EBU
OPERATING EUROVISION AND EURORADIO

TECH 3293

EBU CORE METADATA SET (EBUCore)

SPECIFICATION v. 1.6

Source: MIM

Geneva
June 2015

Page intentionally left blank. This document is paginated for two sided printing

Introduction

'The EBUCore is a metadata specification designed for users with different needs'.

This is version 1.6 of the “EBUCore” metadata set.

EBUCore has been purposefully designed as a minimum and flexible list of attributes to describe audio and video resources for a wide range of broadcasting applications including archives, exchange and production in the context of a Service Oriented Architecture. It is also a metadata schema with well defined syntax and semantics for easier implementation.

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 1.6 takes into account latest developments in the Semantic Web and Linked Open Data communities. EBUCore 1.6 is available as a 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 link to the RDF/OWL ontology and its documentation is provided in Annex B. The EBUCore ontology has been updated to complement EBU's CCDM (Tech 3351) and improve mapping with other ontologies. EBUCore RDF is listed as Linked Open Vocabulary as well as RDF-Vocab for Ruby developers.

The definitions in EBUCore 1.6 have been refined. The schema structure has been reinforced for registration in EBU's Class 13 in SMPTE.

The new advanced data model for audio defined in Tech 3364 and introduced in EBUCore 1.5 has been updated to reflect discussions around its adoption in ITU.

This document provides links to the EBUCore schema and it 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).

Terms and Conditions of Use

This EBUCore is freely available for all to use, but you should take note of the following:

DISCLAIMER: THIS SPECIFICATION AND ASSOCIATED RESOURCES IS PROVIDED BY THE COPYRIGHT OWNER "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT OWNER BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS [SOFTWARE], EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Page intentionally left blank. This document is paginated for two sided printing

Contents

EBU Core Metadata Set (EBUCore)

EBU Committee	*First Issued*	*Revised*	*Re-issued*
TC	Dec. 2008	April 2014 (v1.5)	

Keywords: EBUCore, Metadata, Schema, Dublin Core, P-META, Tech 3293, Radio, Television, CCDM

1. Scope

Metadata is essential to broadcasting.

The “EBUCore” set of metadata defined in this specification has been identified as being the minimum information needed to describe radio and television content.

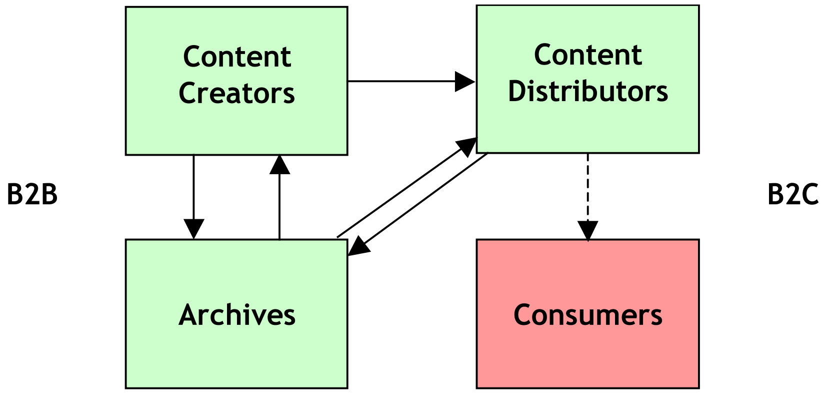


Figure 1: A basic content and metadata workflow

"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 programme 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.

EBUCore takes into account latest developments in the Semantic Web and Linked Open Data communities. EBUCore is available as a 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 (EBU Tech 3351). A RDF/OWL representation of the EBUCore schema is given in Annex B.

The schema structure has been reinforced for registration as EBU's Class 13 in SMPTE. The EBU ontology has been updated to complement the EBU's CCDM (EBU Tech 3351) and improve mapping with other schemas and ontologies.

2. Core Metadata Set

2.1 Introduction

EBUCore is a collection of basic descriptive and technical/strutural metadata elements used to describe audiovisual content as an extension of the Dublin Core. It is directly compatible with the EBU Class Conceptual Data Model (EBU Tech 3351) leading to its compliant 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.

2.2 Documentation

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 Section 6 "Download Zone".

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

The new documentation can be summarised as follows:

- It looks very similar to what was provided in previous versions of the specification, including uml-like diagrams, the semantics of each element and attribute, their cardinality and associated complex types, the localisation 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.

2.3 What is new in EBUCore 1.6

EBUCore 1.6 changes are listed in details in the documentation and can be categorised as follows:

- Additions based on feedback from implementers.
- Additions to facilitate mapping with SMPTECore, PBCore, EUSCreen, Europeana and MediaInfo in which the EBU is directly involved.
- The update of the EBU extended audio model (3D and object audio).

2.4 Tech 3364 - Audio Definition Model (ADM)

The EBU has developed a new definition model that addresses all the richness of audio including 3D binaural 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, programme, accompanying sound tracks by 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.

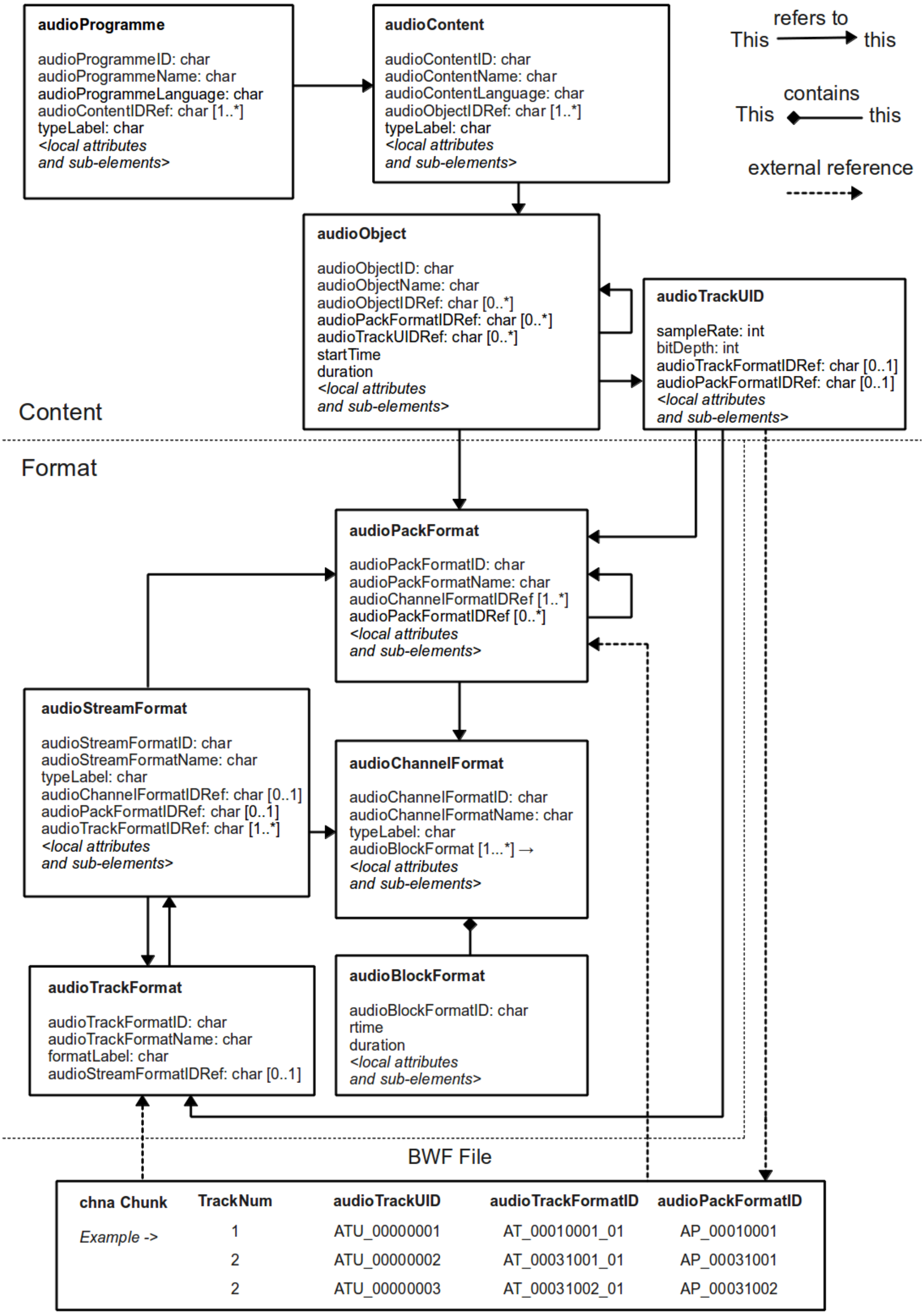
While this model is based around BWF, it is not intended to be solely used for BWF files, but as a more general model. Mappings to MXF streams have also been developed and tested.

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.

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 favour of the new audioFormatExtended element.

The overall diagram of the model is given in Figure 1. This shows how the elements relate to each other and illustrates the split between its content and format parts.

This model has been adopted by the ITU, which is now contributing to its enrichment.



chna Chunk	TrackNum	audioTrackUID	audioTrackFormatID	audioPackFormatID
Example ->	1	ATU_00000001	AT_00010001_01	AP_00010001
	2	ATU_00000002	AT_00031001_01	AP_00031001
	2	ATU_00000003	AT_00031002_01	AP_00031002

Figure 1: Tech 3364 - Audio Definition Model

3. Implementation Guidelines / Questions & Answers

EBUCore has been developed to the attention of users with different needs who can customise their implementation 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.

  Of course, 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 for the purpose of interoperability.

Reference data and controlled vocabularies identified in the specification are proposed by default but can be extended or replaced. In order to maximise 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.

The following sections provide user guidelines, which illustrate the flexibility provided by the EBUCore schema for implementation.

3.1 How do I express titles of a custom type in different languages?

3.1.1 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.

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.

3.1.2 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 ist 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.

3.2 What controlled vocabularies and reference data can I use?

Controlled vocabularies are mainly provided in the form of lists of terms organised 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[1], in the form of a URN[2] or URL[3]) and ‘Alias’ for QNames. EBU namespaces are expressed in accordance to RFC5174[4]. 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”>
```

[1] Unique Resource Identifier - http://tools.ietf.org/html/rfc3986

[2] Unique Resource Namespace - http://tools.ietf.org/html/rfc3986

[3] Unique Resource Locator - http://tools.ietf.org/html/rfc3986

[4] EBU Namespace - http://tools.ietf.org/html/rfc5174

```
                        <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 Organisation System) format using RDF/OWL for use and dereferencing as linked data.

3.3 Video and Audio time point references: anything fixed?

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’ inc. their 'technical parameters', which are the sources providing the AV material for actual realisations.

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.

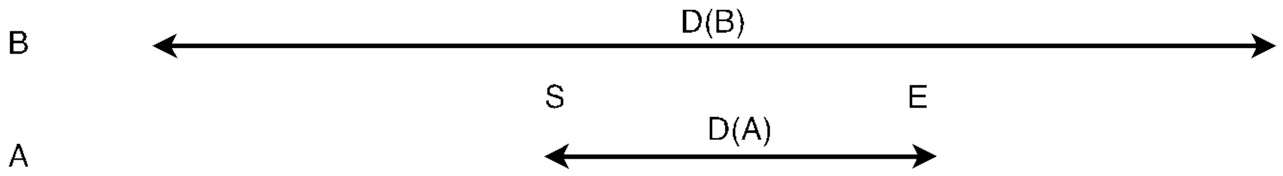


Figure 2: Illustration of a timeline

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.
  - the data type for that is a ISO 8601 duration(e.g. PT1M5.0S) or IETF RFC 3339;
  - 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)
  - this is to be preferred because it ensures that Timeline markers fall on the boundary of the Edit Unit;
  - duration of the EditUnit must be known unambiguously and indicated, otherwise it is better to use the "Elapsed Time".

The two mechanisms mentioned above can also be used to locate the position of an AV-entity on the Timeline of a material source.

However there are contexts, in terms of the type of source, where the information in those terms is not available or it's possibly ambiguous. For instance, identifying the position on a clip within a video-tape in terms of "Elapsed Time" or "Elapsed Units" from the "BOT (Beginning of Tape) is very difficult in practice. The BOT position itself may be not precise enough. In those cases, typically, the position on material source (e.g. the tape) is indicated by the "TimeCode", which is a label recorded together with the EditUnit.

Although the "TimeCode" mechanism doesn't provide any certainty about the uniqueness of the point on the Timeline (the same TimeCode might be repeated) and neither does it provide reliable information on Duration ("TimeCode" is not constrained to be continuous), this is the way on which legacy production systems rely for editing and for saving EDLs (Editing Decision Lists).

This is the reason why EBUCore also supports the indication of TimeCodes for all the cases where the Timeline positioning deals with material sources.

However it is recommended to also provide, if available, the information in terms of elapsed time or edit units.

Alternatively, a user may use the user defined time and duration formats to express time and duration as a number of seconds and fractions of seconds. Other user defined formats can be used.

The pattern used for timecode respects recommendation SMPTE ST 12-1-2008 and supports the use of drop-frame or non-drop-frame timecodes:

```
(([0-1][0-9])|([2][0-3])):[0-5][0-9]:[0-5][0-9](([.,])|([:;]))[0-9]{2,5}
```

3.4 What is the 'part' element? How can I use it?

The 'Part' element was originally introduced to identify 'editorial' segments of content within a media resource. Following work done within the EBU on acquisition metadata, the definition of the 'part' element has been extended to allow any form of partitioned description, editorial or technical, optionally bound to a specific timeline.

Some implementers also use part to sort metadata per category e.g. one or more parts for descriptive metadata, one part for video technical metadata, another for audio technical metadata, etc. This is absolutely in conformance with the EBUCore schema.

The EBU work on the Class Conceptual Data Model (CCDM), tech 3351, has allowed extending the use of 'part' to a business object made of one or more components. For example, EBUCore can be used to describe a series or season, each part describing an episode of that series or season.

The 'part' element is extremely versatile. The following sections illustrate some of these possible implementations. But the use of the 'part' element is not limited to these examples.

An EBUCore xml instance can contains a mix of 'part' elements of different nature, editorial technical or else. It is just a matter for the implementer to figure a coherent identification and name convention to help parsing these elements.

3.4.1 How can I define editorial 'parts' of a media resource?

There are many different editorial reasons why 'parts' (or e.g. segments, sequences, scenes) could be identified within a timeline. For example, content can be split into a set of purposefully constructed sequences designed to facilitate user navigation (e.g. DVD chapters). 'Parts' can also be identified when a particular actor appears (e.g. as the result of face recognition processing or using user labelling). It can also be used to identify, for example, news items (internal, affairs, news report, weather report…) within a news programme.

Two mechanisms allow such 'parts' to be identified and described in EBUCore.

The first solution consists of using the 'part' element, which provides a description of 'parts' (and parts of parts of parts…) within one metadata instance.

The second solution consists of using the 'hasPart' or 'hasTrackPart' relations pointing to objects being described on their own with separate EBUCore metadata instances for each 'part'. This will be the approach followed when using the EBU Core RDF ontology.

3.4.2 How can I use the 'part' element for dynamic technical metadata?

In order to describe the changing value of a technical attribute over time, all that is needed is to identify that the 'Part' element is used for this purpose through an appropriate 'formatId' or 'formatName'. Time segments are defined by sub-parts. The 'format' element contains the value of the technical attribute associated to a 'start', 'end' and/or 'duration' time points.

```
<ebucore:part partId="CameraMetadata">
  <ebucore:part partId="part_CameraMetadata_1">
  <!-- FIRST TIME SEGMENT WITH A PARTICULAR SET OF CAMERA SETTINGS -->
     <ebucore:format>
        <ebucore:start>
           <ebucore:editUnitNumber editRate="60" factorDenominator="1001"
           factorNumerator="1000">200</ebucore:editUnitNumber>
        </ebucore:start>
        <ebucore:duration>
           <ebucore:editUnitNumber editRate="60" factorDenominator="1001"
           factorNumerator="1000">800</ebucore:editUnitNumber>
        </ebucore:duration>
        <ebucore:technicalAttributeString typeLabel="AutoExposureMode"
        typeDefinition="a value from RP224" formatLabel="Universal Label">

        06.0E.2B.34.04.01.01.0B.05.10.01.01.01.02.00.00
        </ebucore:technicalAttributeString>
        <ebucore:technicalAttributeUInt16 typeLabel="ISOSpeed" typeDefinition="ISO12232">
        800</ebucore:technicalAttributeUInt16>
    </ebucore:format>
  </ebucore:part>
  <ebucore:part  partId="part_CameraMetadata_2">
  <!-- SECOND TIME SEGMENT WITH A DIFFERENT SET OF CAMERA SETTINGS -->
    <ebucore:format>
          <ebucore:start>
```

```
            <ebucore:editUnitNumber editRate="60" factorDenominator="1001"
            factorNumerator="1000">1000</ebucore:editUnitNumber>
          </ebucore:start>
          <ebucore:duration>
            <ebucore:editUnitNumber editRate="60" factorDenominator="1001"
            factorNumerator="1000">630</ebucore:editUnitNumber>
          </ebucore:duration>
          <ebucore:technicalAttributeString typeLabel="AutoExposureMode"
          typeDefinition="a value from RP224" formatLabel="Universal Label">
          06.0E.2B.34.04.01.01.0B.05.10.01.01.01.02.00.00
          </ebucore:technicalAttributeString>
          <ebucore:technicalAttributeUInt16 typeLabel="ISOSpeed" typeDefinition="ISO12232">
          1600</ebucore:technicalAttributeUInt16>
      </ebucore:format>
   </ebucore:part>
</ebucore:part>
```

Example - Camera parameter evolution associated to a timeline

Note: Another less verbose solution is being investigated in the EBU-AMWA FIMS project on service oriented architectures, which schema is based on EBUCore.

3.4.3 How can I describe (programme) groups ?

EBUCore fully supports the description of groups and collections using the appropriate relations such as isMemberOf or isEpisodeOf.

Similar mechanisms can be used to identify different parts composing a media resource using e.g. hasPart.

However, it is also possible to use part as syntactically represented in the following xml snippet:

```
<ebuCoreMain xmlns....>
    <coreMetadata>
        <!-- Describe here a series with series title, description, cast, etc.-->
        <!-- define the type / objectType as "series"
        <part partId="season1" partName="season a" typeLabel="Season">
            <!-- describe here the elements characterising a season -->
            <part partId="e1" partName="episode 1" typeLabel="Episode">
                <!-- describe here the episode with title, description, cast incl. e.g.
               guests, etc. -->
            </part>
            <part partId="e2" partName="episode 2" typeLabel="Episode">
                <!-- describe here the episode with title, description, cast incl. e.g.
               guests, etc. -->
            </part>
            <!-- Etc.-->
        </part>
        <!-- Etc.-->
    </coreMetadata>
</ebuCoreMain>
```

Example: description of a series with seasons and episodes

3.4.4 Distributed storage of media resources: where and in which format?

As shown below, there are two built-in mechanisms to describe where are different instantiations of the same editorial objects, possibly in different formats or using different type of storage.

A third option would consists of defining a new relation such as "isInstantiatedBy" establishing the relation between the editorial object described in an EBUCore instances with instantiations described by their own EBUCore instances.

Options 1 - Repeating the format element

```
<ebuCoreMain xmlns=…>
    <coreMetadata>
        <!-- Describe here the editorial objects possibly with associated editorial parts,
        etc.-->
        <!-- Define the type/objectType e.g. as a programme -->
        <format formatId="instance1" formatName="instantiation 1">
            <!-- describe here the format and location of this instantiation -->
            <locator>xxxx</locator>
        </format>
        <format formatId="instance2" formatName="instantiation 2">
            <!-- describe here the format and location of this instantiation -->
            <locator>xxxx</locator>
        </format>
       <!-- Etc. -->
    </coreMetadata>
</ebuCoreMain>
```

Option 2 - Using different 'part' element for each format

```
<ebuCoreMain xmlns=…>
    <coreMetadata>
        <!-- Describe here the editorial objects possibly with associated editorial parts,
        etc.-->
        <!-- Define the type/objectType e.g. as a programme -->
        <part partId="instance1" partName="instantiation 1">
            <format>
                <!-- describe here the format and location of this instantiation -->
                <locator>xxxx</locator>
            </format>
            <!-- describe here the format and location of this instantiation -->
        </part>
        <part partId="instance2" partName="instantiation 2">
            <format>
                <!-- describe here the format and location of this instantiation -->
                <locator>yyyy</locator>
            </format>
        </part>
        <!-- Etc.-->
    </coreMetadata>
</ebuCoreMain>
```

3.4.5 Can I use the 'part' element to fragment my data?

Yes. As an example, some implementers use the part element to clearly separate technical format metadata:

```
<ebuCoreMain xmlns=….>
    <coreMetadata>
        <!-- Optionally describe here the editorial object, not required if the xml
        document only describes an specific instantiation -->
        <format>
            <!-- provide here file and container information -->
            <fileName>filename</fileName>
            <locator>xxxxx</locator>
        </format>
        <part partId="id23" partName="audio format information">
            <format>
                <audioFormatExtended>
                    <!-- describe here the audio format -->

                </audioFormatExtended>
            </format>
        </part>
        <part partId="id34" partName="video format information">
            <format>
                <videoFormat>
                    <!-- describe here the video format -->
                </videoFormat>
            </format>
        </part>
        <!-- Etc.-->
    </coreMetadata>
</ebuCoreMain>
```

This approach can apply in a variety of contexts left to the appreciation of the implementer.

3.5 How can I describe versions of programmes?

There can be many reasons why a programme is declared to be a version of a particular source (e.g. a shorter version, a different language, with or without captioning, but also available on different mediums such as a file, a tape, a disk).

The best approach to identify versions is to use relations such as hasVersion or hasSource. The relation links two instances and their respective descriptions highlighting differences such as given above as examples.

EBUCore provide a rich set of predefined relations. Users can also define their own relation as shown below:

```
 <relation typeLabel="my relation"
           typeDefinition="my type of relation in a few words"
           note="relation for this purpose">
           <dc:relation>isConnectedTo</dc:relation>
 </relation>
```

3.6 How can I use my own technical attributes?

The following example illustrates how to use the technical attribute patterns within EBUCore. The average bitrate can be expressed as:

a. Example of a user defined technicalAttributeString

```
<ebucore:technicalAttributeString typeLabel="averageBitrate" typeDefinition="the average
bitrate" formatLabel="integer">123456789</ebucore:technicalAttributeString>
```

b. Example of a user defined a technicalAttributeLong

```
<ebucore:technicalAttributeLong typeLabel="myCustomTechnicalParameter">123456789
</ebucore:technicalAttributeLong>
```

The choice is left to the implementer within his domain of interoperability. Some implementations use only the technicalAttributeString, which allows defining/replacing all simple datatypes with only one structure. It can also be used for more complex datatypes such as the technicalAttributeRational structure by defining a template in the format attribute, etc.

Some pre-defined technical attributes may be replaced by user defined attributes if required by the format of the data available to the implementer.

3.7 How do I apply loudness?

Documents EBU Tech 3343 and EBU R 128 establish a predictable and well-defined method to measure the loudness level for news, sports, advertisements, drama, music, promotions, film etc. throughout the broadcast chain and thereby helps professionals to create robust specifications for ingest, production, play-out and distribution to a multitude of platforms. EBU R 128 is based entirely on open standards and aims to harmonise the way we produce and measure audio internationally.

The audioFormatExtended element specifies precisely how and where to apply loudness.

3.8 How can I tag content in EBUCore?

It is now common to 'tag' content. Tags can be issued by professionals like content creators or content providers, or by users.

In EBUCore, tags are defined as 'subjects' of typeLabel="tag" issued by 'attributors' (persons or organisations).

3.9 How can I differentiate locators?

The locator attribute in format now has a type attribute to specify what the locator is being used for. A locator can point to an object of typeLabel "resource", "thumbnail", "landing page", etc.

Relations can also be used to point to related external objects.

3.10 How can I associate a format and rights to a publication event?

The publicationHistory lists the publication events of a media resource. This allows indicating, when, where, in which format and under which rights the media resource has been published.

The format attribute now has an associated formatId attribute of type ID, which can be referenced to from the publication event formatIdRef attribute. This allows indicating which format is being used for a particular publication.

The same applies to rights using the rightsID and associated rightsIDREFS.

3.11 When do I use labels and/or links in type/format/status ?

Several EBUCore elements and attributes propose to define their value through a "label" and/ or a "link". Links can be used to define a relationship in the sense of linked data. A typical case of linked data consists of pointing to classification scheme term via its identifier.

However, when available, the corresponding term of value should also be provided as a 'label' to facilitate mapping.

3.12 Can I provide e.g. a display or print name in contactDetails?

A display or print name can easily be implemented as follows:

```
<contactDetails>
   <name typeLabel="Display name">
     Mr. Best Guest for display
   </name>
   <name typeLabel="Print name">
     Mr. Best Guest for print
   </name>
</contactDetails>
```

3.13 Can I provide contactDetails for a group or ensemble?

For groups, ballets or similar non individual formation, you can use contactDetails with typeLabel=“ music group, orchestra dancing team, ballet team or e.g. individual" (real person by default but can be fictitious). Then use “name” to provide the name of the group, orchestra, dancing team, ballet team or individual.

You can use the other more structured way for detailing names for persons either real or fictitious (there are web resource describing the bio and life of fictitious characters). Then you can now use a link to web resource with related information, which can be of any type optionally specified.

Another option would be to use organisationDetails in the same way for groups and then use contactDetails for members of the group.

3.14 Are there examples of implementation of the new audio model?

Examples of implementation of the new EBU extended audio model implemented in the EBUCore schema through the audioFormatExtended element can be found in Annex C and in the audio model specification Tech 3364.

Tech 3364 provide more details on the audio model incl. examples on its mapping to BWF and MXF.

The extended audio model is build around a set of relations. These relations are clearly identified through the use of a naming convention by which elements or attributes contains 'ID', 'IDREF', 'IDREFS'. In xml, IDREF and IDREFS pair with ID to establish a relation. This can be implemented in two ways:

- xml Schema define datatypes for ID, IDREF and IDREFS. If these datatypes are used, relations must be established within the same metadata instance file, which can be seen as a design restriction but provides strong validation support.
- EBUCore doesn't use ID, IDREF and IDREFS datatypes but anyURI. This allows establishing relations across metadata instance files (e.g. allowing to separate a content description from the structural description of the audio model components, or to constitute external libraries of audio configurations). Of course, this requires that an implementer pays particular attention to the pairing of URIs, which is facilitated by the naming convention used for related elements and attributes in the EBUCore schema.

3.15 How can I extend a schedule beyond midnight?

It is common practice that a day schedule starts for example at around 6 O'clock in the morning and finishes at around the same time on the following day. The following xml snippet shows how it should be done instantiating the EBUCore schema.

```
<publicationEvent>
    <publicationDate>2014-03-12</ns2:publicationDate>
    <publicationTime>01:00:00</ns2:publicationTime>
    <scheduleDate>2014-03-11</ns2:scheduleDate>
    <publicationService…
</publicationEvent>
```

In this example, a programme is broadcast a 1 O'clock in the morning on 12th March 2014, but this publication event belong to the schedule of 11th March 2014.

3.16 targetAudience, audienceLevel and audienceRating?

Originally, targetAudience has been the common placeholder for audience rating and audience level as defined also by MPEG-7 and TV-Anytime. However, for the sake of harmonisation with North-American best practice, the audienceLevel element has been added as a sub-element of ebucore:type. It is recommended to use targetAudience or audienceLevel to identify age and population groups.

The element audienceRating has also been added for the sake of harmonisation. It shall be used to define an audience appropriate to the programme. The EBU Classification Scheme for audience rating has been deprecated. The EBU now recommends the use of http://www.movielabs.com/md/ratings/v2.0/html/Summary.html for ratings.

3.17 When should I use rating?

Rating can be used to rate content (e.g. ‘like’ or ‘not like’ or using custom scales). Rating can be provided by users or organisations.

3.18 How do I provide annotation along a timeline?

Use a part element with a timestamp and a description of type annotation with an attributor.

3.19 How do I map mxf video and audio tracks to EBUCore?

The following is an example of technical metadata extracted from a UK DPP AS-11 MXF file and converted into EBUCore using mediaInfo (https://mediaarea.net/fr/MediaInfo).

```
<ebucore:coreMetadata>
      <ebucore:title typeLabel="PROGRAMME TITLE">
            <dc:title>Programme Title - Post Watershed Version</dc:title>
      </ebucore:title>
      <ebucore:alternativeTitle typeLabel="SERIES TITLE">
            <dc:title>Series Title</dc:title>
      </ebucore:alternativeTitle>
      <ebucore:alternativeTitle typeLabel="EPISODE TITLE NUMBER">
            <dc:title>Episode Title / Number</dc:title>
      </ebucore:alternativeTitle>
      <ebucore:description typeLabel="SYNOPSIS">
            <dc:description>DPP test material</dc:description>
      </ebucore:description>
      <ebucore:description typeLabel="PRODUCT PLACEMENT">
            <dc:description>false</dc:description>
      </ebucore:description>
      <ebucore:contributor>
            <ebucore:contactDetails>
                  <ebucore:details>
                        <ebucore:emailAddress>xxx.yyy@bbc.co.uk</ebucore:emailAddress>
                        <ebucore:telephoneNumber>0208 008 4566</ebucore:telephoneNumber>
                  </ebucore:details>
```

```
        </ebucore:contactDetails>
        <ebucore:role typeLabel="contact"/>
    </ebucore:contributor>
    <ebucore:contributor>
        <ebucore:organisationDetails>
            <ebucore:organisationName>BBC R&D</ebucore:organisationName>
        </ebucore:organisationDetails>
        <ebucore:role typeLabel="originator"/>
    </ebucore:contributor>
    <ebucore:date>
        <ebucore:copyrighted startYear="2013"/>
    </ebucore:date>
    <ebucore:type>
        <ebucore:genre typeDefinition="Test Material"/>
    </ebucore:type>
    <ebucore:format>
        <ebucore:videoFormat videoFormatName="AVC">
            <ebucore:width unit="pixel">1920</ebucore:width>
            <ebucore:height unit="pixel">1080</ebucore:height>
            <ebucore:frameRate factorNumerator="25000"
            factorDenominator="1000">25</ebucore:frameRate>
            ebucore:aspectRatio typeLabel="display">
                <ebucore:factorNumerator>16</ebucore:factorNumerator>
                <ebucore:factorDenominator>9</ebucore:factorDenominator>
            </ebucore:aspectRatio>
            <ebucore:videoEncoding typeLabel="High 4:2:2 Intra@L4.1"/>
            <ebucore:codec>
                <ebucore:codecIdentifier>
                    <dc:identifier>0D01030102106001-
                    0401020201323102</dc:identifier>
                </ebucore:codecIdentifier>
            </ebucore:codec>
            <ebucore:bitRate>113664000</ebucore:bitRate>
            <ebucore:scanningFormat>interlaced</ebucore:scanningFormat>
            <ebucore:scanningOrder>top</ebucore:scanningOrder>
            <ebucore:videoTrack trackId="1001" trackName="V1"/>
            <ebucore:technicalAttributeString
            typeLabel="ActiveFormatDescription">5</ebucore:technicalAttributeString>
            <ebucore:technicalAttributeString
            typeLabel="Standard">Component</ebucore:technicalAttributeString>
            <ebucore:technicalAttributeString
            typeLabel="ColorSpace">YUV</ebucore:technicalAttributeString>
            <ebucore:technicalAttributeString
            typeLabel="ChromaSubsampling">4:2:2</ebucore:technicalAttributeString>
            <ebucore:technicalAttributeString
            typeLabel="colour_primaries">BT.709</ebucore:technicalAttributeString>
            <ebucore:technicalAttributeString
            typeLabel="transfer_characteristics">BT.709
            </ebucore:technicalAttributeString>
            <ebucore:technicalAttributeString typeLabel="matrix_coefficients">BT.709
            </ebucore:technicalAttributeString>
            <ebucore:technicalAttributeString
            typeLabel="colour_range">Full</ebucore:technicalAttributeString>
            <ebucore:technicalAttributeInteger
            typeLabel="StreamSize">11700924815</ebucore:technicalAttributeInteger>
            <ebucore:technicalAttributeInteger
            typeLabel="BitDepth">10</ebucore:technicalAttributeInteger>
            <ebucore:technicalAttributeBoolean
            typeLabel="CABAC">false</ebucore:technicalAttributeBoolean>
            <ebucore:technicalAttributeBoolean
            typeLabel="MBAFF">true</ebucore:technicalAttributeBoolean>
            <ebucore:comment typeLabel="VideoComments">RP 2027 AVC-Intra compatible
            encoded</ebucore:comment>
        </ebucore:videoFormat>
        <ebucore:audioFormat audioFormatName="PCM">
            <ebucore:audioEncoding typeLabel="PCM"/>
            <ebucore:codec>
                <ebucore:codecIdentifier>
                    <dc:identifier>0D01030102060100</dc:identifier>
                </ebucore:codecIdentifier>
            </ebucore:codec>
            <ebucore:audioTrackConfiguration typeLabel="EBU R 123: 16c"/>
            <ebucore:samplingRate>48000</ebucore:samplingRate>
            <ebucore:sampleSize>24</ebucore:sampleSize>
            <ebucore:bitRate>1152000</ebucore:bitRate>
            <ebucore:bitRateMode>constant</ebucore:bitRateMode>
            <ebucore:audioTrack trackId="2001" trackName="A1"/>
            <ebucore:channels>1</ebucore:channels>
            <ebucore:technicalAttributeString typeLabel="ChannelPositions">
            Front: L</ebucore:technicalAttributeString>
            <ebucore:technicalAttributeString typeLabel="ChannelLayout">L
            </ebucore:technicalAttributeString>
            <ebucore:technicalAttributeString
            typeLabel="Endianness">Little</ebucore:technicalAttributeString>
            <ebucore:technicalAttributeString typeLabel="Wrapping">Frame (BWF)
            </ebucore:technicalAttributeString>
            <ebucore:technicalAttributeInteger
            typeLabel="StreamSize">118431360</ebucore:technicalAttributeInteger>
        </ebucore:audioFormat>
        <!—-other audio channel formats-->
        <ebucore:containerFormat containerFormatName="MXF">
            <ebucore:containerEncoding formatLabel="MXF"/>
            <ebucore:technicalAttributeString typeLabel="AS11ShimName">UK DPP HD
            </ebucore:technicalAttributeString>
            <ebucore:technicalAttributeString typeLabel="AS11ShimVersion">1.1
            </ebucore:technicalAttributeString>
            <ebucore:technicalAttributeString typeLabel="FormatProfile">OP-1a
            </ebucore:technicalAttributeString>
            <ebucore:technicalAttributeString typeLabel="FormatSettings">Closed /
            Complete</ebucore:technicalAttributeString>
            <ebucore:technicalAttributeString
            typeLabel="WrittingApplication">
            BBC bmx 0.1.2.0.2</ebucore:technicalAttributeString>
            <ebucore:technicalAttributeString typeLabel="WrittingLibrary">BBC bmx
            0.1.2.0.2</ebucore:technicalAttributeString>
        </ebucore:containerFormat>
        <ebucore:signingFormat signingPresenceFlag="false"/>
        <ebucore:dataFormat>
            <ebucore:captioningFormat captioningPresenceFlag="false"
            closed="true"/>
        </ebucore:dataFormat>
        <ebucore:dataFormat>
            <ebucore:captioningFormat captioningPresenceFlag="false"
            closed="false"/>
        </ebucore:dataFormat>
        <ebucore:timecodeFormat timecodeFormatName="MXF TC">
            <ebucore:timecodeStart typeLabel="Material">
                <ebucore:timecode>09:59:30:00</ebucore:timecode>
            </ebucore:timecodeStart>
            <ebucore:timecodeTrack trackId="901" trackName="MXF_TC"/>
            <ebucore:technicalAttributeBoolean typeLabel="Stripped">
            true</ebucore:technicalAttributeBoolean>
        </ebucore:timecodeFormat>
        <ebucore:timecodeFormat timecodeFormatName="MXF TC">
            <ebucore:timecodeStart typeLabel="Source">
                <ebucore:timecode>09:59:30:00</ebucore:timecode>
            </ebucore:timecodeStart>
            <ebucore:timecodeTrack trackId="901" trackName="MXF_TC"/>
            <ebucore:technicalAttributeBoolean typeLabel="Stripped">
                true</ebucore:technicalAttributeBoolean>
        </ebucore:timecodeFormat>
        <ebucore:metadataFormat metadataFormatName="AS-11 Core">
            <ebucore:metadataTrack trackName="AS-11 Core" trackId="3001"/>
        </ebucore:metadataFormat>
        <ebucore:metadataFormat metadataFormatName="AS_11_Segmentation">
            <ebucore:metadataTrack trackName="AS_11_Segmentation"
            trackId="3002"/>
        </ebucore:metadataFormat>
        <ebucore:metadataFormat metadataFormatName="AS_11_UKDPP">
            <ebucore:metadataTrack trackName="AS_11_UKDPP" trackId="3101"/>
        </ebucore:metadataFormat>
        <ebucore:start typeLabel="LineUpStart">
```

```
                    <ebucore:timecode>09:59:30:00</ebucore:timecode>
             </ebucore:start>
             <ebucore:start typeLabel="IdentClockStart">
                    <ebucore:timecode>09:59:50:00</ebucore:timecode>
             </ebucore:start>
             <ebucore:duration>
                    <ebucore:normalPlayTime>PT13M42.440S</ebucore:normalPlayTime>
             </ebucore:duration>
             <ebucore:duration typeLabel="TotalProgrammeDuration">
                    <ebucore:timecode>09:59:50:00</ebucore:timecode>
             </ebucore:duration>
             <ebucore:fileSize>13597677029</ebucore:fileSize>
             <ebucore:fileName>AS11_DPP_HD_EXAMPLE_1.mxf</ebucore:fileName>
             <ebucore:locator>E:\MediaInfoLib_CrashTest\Nominal\Multiple\MXF\AS-
             11\AS11_DPP_HD_EXAMPLE_1.mxf</ebucore:locator>
             <ebucore:technicalAttributeString typeLabel="AudioLoudnessStandard">EBU
             R 128</ebucore:technicalAttributeString>
             <ebucore:technicalAttributeInteger typeLabel="OverallBitRate">
             132266690</ebucore:technicalAttributeInteger>
             <ebucore:dateCreated startDate="2014-02-18" startTime="14:28:14Z"/>
       </ebucore:format>
       <ebucore:identifier typeLabel="PRODUCTION NUMBER">
             <dc:identifier>DRAZ855R/01</dc:identifier>
       </ebucore:identifier>
       <ebucore:language typeLabel="PrimaryAudioLanguage">
             <dc:language>eng</dc:language>
       </ebucore:language>
       <ebucore:language typeLabel="ProgrammeTextLanguage">
             <dc:language>eng</dc:language>
       </ebucore:language>
       <ebucore:part partNumber="1" partTotalNumber="1">
             <ebucore:partStartTime>
                    <ebucore:timecode>10:00:00:00</ebucore:timecode>
             </ebucore:partStartTime>
             <ebucore:partDuration>
                    <ebucore:timecode>00:13:06:00</ebucore:timecode>
             </ebucore:partDuration>
       </ebucore:part>
</ebucore:coreMetadata>
```

3.20 *How do I map mpeg video and audio tracks to EBUCore?*

The following is an example of technical metadata extracted from an mpeg transport stream (TS) file and converted into EBUCore using mediaInfo (https://mediaarea.net/fr/MediaInfo).

```
<ebucore:format>
       <ebucore:videoFormat videoFormatName="MPEG Video" videoFormatVersionId="Version 2">
             <ebucore:width unit="pixel">720</ebucore:width>
             <ebucore:height unit="pixel">576</ebucore:height>
             <ebucore:framerate factorNumerator="25000"
             factorDenominator="1000">25</ebucore:frameRate>
                    <ebucore:aspectRatio typeLabel="display">
                           <ebucore:factorNumerator>4</ebucore:factorNumerator>
                           <ebucore:factorDenominator>3</ebucore:factorDenominator>
                    </ebucore:aspectRatio>
                    <ebucore:videoEncoding typeLabel="MPEG-2 Video Main Profile @ Main
                   Level"/>
             <ebucore:codec>
                   <ebucore:codecIdentifier>
                          <dc:identifier>2</dc:identifier>
                   </ebucore:codecIdentifier>
             </ebucore:codec>
             <ebucore:bitRate>3614266</ebucore:bitRate>
             <ebucore:bitRateMax>15000000</ebucore:bitRateMax>
             <ebucore:scanningFormat>interlaced</ebucore:scanningFormat>
             <ebucore:scanningOrder>top</ebucore:scanningOrder>
             <ebucore:videoTrack trackId="120"/>
       </ebucore:videoFormat>
       <ebucore:audioFormat audioFormatName="MPEG Audio" audioFormatVersionId="Version 1">
       <ebucore:audioEncoding typeLabel="MPEG-1 Audio Layer II"
       typeLink="http://www.ebu.ch/metadata/cs/ebu_AudioCompressionCodeCS.xml#7.2"/>
       <ebucore:codec>
             <ebucore:codecIdentifier>
                    <dc:identifier>4</dc:identifier>
             </ebucore:codecIdentifier>
       </ebucore:codec>
       <ebucore:samplingRate>48000</ebucore:samplingRate>
       <ebucore:bitRate>256000</ebucore:bitRate>
       <ebucore:bitRateMode>constant</ebucore:bitRateMode>
       <ebucore:audioTrack trackId="130" trackLanguage="fr"/>
       <ebucore:channels>2</ebucore:channels>
</ebucore:audioFormat>
<ebucore:audioFormat audioFormatName="AC-3">
       <ebucore:audioEncoding typeLabel="AC3"/>
             <ebucore:codec>
                    <ebucore:codecIdentifier>
                          <dc:identifier>6</dc:identifier>
                    </ebucore:codecIdentifier>
             </ebucore:codec>
          </ebucore:audioEncoding>
                 <ebucore:audioTrackConfiguration typeLabel=">Front: L C R, Side: L R "/>
                 <ebucore:samplingRate>48000</ebucore:samplingRate>
                 <ebucore:sampleSize>16</ebucore:sampleSize>
                 <ebucore:bitRate>384000</ebucore:bitRate>
                 <ebucore:bitRateMode>constant</ebucore:bitRateMode>
                 <ebucore:audioTrack trackId="131" trackLanguage="fr"/>
                 <ebucore:channels>5</ebucore:channels>
          </ebucore:audioFormat>

         <!—other audio channels and associated formats→

         <ebucore:containerFormat formatLabel="MPEG-TS"/>
         <ebucore:dataFormat dataFormatName="Teletext" dataTrackId="140-100">
             <ebucore:subtitlingFormat subtitlingFormatName="Teletext" trackId="140-
             100" language="fr"/>
         </ebucore:dataFormat>
         <ebucore:dataFormat dataFormatName="Teletext Subtitle" dataTrackId="140-888">
              <ebucore:subtitlingFormat subtitlingFormatName="Teletext Subtitle"
              trackId="140-888" language="fr"/>
         </ebucore:dataFormat>
         <ebucore:dataFormat dataFormatName="DVB Subtitle" dataTrackId="150">
              <ebucore:subtitlingFormat subtitlingFormatName="DVB Subtitle"
              trackId="150" language="fr"/>
         </ebucore:dataFormat>
         <ebucore:duration>
              <ebucore:normalPlayTime>PT34.171S</ebucore:normalPlayTime>
         </ebucore:duration>
         <ebucore:fileSize>19188488</ebucore:fileSize>
         <ebucore:fileName>E:\MediaInfo_EbuCore_File1.ts</ebucore:fileName>
</ebucore:format>
```

3.21 How do implement EIDR in EBUCore?

As defined in collaboration with EIDR, this is how it is recommended to encode EIDR identifiers into EBUCore metadata instances:

```
<ebucore:identifier typeLabel="EIDR"
    typeLink="http://www.ebu.ch/metadata/cs/ebu_IdentifierTypeCodeCS.xml#3.11">
    <dc:identifier>10.5240/7791-8534-2C23-9030-8610-5</dc:identifier>
</ebucore:identifier>
```

```
Term 3.11 points to the EBU Classification Scheme for identifiers containing the following
information:

<Term termID="3.11">
  <Name xml:lang="en">EIDR</Name>
  <Definition xml:lang="en">
    Canonical Representation of an Entertainment Identifier Registry
    (EIDR) Identifier, a universal unique identifier for movie and television assets.
  </Definition>
  <Reference>Section 2.2 of EIDR: ID FORMAT</Reference>
  <ChangeComment>Clarified that the Canonical Representation is used.</ChangeComment>
  <ChangeVersionDate>2015-05-05</ChangeVersionDate>
  <ValidityFlag>1</ValidityFlag>
  <Link xml:lang="en">
    <URL>http://eidr.org/documents/EIDR_ID_Format_v1.2.pdf</URL>
    <LinkName>EIDR: ID FORMAT</LinkName>
  </Link>
</Term>
```

3.22 How to define a checksum for insertion in BWF chunks?

As defined in collaboration with “The Music Producers Guild” this is how it is recommended to represent checksums in an EBUCore snippet for insertion in BWF metadata chunks.

```
<format>
  <hash>
     <hashValue>
        d131dd02c5e6eec4 693d9a0698aff95c 2fcab58712467eab 4004583eb8fb7f89
        55ad340609f4b302 83e488832571415a 085125e8f7cdc99f d91dbdf280373c5b
        d8823e3156348f5b ae6dacd436c919c6 dd53e2b487da03fd 02396306d248cda0
        e99f33420f577ee8 ce54b67080a80d1e c69821bcb6a88393 96f9652b6ff72a70
     </hashValue>
     </hashFunction typeLabel="MD5" typeLink="http://dbpedia.org/page/MD5">
  </hash>
</format>
```

3.23 How do I map EBUCore xml to EBUCore rdf?

The EBUCore schema inherently addresses the classes and properties that can be found in EBUCore RDF.

An EBUCore description is about content i.e. a programme, a group of programme or else. Several of these types of programmes are predefined in the ontology as subclasses of the EditorialObject. Descriptive metadata such as e.g. title or description are associated with the EditorialObject.

Each EditorialObject is instantiated into MediaResources and Essences. This corresponds to what is described in the format element of the EBUCore schema, including all technical properties. The EBUCore schema allows describing the different formats in which content is available, which would correspond to different MediaResources or Essences.

Other ontology classes that can be found in the ontology are entities (persons/contacts and organisations), events, locations, etc.

In order to facilitate future mappings, it is recommended to associate identifiers as early in the process as possible and when applicable to formats/@formatId, entities/@entityId, locations/@locationId, events/@eventId, etc. This will be useful when defining URIs to identify instances of classes in RDF.

3.24 More questions?

The guidelines and questions presented in this specification address queries received from a variety of EBUCore implementers. EBUCore can sustain more scenarios.

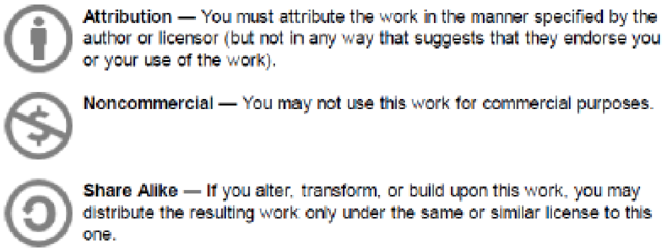
If you have additional questions on how to use EBUCore, please forward your queries to metadata@ebu.ch. You will receive personalised advice and answers will enrich this section of the EBUCore specification, with your permission.

4. Compliance

EBUCore doesn't pretend to cover everyone's needs in details. EBUCore is an open framework allowing each user to adapt it to his own needs!

EBUCore is governed by Creative Commons' Attribution-NonCommercial-ShareAlike3.0 Unported(CC BY-NC-SA 3.0).

You are free: *to Share*—to copy, distribute and transmit the work *to Remix*—to adapt the work inc. under your own namespace under the following conditions:



Attribution — You must attribute the work in the manner specified by the author or licensor (but not in any way that suggests that they endorse you or your use of the work).

Noncommercial — You may not use this work for commercial purposes.

Share Alike — If you alter, transform, or build upon this work, you may distribute the resulting work only under the same or similar license to this one.

Noncommercial: EBUCore can be adapted and integrated into commercial products but shall not be subject to a specific financial license.

EBUCore is flexible and adaptable in nature. For example, thanks to the extended nature of the 'Part' element, description can be implemented in different ways. Each implementer will define best practice, inc. additional compliance rules specific to its implementation and own domain of interoperability.

5. Maintenance

The EBU Core Metadata Set is maintained by the EBU and suggestions for corrections or additions can be made by mailing to (metadata@ebu.ch).

Contributions will be subject to peer review by the metadata experts participating in EBU metadata Strategic Programmes and projects (http://tech.ebu.ch/groups/mim).

6. Download Zone

Filename	Doc. Description	Contents
ebucore.zip	XML Schema	EBU_CORE.xsd , xml.xsd, simpledc20021212.xsd
ebucoredoc.zip	HTML documentation	Unzip in a folder of your choice, open EBU_CORE.html and navigate through the dynamic schema documentation.
https://www.ebu.ch/metadata/cs/EBU_cs_p.zip	EBU Classification Schemes	periodically updated list of EBU Classification Schemes
https://www.ebu.ch/metadata/ontologies/ebucore/ebucore.rdf https://www.ebu.ch/metadata/ontologies/ebucore/ (html documentation)	RDF/OWL Schema	ebucore.rdf
https://www.ebu.ch/metadata/ontologies/skos/EBU_cs_skos_p.zip	EBU SKOS Classification Schemes	Periodically updated list of EBU Classification Schemes in RDF

7. Useful links

AES (http://www.aes.org)

Dublin Core (http://dublincore.org)

EBU Metadata (http://tech.ebu.ch/metadata/)

EBU Loudness (http://tech.ebu.ch/docs/tech/tech3343.pdf)

EBU BWF (http://tech.ebu.ch/docs/tech/tech3285.pdf)

EBU ADM (http://tech.ebu.ch/docs/tech/tech3364.pdf)

EUScreen (http://www.euscreen.eu)

FIMS (http://wiki.amwa.tv/ebu, http://fims.tv)

IOC - International Olympic Committee (http://www.olympic.org/uk/sports/)

W3C SKOS (http://www.w3.org/2004/02/skos/)

ISO (http://www.iso.org)

ISO 4217 - Currency codes:
http://www.iso.org/iso/en/prods-services/popstds/currencycodeslist.html

ISO 3166-1 - Country codes (English):
http://www.iso.ch/iso/en/prods-services/iso3166ma/02iso-3166-code-lists/list-en1.html

ISO 3166-1 - Country codes (French):
http://www.iso.ch/iso/en/prods-services/iso3166ma/02iso-3166-code-lists/list-fr1.html

ISO 639 - Language codes : http://www.loc.gov/standards/iso639-2/

IETF

RFC 3339 (Date and time on the Internet): http://tools.ietf.org/html/rfc3339

RFC5174 (EBU namespace): http://tools.ietf.org/html/rfc5174

IANA MIME Type: http://www.iana.org/assignments/media-types/

Thesaurus of Geographic Names: http://www.getty.edu/research/tools/vocabulary/tgn/index.html

8. Bibliography

- EBU Technical Information I36-2003 – Metadata Implementation considerations for Broadcasters
- EBU Tech 3293-2001 – Core Metadata Set for Radio Archives
- EBU Tech 3295 – P-META Metadata Library
- EBU Tech 3343 - Practical guidelines for Production and Implementation of EBU R 128
- EBU Tech 3351 - Class Conceptual Data Model
- EBU Tech 3364 - Audio Definition Model (ADM)

Annex A: EBUCore Metadata Set Schema

The EBUCore Metadata schema is used to generate compliant EBUCore Metadata instances formed of an ebuCoreMain document.

The ebuCoreMain document contains several attributes required to contribute to OAI (Open Archive Initiative) for metadata harvesting. These attributes include the name of the schema (in case the schema location urn would not be present), the version of the schema used to generate the document, the date and time of last modification of the document and a unique identifier associated to the document. The name of the contributing archive is given by the metadata provider’s organisation name or ID.

Resource related information is provided by instantiating the coreMetadata element.

The reference schema is available from the download links in § 6 (Download Zone) of this document.

Annex B: EBUCore and Semantic Web

The EBUCore RDF/OWL schema (so called EBUCore ontology) is a semantic alternative to the EBUCore XML schema. The EBUCore ontology has been designed to provide classes and properties in complement to the minimum set defined in the EBU Class Conceptual Data Model (Tech 3351 - CCDM). The business object and resource names have been selected to offer maximum harmonisation with other related ontologies. The hierarchy of the EBUCore RDF class model reflects the audiovisual objects that can be met in audiovisual production. The ontology offers all the properties defined in EBUCore XML schema still providing additional expressivity.

The EBUCore RDF ontology can be accessed from this location as a permanent dereferencable resource: http://www.ebu.ch/metadata/ontologies/ebucore/. The server has been setup to allow client requests for xml/rdf or html content with a priority to the documentation.

- If your application makes use of RDF content, set the request to accept xml/rdf content. In this case, a URI like http://www.ebu.ch/metadata/ontologies/ebucore/ebucore#targetAudience, the rdf file will be opened. The EBU server is set to provide access to the html documentation (see below).
- The link http://www.ebu.ch/metadata/ontologies/ebucore/ebucore.rdf gives a direct access to the rdf file.
- If the client is set to accept html requests, http://www.ebu.ch/metadata/ontologies/ebucore/ebucore#targetAudience will be transformed into http://www.ebu.ch/metadata/ontologies/ebucore/index.html #targetAudience and an access will be provided to the ontology html documentation.The link http://www.ebu.ch/metadata/ontologies/ebucore/ gives a direct access to the html documentation.

More information on server setups can be found at the following address (Best Practice Recipes for Publishing RDF Vocabularies):

http://www.w3.org/TR/swbp-vocab-pub/

The EBU server has been setup following Recipe 3 with a default to the html documentation.

The EBUCore ontology has been designed to use "cool URIs" with "hash namespaces".

Important Notes:

- The EBUCore ontology is now only RDF, which allows to instantiate properties with resources or literals. This approach offers greatly interoperability with various communities.
- SubClasses inherit properties from upper classes;
- Custom classes can be added;
- Custom properties can also be added but adding classes and using predefined EBUCore properties is recommended;
- Ids are intrinsic properties of classes (defined by their URIs);
- Types, formats, status (see the attribute groups in the XML schema) shall be implemented

Page intentionally left blank. This document is paginated for two sided printing

through the definition of sub-classes (e.g. manufacturer would be defined as a sub-class of organisation if the defined as such in the organisation typeGroup attributes);

- Terms that can be derived from Classification Schemes, such as Genre or Role, shall be treated as Classes. If expressed in SKOS, such Classes are sub-classes of the SKOS Concept Class. If a term identifier (e.g. a SKOS Concept) is not available, additional properties associated to the Class can be used through a blank node. The EBUCore imports the SKOS ontology. In this implementation, e.g. Genre is declared as a subclass of skos:Concept.

http://www.ebu.ch/metadata/ontologies/ebucore/

The EBUCore RDF ontology is referenced as a Linked Open Vocabulary (Linked Open Vocabulary) (http://lov.okfn.org/dataset/lov/vocabs/ebucore) and also as RDF-Vocab for Ruby developers (https://github.com/ruby-rdf/rdf-vocab).

Figure B.1 below shows a simplified overall representation of the EBUCore ontology class model.

The EBUCore RDF/OWL schema and EBU Classification Schemes in SKOS/RDF are available from the 'download zone' of the specification.

The EBUCore RDF/OWL including SKOS can be accessed from:

http://www.ebu.ch/metadata/ontologies/ebucore_skos/

Different tools offer different levels of documentation, each with their own value added features. The EBUCore documentation is available in two forms:

- Protégé documentation
  https://www.ebu.ch/metadata/ontologies/ebucore/index.html

- TopBraid documentation
  https://www.ebu.ch/metadata/ontologies/ebucore_skos/index.html

Note : The two URLs above refer to the same ontology that imports SKOS and map to several ontologies as graphically illustrated here: http://lov.okfn.org/dataset/lov/vocabs/ebucore.

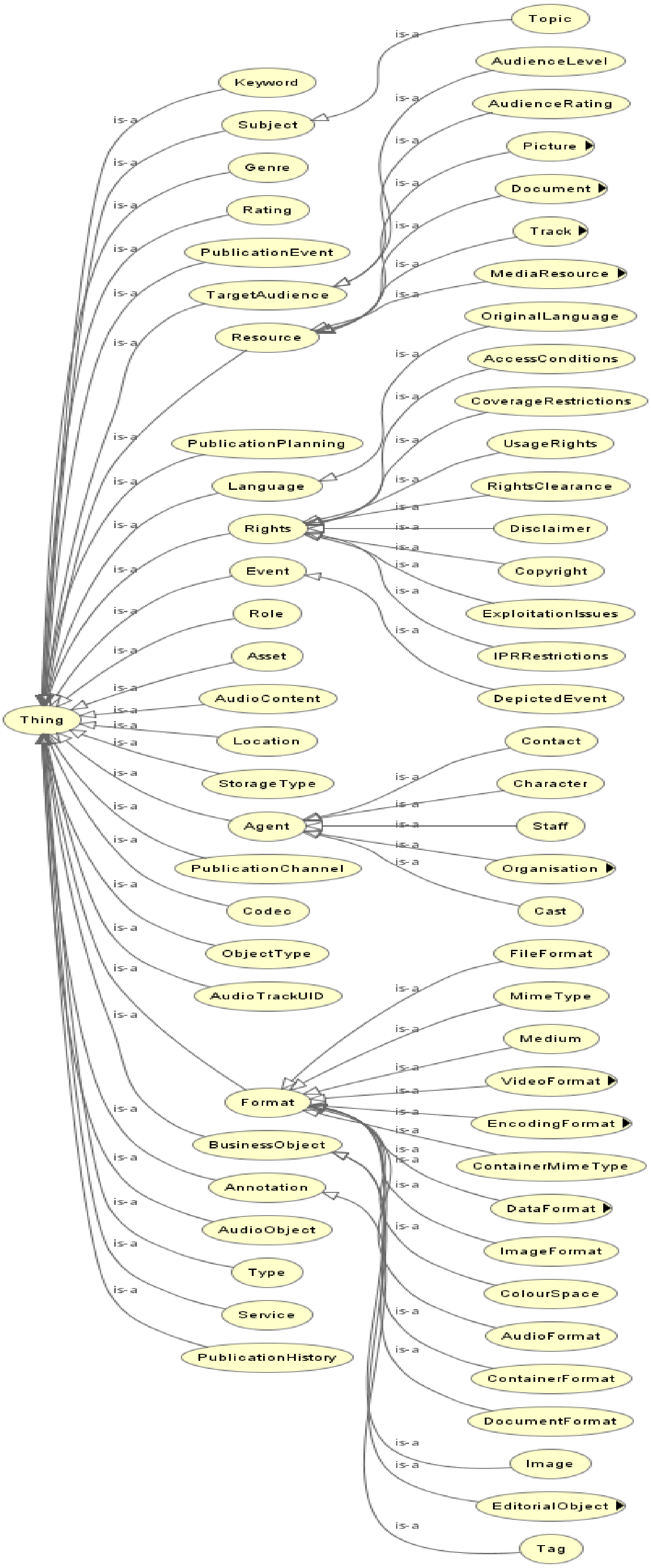


Figure B.1: EBUCore ontology

Page intentionally left blank. This document is paginated for two sided printing

Annex C: Applying Tech 3364's data model in EBUCore

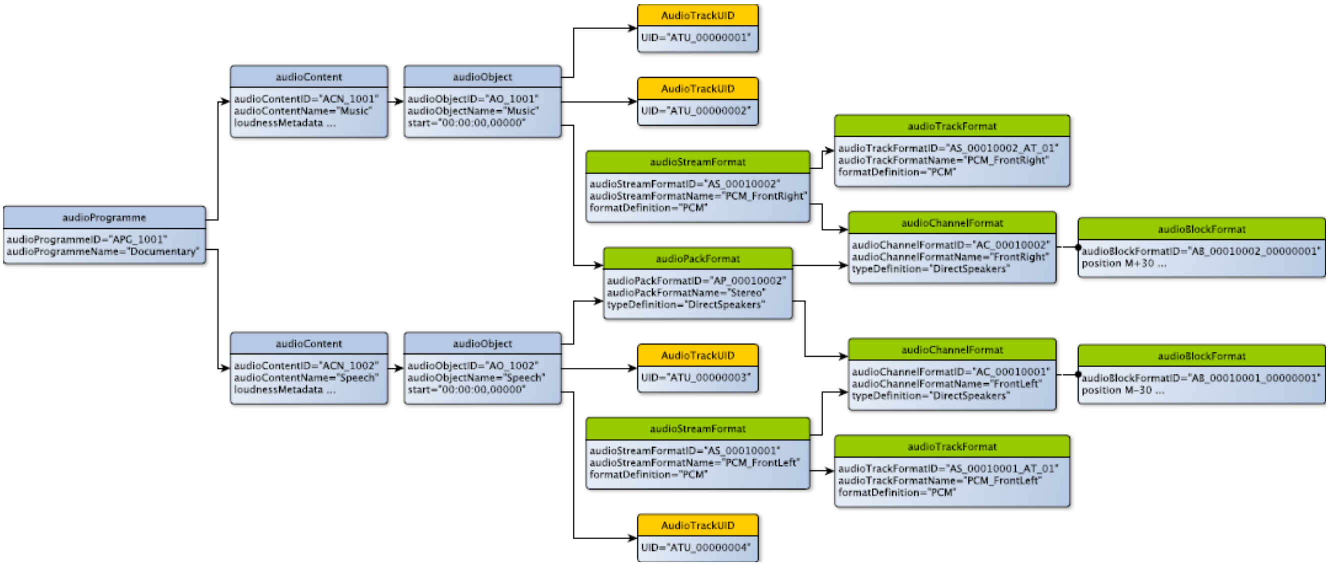
C.1 Channel based example (extract from Tech 3364)

The most common use of audio is still channel-based, where tracks within a file each represent a static audio channel. This example demonstrates how to define two tracks, streams and channels; and a pack for stereo. The track and stream definitions are for PCM audio. Two objects are defined, both stereo, but containing different content so there are 4 tracks used. This example uses a programme called ‘Documentary’ containing ‘Music’ and ‘Speech’ each defined as separate stereo objects.

The format-related elements in this example represent a tiny subset of the standard reference set of definitions. In practice, this XML code would be part of the standard reference file and would not have to be included in the BWF file. All that would be required is a <*chna*> chunk with the references to the audioTrackFormats and audioPackFormats and any extra XML required for audioObject, audioContent and audioProgramme.

Table C.1: Summary of model elements

Element	ID	Name	Description
audioTrackFormat	AT_00010001_01	PCM_FrontLeft	Defines track as PCM
audioTrackFormat	AT_00010002_01	PCM_FrontRight	Defines track as PCM
audioStreamFormat	AS_00010001	PCM_FrontLeft	Defines stream as PCM
audioStreamFormat	AS_00010002	PCM_FrontRight	Defines stream as PCM
audioChannelFormat & audioBlockFormat	AC_00010001 AB_00010001_00000001	FrontLeft	Describes channel as front left with a position and speaker reference
audioChannelFormat & audioBlockFormat	AC_00010002 AB_00010002_00000001	FrontRight	Describes channel as front right with a position and speaker reference
audioPackFormat	AP_00010002	Stereo	Defines a stereo pack referring to two channels.


AudioTrackUID
UID="ATU_00000001"
audioContent
audioContentID="ACN_1001"
audioContentName="Music"
loudnessMetadata ...
audioObject
audioObjectID="AO_1001"
audioObjectName="Music"
start="00:00:00,00000"
AudioTrackUID
UID="ATU_00000002"
audioTrackFormat
audioTrackFormatID="AS_00010002_AT_01"
audioTrackFormatName="PCM_FrontRight"
formatDefinition="PCM"
audioStreamFormat
audioStreamFormatID="AS_00010002"
audioStreamFormatName="PCM_FrontRight"
formatDefinition="PCM"
audioProgramme
audioProgrammeID="APG_1001"
audioProgrammeName="Documentary"
audioChannelFormat
audioChannelFormatID="AC_00010002"
audioChannelFormatName="FrontRight"
typeDefinition="DirectSpeakers"
audioBlockFormat
audioBlockFormatID="AB_00010002_00000001"
position M+30 ...
audioPackFormat
audioPackFormatID="AP_00010002"
audioPackFormatName="Stereo"
typeDefinition="DirectSpeakers"
audioContent
audioContentID="ACN_1002"
audioContentName="Speech"
loudnessMetadata ...
audioObject
audioObjectID="AO_1002"
audioObjectName="Speech"
start="00:00:00,00000"
AudioTrackUID
UID="ATU_00000003"
audioChannelFormat
audioChannelFormatID="AC_00010001"
audioChannelFormatName="FrontLeft"
typeDefinition="DirectSpeakers"
audioBlockFormat
audioBlockFormatID="AB_00010001_00000001"
position M-30 ...
audioStreamFormat
audioStreamFormatID="AS_00010001"
audioStreamFormatName="PCM_FrontLeft"
formatDefinition="PCM"
audioTrackFormat
audioTrackFormatID="AS_00010001_AT_01"
audioTrackFormatName="PCM_FrontLeft"
formatDefinition="PCM"
AudioTrackUID
UID="ATU_00000004"

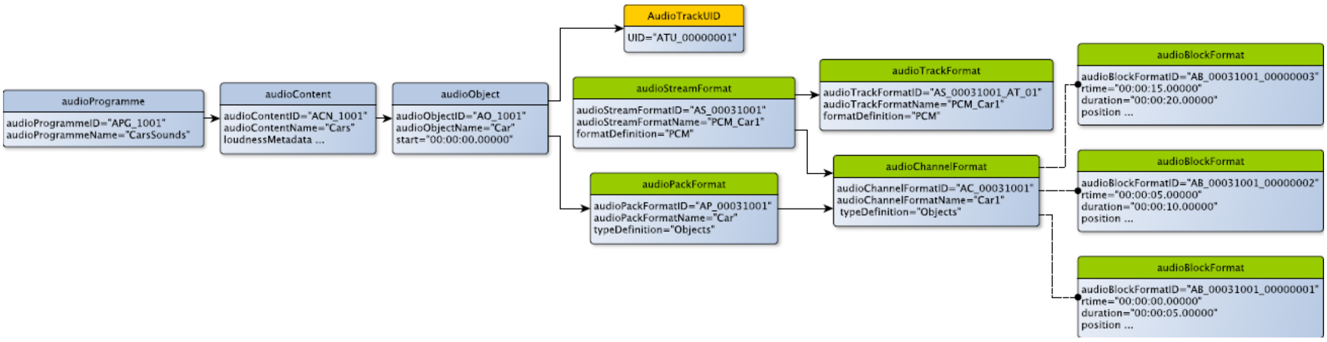
```
<?xml version="1.0" encoding="UTF-8"?>
<ebuCoreMain xmlns="urn:ebu:metadata-schema:ebuCore_2014"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:schemaLocation="urn:ebu:metadata-schema:ebuCore_2014 EBU_CORE_20131014/EBU_CORE_20131014.xsd"
 xmlns:dc="http://purl.org/dc/elements/1.1/">
 <coreMetadata>

  <format>

   <audioFormatExtended>

    <!-- audio programme -->
    <audioProgramme audioProgrammeID="APG_1001" audioProgrammeName="Documentary">
     <audioContentIDRef>ACN_1001</audioContentIDRef>
     <audioContentIDRef>ACN_1002</audioContentIDRef>
    </audioProgramme>

    <!-- audio content -->
    <audioContent audioContentID="ACN_1001" audioContentName="Music">
     <audioObjectIDRef>AO_1001</audioObjectIDRef>
     <loudnessMetadata>
      <integratedLoudness>-28.0</integratedLoudness>
     </loudnessMetadata>
    </audioContent>

    <audioContent audioContentID="ACN_1002" audioContentName="Speech">
     <audioObjectIDRef>AO_1002</audioObjectIDRef>
     <loudnessMetadata>
      <integratedLoudness>-23.0</integratedLoudness>
     </loudnessMetadata>
    </audioContent>

    <!-- audio object -->
    <audioObject audioObjectID="AO_1001" audioObjectName="Music" start="00:00:00,00000">
     <audioPackFormatIDRef>AP_00010002</audioPackFormatIDRef>
     <audioTrackUIDRef>ATU_00000001</audioTrackUIDRef>
     <audioTrackUIDRef>ATU_00000002</audioTrackUIDRef>
    </audioObject>
    <audioObject audioObjectID="AO_1002" audioObjectName="Speech" start="00:00:00,00000">
     <audioPackFormatIDRef>AP_00010002</audioPackFormatIDRef>
     <audioTrackUIDRef>ATU_00000003</audioTrackUIDRef>
     <audioTrackUIDRef>ATU_00000004</audioTrackUIDRef>
    </audioObject>

    <!-- audio pack -->
    <audioPackFormat audioPackFormatID="AP_00010002" audioPackFormatName="Stereo"
     typeDefinition="DirectSpeakers">
     <audioChannelFormatIDRef>AC_00010001</audioChannelFormatIDRef>
     <audioChannelFormatIDRef>AC_00010002</audioChannelFormatIDRef>
    </audioPackFormat>

   <!-- audio channel -->
   <audioChannelFormat audioChannelFormatID="AC_00010001" audioChannelFormatName="FrontLeft"
            typeLabel="0001" typeDefinition="DirectSpeakers">
            <audioBlockFormat audioBlockFormatID="AB_00010001_00000001">
                  <speakerLabel>M+30</speakerLabel>
                  <position coordinate="azimuth">30.0</position>
                  <position coordinate="elevation">0.0</position>
                   <position coordinate="distance">1.0</position>
             </audioBlockFormat>
   </audioChannelFormat>

   <audioChannelFormat audioChannelFormatID="AC_00010002" audioChannelFormatName="FrontRight"
           typeLabel="0001" typeDefinition="DirectSpeakers">
           <audioBlockFormat audioBlockFormatID="AB_00010002_00000001">
                     <speakerLabel>M-30</speakerLabel>
                     <position coordinate="azimuth">-30.0</position>
                     <position coordinate="elevation">0.0</position>
                     <position coordinate="distance">1.0</position>
            </audioBlockFormat>
   </audioChannelFormat>

    <!-- audio stream -->
    <audioStreamFormat audioStreamFormatID="AS_00010001" audioStreamFormatName="PCM_FrontLeft"
     formatLabel="0001" formatDefinition="PCM">
     <audioChannelFormatIDRef>AC_00010001</audioChannelFormatIDRef>
     <audioTrackFormatIDRef>AS_00010001_AT_01</audioTrackFormatIDRef>
    </audioStreamFormat>

    <audioStreamFormat audioStreamFormatID="AS_00010002" audioStreamFormatName="PCM_FrontRight"
     formatLabel="0001" formatDefinition="PCM">
     <audioChannelFormatIDRef>AC_00010002</audioChannelFormatIDRef>
     <audioTrackFormatIDRef>AS_00010002_AT_01</audioTrackFormatIDRef>
    </audioStreamFormat>

    <!-- audio track format-->
    <audioTrackFormat audioTrackFormatID="AS_00010001_AT_01" audioTrackFormatName="PCM_FrontLeft"
     formatLabel="0001" formatDefinition="PCM">
     <audioStreamFormatIDRef>AS_00010001</audioStreamFormatIDRef>
    </audioTrackFormat>

    <audioTrackFormat audioTrackFormatID="AS_00010002_AT_01" audioTrackFormatName="PCM_FrontRight"
     formatLabel="0001" formatDefinition="PCM">
     <audioStreamFormatIDRef>AS_00010002</audioStreamFormatIDRef>
    </audioTrackFormat>

    <!-- audio track -->
    <audioTrackUID UID="ATU_00000001"/>
    <audioTrackUID UID="ATU_00000002"/>
    <audioTrackUID UID="ATU_00000003"/>
    <audioTrackUID UID="ATU_00000004"/>
   </audioFormatExtended>
  </format>
 </coreMetadata>
</ebuCoreMain>
```

C.2 *Object based example (extract from Tech 3364)*

To demonstrate how the ADM can be used in object-based audio here is a simple example using a single object. This example uses multiple audioBlockFormats within an audioChannelFormat to describe the dynamic properties of an object called “Car”. The audioBlockFormats uses the start and duration attributes to frame the time dependent metadata, thus allowing the object’s position to move in space.

Table C.2: Summary of model elements

Element	ID	Name	Description
audioTrackFormat	AT_00031001_01	PCM_Car1	Defines track as PCM
audioStreamFormat	AS_00031001	PCM_Car1	Defines stream as PCM
audioChannelFormat & audioBlockFormat	AC_00031001 AB_00031001_00000001 AB_00031001_00000002 AB_00031001_00000003	Car1	Describes channel as an object type containing 3 blocks with different positional metadata in each.
audioPackFormat	AP_00031001	Car	Defines a pack referring to one channel.
audioObject	AO_1001	Car	Object for ‘Car, stereo format
audioContent	ACN_1001	Cars	‘Cars’ content
audioProgramme	APG_1001	CarsSounds	Programme ‘CarsSounds’ containing ‘Cars’ content


AudioTrackUID
UID="ATU_00000001"
audioProgramme
audioProgrammeID="APG_1001"
audioProgrammeName="CarsSounds"
audioContent
audioContentID="ACN_1001"
audioContentName="Cars"
loudnessMetadata ...
audioObject
audioObjectID="AO_1001"
audioObjectName="Car"
start="00:00:00.00000"
audioStreamFormat
audioStreamFormatID="AS_00031001"
audioStreamFormatName="PCM_Car1"
formatDefinition="PCM"
audioPackFormat
audioPackFormatID="AP_00031001"
audioPackFormatName="Car"
typeDefinition="Objects"
audioTrackFormat
audioTrackFormatID="AS_00031001_AT_01"
audioTrackFormatName="PCM_Car1"
formatDefinition="PCM"
audioChannelFormat
audioChannelFormatID="AC_00031001"
audioChannelFormatName="Car1"
typeDefinition="Objects"
audioBlockFormat
audioBlockFormatID="AB_00031001_00000003"
rtime="00:00:15.00000"
duration="00:00:20.00000"
position ...
audioBlockFormat
audioBlockFormatID="AB_00031001_00000002"
rtime="00:00:05.00000"
duration="00:00:10.00000"
position ...
audioBlockFormat
audioBlockFormatID="AB_00031001_00000001"
rtime="00:00:00.00000"
duration="00:00:05.00000"
position ...

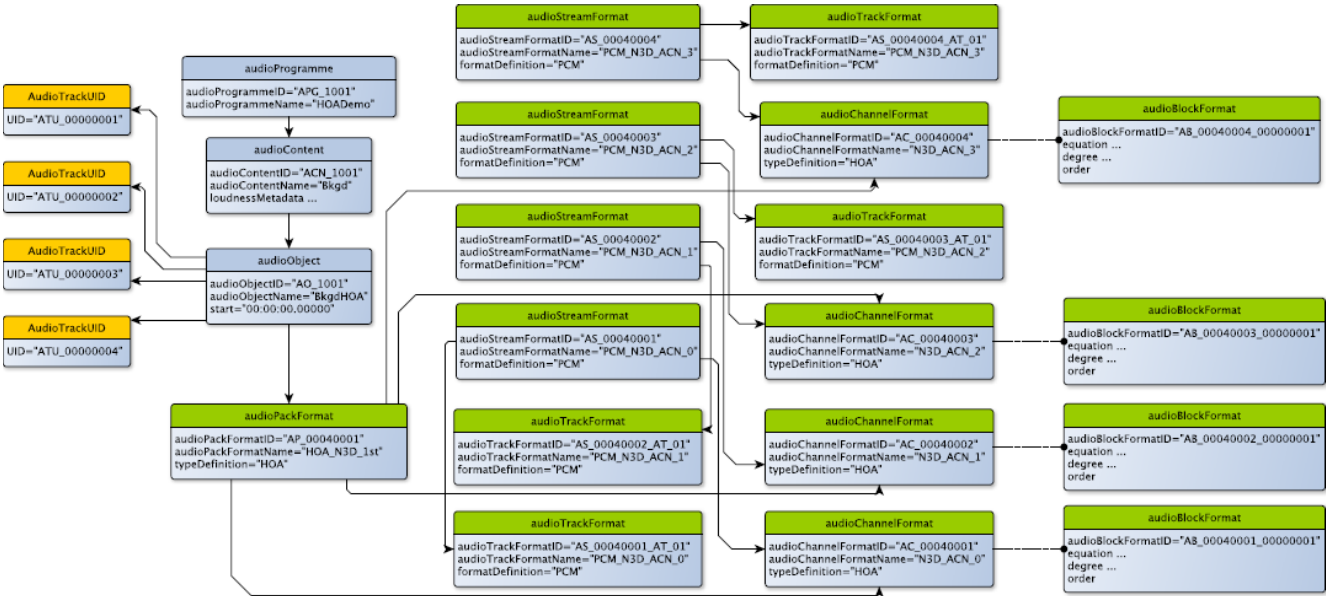
```
<?xml version="1.0" encoding="UTF-8"?>
<ebuCoreMain xmlns="urn:ebu:metadata-schema:ebuCore_2014"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:schemaLocation="urn:ebu:metadata-schema:ebuCore_2014 EBU_CORE_20131014/EBU_CORE_20131014.xsd"
 xmlns:dc="http://purl.org/dc/elements/1.1/">

 <coreMetadata>

  <format>

   <audioFormatExtended>

    <!-- audio programme -->
    <audioProgramme audioProgrammeID="APG_1001" audioProgrammeName="CarsSounds">
     <audioContentIDRef>ACN_1001</audioContentIDRef>
    </audioProgramme>

    <!-- audio content -->
    <audioContent audioContentID="ACN_1001" audioContentName="Cars">
     <audioObjectIDRef>AO_1001</audioObjectIDRef>
     <loudnessMetadata>
      <integratedLoudness>-23.0</integratedLoudness>
     </loudnessMetadata>
    </audioContent>

    <!-- audio object -->
    <audioObject audioObjectID="AO_1001" audioObjectName="Car" start="00:00:00.00000">
     <audioPackFormatIDRef>AP_00031001</audioPackFormatIDRef>
     <audioTrackUIDRef>ATU_00000001</audioTrackUIDRef>
    </audioObject>

    <!-- audio pack -->
    <audioPackFormat audioPackFormatID="AP_00031001" audioPackFormatName="Car" typeLabel="0003"     typeDefinition="Objects">
     <audioChannelFormatIDRef>AC_00031001</audioChannelFormatIDRef>
    </audioPackFormat>

    <!-- audio channel -->
    <audioChannelFormat audioChannelFormatID="AC_00031001" audioChannelFormatName="Car1" typeLabel="0003"
typeDefinition="Objects">
     <audioBlockFormat audioBlockFormatID="AB_00031001_00000001" rtime="00:00:00.00000"        duration="00:00:05.00000">
      <position coordinate="azimuth">-22.5</position>
      <position coordinate="elevation">5.0</position>
      <position coordinate="distance">1.0</position>
     </audioBlockFormat>

     <audioBlockFormat audioBlockFormatID="AB_00031001_00000002" rtime="00:00:05.00000"        duration="00:00:10.00000">
      <position coordinate="azimuth">-24.5</position>
      <position coordinate="elevation">6.0</position>
      <position coordinate="distance">0.9</position>
     </audioBlockFormat>

     <audioBlockFormat audioBlockFormatID="AB_00031001_00000003" rtime="00:00:15.00000"        duration="00:00:20.00000">
      <position coordinate="azimuth">-26.5</position>
      <position coordinate="elevation">7.0</position>
      <position coordinate="distance">0.8</position>
     </audioBlockFormat>
    </audioChannelFormat>

    <!-- audio stream -->
    <audioStreamFormat audioStreamFormatID="AS_00031001" audioStreamFormatName="PCM_Car1" formatLabel="0001"
formatDefinition="PCM">
     <audioChannelFormatIDRef>AC_00031001</audioChannelFormatIDRef>
     <audioTrackFormatIDRef>AS_00031001_AT_01</audioTrackFormatIDRef>
    </audioStreamFormat>

    <!-- audio track format-->
    <audioTrackFormat audioTrackFormatID="AS_00031001_AT_01" audioTrackFormatName="PCM_Car1" formatLabel="0001"
      formatDefinition="PCM">
     <audioStreamFormatIDRef>AS_00031001</audioStreamFormatIDRef>
    </audioTrackFormat>

    <!-- audio track -->
    <audioTrackUID UID="ATU_00000001"/>
   </audioFormatExtended>
  </format>
 </coreMetadata>
</ebuCoreMain>
```

C.3 Scene based example (extract from Tech 3364)

The other main type of audio is scene-based where the audio channels are representing Ambisonic/HOA components. Their use is very similar to that of the channel-based approach with the main difference being the parameters used within audioBlockFormat. This example shows a simple 1^{st} order Ambisonic (using the N3D method) configuration using 4 channels mapped onto 4 tracks. Like the channel-based approach, the format elements would be defined in a standard reference file so in practice would not need to be included in the BWF file itself.

Table C.3: Summary of model elements

Element	ID	Name	Description
audioTrackFormat	AT_00040001_01	PCM_N3D_ACN_0	Defines track as PCM
audioTrackFormat	AT_00040002_01	PCM_N3D_ACN_1	Defines track as PCM
audioTrackFormat	AT_00040003_01	PCM_N3D_ACN_2	Defines track as PCM
audioTrackFormat	AT_00040004_01	PCM_N3D_ACN_3	Defines track as PCM
audioStreamFormat	AS_00040001	PCM_N3D_ACN_0	Defines stream as PCM
audioStreamFormat	AS_00040002	PCM_N3D_ACN_1	Defines stream as PCM
audioStreamFormat	AS_00040003	PCM_N3D_ACN_2	Defines stream as PCM
audioStreamFormat	AS_00040004	PCM_N3D_ACN_3	Defines stream as PCM
audioChannelFormat & audioBlockFormat	AC_00040001 AB_00040001_00000001	N3D_ACN_0	Describes channel as ACN0 HOA component
audioChannelFormat & audioBlockFormat	AC_00040002 AB_00040002_00000001	N3D_ACN_1	Describes channel as ACN1 HOA component
audioChannelFormat & audioBlockFormat	AC_00040003 AB_00040003_00000001	N3D_ACN_2	Describes channel as ACN2 HOA component
audioChannelFormat & audioBlockFormat	AC_00040004 AB_00040004_00000001	N3D_ACN_3	Describes channel as ACN3 HOA component
audioPackFormat	AP_00040001	HOA_N3D_1st	Defines a 1^{st} order HOA pack referring to four ACN channels.


AudioTrackUID
UID="ATU_00000001"
AudioTrackUID
UID="ATU_00000002"
AudioTrackUID
UID="ATU_00000003"
AudioTrackUID
UID="ATU_00000004"
audioProgramme
audioProgrammeID="APG_1001"
audioProgrammeName="HOADemo"
audioContent
audioContentID="ACN_1001"
audioContentName="Bkgd"
loudnessMetadata ...
audioObject
audioObjectID="AO_1001"
audioObjectName="BkgdHOA"
start="00:00:00.00000"
audioPackFormat
audioPackFormatID="AP_00040001"
audioPackFormatName="HOA_N3D_1st"
typeDefinition="HOA"
audioStreamFormat
audioStreamFormatID="AS_00040004"
audioStreamFormatName="PCM_N3D_ACN_3"
formatDefinition="PCM"
audioStreamFormat
audioStreamFormatID="AS_00040003"
audioStreamFormatName="PCM_N3D_ACN_2"
formatDefinition="PCM"
audioStreamFormat
audioStreamFormatID="AS_00040002"
audioStreamFormatName="PCM_N3D_ACN_1"
formatDefinition="PCM"
audioStreamFormat
audioStreamFormatID="AS_00040001"
audioStreamFormatName="PCM_N3D_ACN_0"
formatDefinition="PCM"
audioTrackFormat
audioTrackFormatID="AS_00040002_AT_01"
audioTrackFormatName="PCM_N3D_ACN_1"
formatDefinition="PCM"
audioTrackFormat
audioTrackFormatID="AS_00040001_AT_01"
audioTrackFormatName="PCM_N3D_ACN_0"
formatDefinition="PCM"
audioTrackFormat
audioTrackFormatID="AS_00040004_AT_01"
audioTrackFormatName="PCM_N3D_ACN_3"
formatDefinition="PCM"
audioChannelFormat
audioChannelFormatID="AC_00040004"
audioChannelFormatName="N3D_ACN_3"
typeDefinition="HOA"
audioTrackFormat
audioTrackFormatID="AS_00040003_AT_01"
audioTrackFormatName="PCM_N3D_ACN_2"
formatDefinition="PCM"
audioChannelFormat
audioChannelFormatID="AC_00040003"
audioChannelFormatName="N3D_ACN_2"
typeDefinition="HOA"
audioChannelFormat
audioChannelFormatID="AC_00040002"
audioChannelFormatName="N3D_ACN_1"
typeDefinition="HOA"
audioChannelFormat
audioChannelFormatID="AC_00040001"
audioChannelFormatName="N3D_ACN_0"
typeDefinition="HOA"
audioBlockFormat
audioBlockFormatID="AB_00040004_00000001"
equation ...
degree ...
order
audioBlockFormat
audioBlockFormatID="AB_00040003_00000001"
equation ...
degree ...
order
audioBlockFormat
audioBlockFormatID="AB_00040002_00000001"
equation ...
degree ...
order
audioBlockFormat
audioBlockFormatID="AB_00040001_00000001"
equation ...
degree ...
order

```xml
<?xml version="1.0" encoding="UTF-8"?>
<ebuCoreMain xmlns="urn:ebu:metadata-schema:ebuCore_2014"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:schemaLocation="urn:ebu:metadata-schema:ebuCore_2014 EBU_CORE_20131014/EBU_CORE_20131014.xsd"
 xmlns:dc="http://purl.org/dc/elements/1.1/">
 <coreMetadata>

  <format>

   <audioFormatExtended>

    <!-- audio programme -->
    <audioProgramme audioProgrammeID="APG_1001" audioProgrammeName="HOADemo">
     <audioContentIDRef>ACN_1001</audioContentIDRef>
    </audioProgramme>

    <!-- audio content -->
    <audioContent audioContentID="ACN_1001" audioContentName="Background">
     <audioObjectIDRef>AO_1001</audioObjectIDRef>
    </audioContent>

    <!-- audio object -->
    <audioObject audioObjectID="AO_1001" audioObjectName="BackgroundHOA">
     <audioPackFormatIDRef>AP_00040001</audioPackFormatIDRef>
     <audioTrackUIDRef>ATU_00000001</audioTrackUIDRef>
     <audioTrackUIDRef>ATU_00000002</audioTrackUIDRef>
     <audioTrackUIDRef>ATU_00000003</audioTrackUIDRef>
     <audioTrackUIDRef>ATU_00000004</audioTrackUIDRef>
    </audioObject>

    <!-- audio pack -->
    <audioPackFormat audioPackFormatID="AP_00040001" audioPackFormatName="HOA_N3D_1st" typeLabel="0004"
typeDefinition="HOA">
     <audioChannelFormatIDRef>AC_00040001</audioChannelFormatIDRef>
     <audioChannelFormatIDRef>AC_00040002</audioChannelFormatIDRef>
     <audioChannelFormatIDRef>AC_00040003</audioChannelFormatIDRef>
     <audioChannelFormatIDRef>AC_00040004</audioChannelFormatIDRef>
    </audioPackFormat>

    <!-- audio channel -->
    <audioChannelFormat audioChannelFormatID="AC_00040001" audioChannelFormatName="N3D_ACN_0"    typeDefinition="HOA">
     <audioBlockFormat audioBlockFormatID="AB_00040001_00000001">
      <equation>1</equation>
      <degree>0</degree>
      <order>0</order>
     </audioBlockFormat>
    </audioChannelFormat>
    <audioChannelFormat audioChannelFormatID="AC_00040002" audioChannelFormatName="N3D_ACN_1"    typeDefinition="HOA">
     <audioBlockFormat audioBlockFormatID="AB_00040002_00000001">
      <equation>sqrt(3)*cos(E)</equation>
      <degree>1</degree>
      <order>-1</order>
     </audioBlockFormat>
    </audioChannelFormat>
    <audioChannelFormat audioChannelFormatID="AC_00040003" audioChannelFormatName="N3D_ACN_2"     typeDefinition="HOA">
     <audioBlockFormat audioBlockFormatID="AB_00040003_00000001">
      <equation>sqrt(3)*sin(E)</equation>
      <degree>1</degree>
      <order>0</order>
     </audioBlockFormat>
    </audioChannelFormat>
    <audioChannelFormat audioChannelFormatID="AC_00040004" audioChannelFormatName="N3D_ACN_3"     typeDefinition="HOA">
     <audioBlockFormat audioBlockFormatID="AB_00040004_00000001">
      <equation>sqrt(3)*cos(E)*cos(A)</equation>
      <degree>1</degree>
      <order>1</order>
     </audioBlockFormat>
    </audioChannelFormat>

    <!-- audio stream -->
    <audioStreamFormat audioStreamFormatID="AS_00040001" audioStreamFormatName="PCM_N3D_ACN_0"     formatLabel="0001"
formatDefinition="PCM">
     <audioChannelFormatIDRef>AC_00040001</audioChannelFormatIDRef>
     <audioTrackFormatIDRef>AS_00040001_AT_01</audioTrackFormatIDRef>
    </audioStreamFormat>

    <audioStreamFormat audioStreamFormatID="AS_00040002" audioStreamFormatName="PCM_N3D_ACN_1"     formatLabel="0001"
formatDefinition="PCM">
     <audioChannelFormatIDRef>AC_00040002</audioChannelFormatIDRef>
     <audioTrackFormatIDRef>AS_00040002_AT_01</audioTrackFormatIDRef>
    </audioStreamFormat>

    <audioStreamFormat audioStreamFormatID="AS_00040003" audioStreamFormatName="PCM_N3D_ACN_2"     formatLabel="0001"
formatDefinition="PCM">
     <audioChannelFormatIDRef>AC_00040003</audioChannelFormatIDRef>
     <audioTrackFormatIDRef>AS_00040003_AT_01</audioTrackFormatIDRef>
    </audioStreamFormat>

    <audioStreamFormat audioStreamFormatID="AS_00040004" audioStreamFormatName="PCM_N3D_ACN_3"     formatLabel="0001"
formatDefinition="PCM">
     <audioChannelFormatIDRef>AC_00040004</audioChannelFormatIDRef>
     <audioTrackFormatIDRef>AS_00040004_AT_01</audioTrackFormatIDRef>
    </audioStreamFormat>

    <!-- audio track format-->
    <audioTrackFormat audioTrackFormatID="AS_00040001_AT_01" audioTrackFormatName="PCM_N3D_ACN_0"     formatLabel="0001"
formatDefinition="PCM">
     <audioStreamFormatIDRef>AS_00040001</audioStreamFormatIDRef>
    </audioTrackFormat>

    <audioTrackFormat audioTrackFormatID="AS_00040002_AT_01" audioTrackFormatName="PCM_N3D_ACN_1"     formatLabel="0001"
formatDefinition="PCM">
     <audioStreamFormatIDRef>AS_00040002</audioStreamFormatIDRef>
    </audioTrackFormat>

    <audioTrackFormat audioTrackFormatID="AS_00040003_AT_01" audioTrackFormatName="PCM_N3D_ACN_2"     formatLabel="0001"
formatDefinition="PCM">
     <audioStreamFormatIDRef>AS_00040003</audioStreamFormatIDRef>
    </audioTrackFormat>

    <audioTrackFormat audioTrackFormatID="AS_00040004_AT_01" audioTrackFormatName="PCM_N3D_ACN_3"     formatLabel="0001"
formatDefinition="PCM">
     <audioStreamFormatIDRef>AS_00040004</audioStreamFormatIDRef>
    </audioTrackFormat>

    <!-- audio track -->
    <audioTrackUID UID="ATU_00000001"/>
    <audioTrackUID UID="ATU_00000002"/>
    <audioTrackUID UID="ATU_00000003"/>
    <audioTrackUID UID="ATU_00000004"/>

   </audioFormatExtended>

  </format>
 </coreMetadata>
</ebuCoreMain>
```