attributes that allow flexible naming of elements such as title, description, etc.

EBUCore provides two mechanisms for extensions:

- The schema is systematically structured around the definition of complex types. This has been done to facilitate the "redefinition" of these complex types using restrictions or extensions via the xs:redefine function. This has been preferred to the use of xs:any allowing extensions at the instance level as xs:redefine is more flexible and provides more structured data, which is important for stricter validation in particular when aggregating data from different sources who may not respect the same element ordering (unless associated with a common schema for extension).
- A set of predefined technical attributes is provided at key format extension points in the schema. These technical attributes cover the most common datatypes and structures (such as rationals). Each technical attribute is associated with a 'type' that allows the user to implement a parameter of his choice. When applicable, the user can additionally define the format of the data associated with this parameter.

Users can extend the EBUCore schema using proprietary definitions within their own namespace, which shall not conflict with EBUCore's and shall be used within walled garden application domains.

In all cases, it is the responsibility of the user to share the definitions of its extensions with third parties within his domain of interoperability.

Reference data and controlled vocabularies identified in the specification are proposed by default but can be extended or replaced. In order to maximize interoperability in case of e.g. exchange, it is recommended that extensions or alternative reference data be duly documented, maintained and made available to other users e.g. as open permanent resources on line.

The schema is built as an extension to the Simple Dublin Core.

The implementers are left with the choice of the method for implementation within their respective domains of application and interoperability.

User guidelines are now given that illustrate the flexibility of EBUCore schema for implementation.

5.2 Expressing titles of a custom type in different languages

5.2.1 Title

The MAIN title is expressed using the title element in which dc:title is repeated in as many languages as required using the dc:element and its associated xml:lang tag. The type of the main title can be refined as fits users' needs.

The user can specify the geographical zones where the title can or cannot be used, as well as the date when it was attributed.

```
<ebucore:title startYear="2006" length="6" geographicalScope="France"
  geographicalExclusionScope="Germany" typeLabel="main title in English">
  <dc:title xml:lang="en">title0</dc:title>
</ebucore:title>
```

It is also possible to express the language used to define the type of title, or an indication of the source of the title, etc.

Note: the same applies to other elements build around a similar structure such as description, subject, rights, etc.

5.2.2 Alternative Title

Any other type of alternative title is expressed using `alternativeTitle` for which the type is defined and within which `dc:title` is repeated in as many languages as required using the `dc:element` and its associated `xml:lang` tag.

There can therefore be as many `alternativeTitle` as required type of `alternativeTitle`, each one grouping its expression in one or more languages.

```
<ebucore:alternativeTitle typeLabel="secondary title" typeLanguage="en-US"
  statusLabel="working title" startDate="2014-01-20">
  <dc:title xml:lang="en">Additional secondary title</dc:title>
  <dc:title xml:lang="fr">Titre additionnel et secondaire</dc:title>
</ebucore:alternativeTitle>

<ebucore:alternativeTitle typeLabel="display title" typeLanguage="en-US"
  statusLabel="working title" startDate="2014-01-20">
  <dc:title xml:lang="en">Additional secondary title for display</dc:title>
  <dc:title xml:lang="fr">Titre additionnel et secondaire pour affichage</dc:title>
</ebucore:alternativeTitle>
```

The need has been expressed that different types might apply to the same title. Types being defined by attributes, the solution consists of repeating the title with different types.

Note: the same applies to other elements build around a similar structure such as description, subject, rights, etc.

5.3 Using controlled vocabularies and reference data

Controlled vocabularies are mainly provided in the form of lists of terms organized as Classification Schemes (CS). These CSs are structured to allow access to terms within a predefined hierarchical vocabulary list (thesaurus). Each list is uniquely identified by its namespace (URI, in the form of a URN or URL) and 'Alias' for QNames. EBU namespaces are expressed in accordance to RFC5174. A Classification Term is defined by a unique key (termID) or a Name as follows:

Example:

```
<ClassificationScheme uri="urn:ebu:metadata-cs:ContentGenreCS:2008">
  <Alias>GenreCS</Alias>
  <Term termID="3.1">
    <Name xml:lang="en">NON-FICTION / INFORMATION</mpeg7:Name>
    <Term key="3.1.1">
      <Name xml:lang="en">News</mpeg7:Name>
    </Term>
  <!--etc.-->
</ClassificationScheme>
```

It is an important implementation requirement to ensure that these resources are accessible by the metadata recipient. Classification schemes shall preferably be available as resources on the open Internet via maintained URLs. In this case URIs shall respect the following syntax:

URL#termID e.g. http://www.ebu.ch/metadata/cs/ebu_ContentGenreCS.xml#3.1

A conforming parser uses that URI to resolve the termID reference to a resource, whether physical or logical. Once the termID has been resolved, the term name can be accessed (e.g. 'News' in the above example). The resolution method is left to the appreciation of each recipient.

URIs (URLs) can be replaced by aliases to provide a more concise, application-specific way of referring to classification terms as long as a look-up table is provided describing the relationship between Aliases and URIs.

If 'GenreCS' is the alias for "http://www.ebu.ch/metadata/cs/ebu_ContentGenreCS.xml". In the above example, 'News' could be identified through "GenreCS#3.1".

EBU Classification Schemes are also published in the SKOS (Simple Knowledge Organization System) format using RDF for use and dereferencing as linked data (<https://www.ebu.ch/metadata/ontologies/skos/>).

5.4 Video and Audio time point references

Controlled vocabularies are mainly provided in the form of lists of terms organized as Classification Schemes (CS). These CSs are structured to allow access to terms within a predefined hierarchical vocabulary list (thesaurus). Each list is uniquely identified by its namespace (URI, in the form of a URN or URL) and 'Alias' for QNames. EBU namespaces are expressed in accordance to RFC5174. A Classification Term is defined by a unique key (termID) or a Name as follows:

EBUCore uses three methods to identify video and audio time point references:

- a time duration according to ISO 8601 or IETF RFC 3339
- timecodes as defined by SMPTE in specification ST 12-1:2008
- a number of edit units, which are the fraction of time calculated as the inverse of the framerate for video, or the inverse of the sample rate for audio.

Audiovisual entities generally embed the property of having a "Timeline", which comes from the fact that the AV work is conceived to be played for a defined "Duration", and all the events characteristic of the AV work itself are located on the Timeline.

The Timeline concept applies to AV 'editorial entities' as well as to the 'physical entities' incl. their 'technical parameters', which are the sources providing the AV material for actual realizations.

A typical application of the timeline mechanism is for identifying the location of a given AV-entity A which is a part (in time) of another AV-entity B.

As B has got its own duration $D(B)$, we can say that A, with its own duration $D(A)$, is located at point S of the Timeline of B.

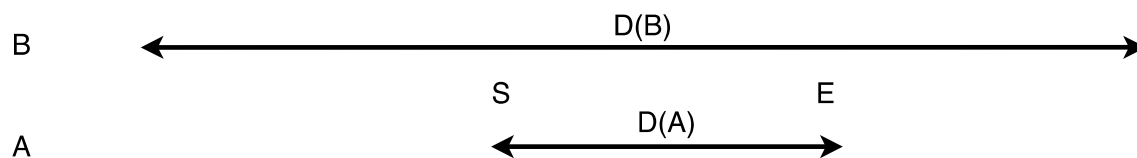


Figure 3: Illustration of a timeline

This means that if A is located on the Timeline of B, from S to E, then $E = S + D(A)$.

In EBUCore there are two mechanisms for expressing a position on a Timeline:

- the "Elapsed Time", which gives the time elapsed on the Timeline of the reference entity (B in the example above) from its beginning.
 - o the data type for that is a ISO 8601 duration(e.g. PT1M5.0S) or IETF RFC 3339;
 - o the reference point for the elapsed time is always the beginning of the reference entity.
- the "Elapsed Units" which give the same information in terms of the number of Edit Units (which are countable)
 - o this is to be preferred because it ensures that Timeline markers fall on the boundary of the Edit Unit;
 - o duration of the EditUnit must be known unambiguously and indicated, otherwise it is better to use the "Elapsed Time".