SMPTE STANDARD

Broadcast Exchange Format (BXF) — Schema Documentation

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(*) Indicates XSD's with changes to be reviewed.

Approved January 1, 2020

Foreword

SMPTE (the Society of Motion Picture and Television Engineers) is an internationally-recognized standards developing organization. Headquartered and incorporated in the United States of America, SMPTE has members in over 80 countries on six continents. SMPTE's Engineering Documents, including Standards, Recommended Practices and Engineering Guidelines, are prepared by SMPTE's Technology Committees. Participation in these Committees is open to all with a bona fide interest in their work. SMPTE cooperates closely with other standards-developing organizations, including ISO, IEC and ITU.

SMPTE Engineering Documents are drafted in accordance with the rules given in Part XIII of its Administrative practices. SMPTE Standard 2021-4 was prepared by Technology Committee 34CS.

Intellectual Property

At the time of publication, no notice had been received by SMPTE claiming patent rights essential to the implementation of this Standard. However, attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. SMPTE shall not be held responsible for identifying any or all such patent rights.

Introduction

This section is entirely informative and does not form an integral part of this Engineering Document

Broadcast Exchange Format (BXF) is a protocol for exchange of data among broadcast systems such as Traffic, Program Management, Automation, and Content Distribution. It is intended to facilitate the movement of content and its associated metadata for better management, coordination and reporting between these broadcast systems. The BXF Protocol serves as a replacement for the many proprietary interfaces in place today between vendors in these areas.

Unless otherwise specified the order of precedence of the types of normative information in this document shall be as follows. Normative prose shall be the authoritative definition. Tables shall be next, followed by formal languages, then figures, and then any other language forms. In the event of a conflict between the schema and other information in this document, the schema is authoritative.

With this new release of BXF, additional schema changes including new headers have taken place. These have been accomplished with the minimum of adjustments or effect on previous versions. However, as with any update, systems based on prior BXF versions should be thoroughly tested for their ability to work correctly under this new version before their release to the public. The changes in the BXF schema for this version are described under the appropriate schema sections in this document and represent only the changes since the previous release of BXF. Please reference prior release documentation for any BXF modifications included in prior releases.

1. Scope

This document provides documentation of the BXF schemas specified in the associated Data Supplement, including schema changes and additional elements of BXF Version 7.0.

2. Conformance Notation

Documents consist of normative text and, optionally, informative text. Normative text is that describes elements of the design that are indispensable or contains the conformance language keywords: "shall", "should", or "may". Informative text is text that is potentially helpful to the user, but not indispensable, and can be removed, changed, or added editorially without affecting interoperability. Informative text does not contain any conformance keywords.

All text in a Standard, Recommended Practice, Amendment, Addendum, or Corrigendum, is, by default, normative, except: the Introduction, any section explicitly labeled as "Informative" or individual paragraphs that start with "Note:"

Normative references are external documents referenced in normative text that are indispensable to the user. Bibliographic references are references made in informative text or are those otherwise not indispensable to the user. Normative references shall conform to the types and procedures specified in the Engineering Administrative Practices.

The keywords "shall" and "shall not" indicate requirements strictly to be followed in order to conform to the document and from which no deviation is permitted. The keywords, "should" and "should not" indicate that, among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required; or that (in the negative form) a certain possibility or course of action is deprecated but not prohibited.

The keywords "may" and "need not" indicate courses of action permissible within the limits of the document.

The keyword “reserved” indicates a provision that is not defined at this time, shall not be used, and may be defined in the future. The keyword “forbidden” indicates “reserved” and in addition indicates that the provision will never be defined in the future.

A conformant implementation according to an Engineering Document is one that includes all mandatory provisions ("shall") and, if implemented, all recommended provisions ("should") as described. A conformant implementation need not implement optional provisions ("may") and need not implement them as described.

3. Description of BXF Schema

This documentation does not contain the actual schema, but instead provides a reference to the individual files that can be viewed with any number of tools, including most commonly used browsers as well as other third party tools. In addition to the XML Schema Files (.XSD) the user can also browse the schema using the .html files.

Depending on the tools you use, different parts of the schema may appear in different formatting. The section below describes the meaning of various parts of the schema as you would see them in the .html version.

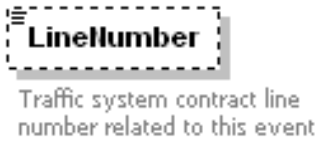
The schema shall be normative and this document informative should any differences exist between the two.

4. Schema Documention

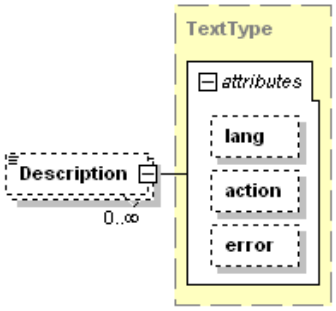
A number of graphics and symbols are used in the documentation to help describe the various elements of the schema and how the elements are related. These represent components and the relationships between schema components. The different components are represented by the following:

Single element – mandatory: Indicated by a rectangle with a solid border. The element name is inside the shape.

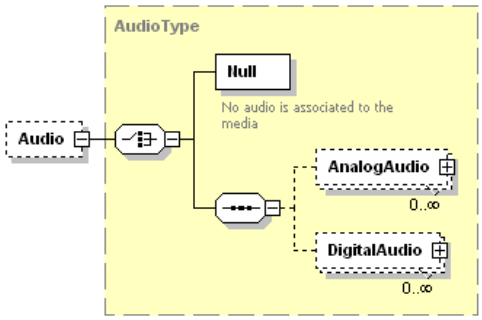
Single element – optional: Indicated by a rectangle with a dashed border. The element name is inside the shape.



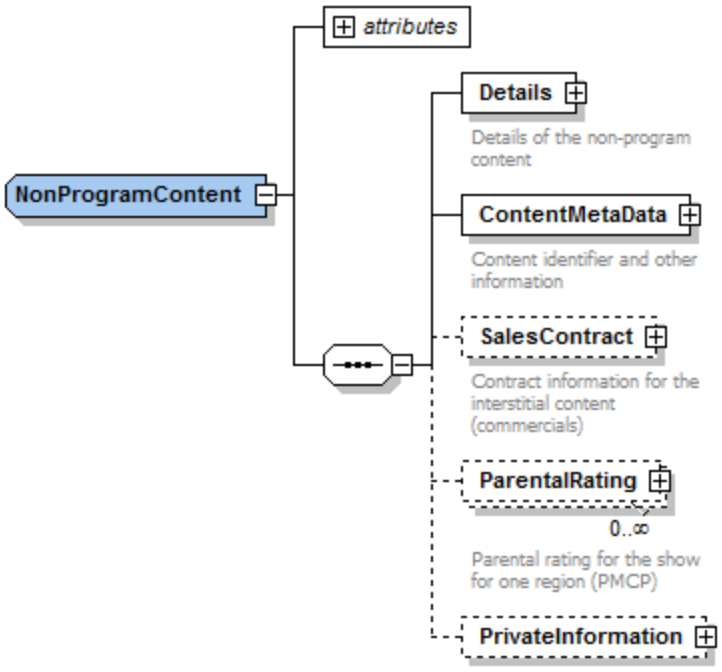
Multiple elements: Indicated by a rectangle with a solid border with a number range representing the minimum and maximum number of occurrences possible. In the example, 0 to infinity (0..∞) is shown.



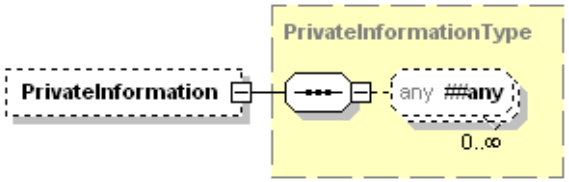
Elements containing child elements: Indicated by a [+] or [-] on the element, representing an element containing additional attributes or elements. The [+] indicates that additional elements are available for display. The [-] indicates that the child elements are displayed.



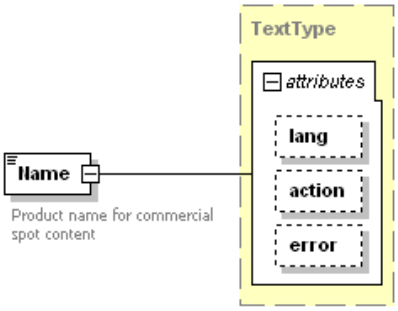
Complex type: Indicated by a partial hexagon and a child element symbol.



Wildcards: Indicated by an octagon with any at the left.

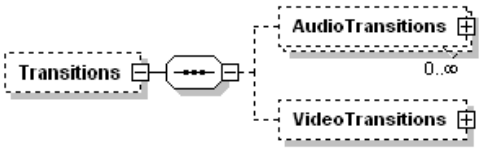


Attributes: Indicated by the word ‘attributes’

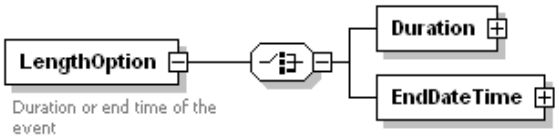


The relationships between components are represented by symbols for sequence and choice.

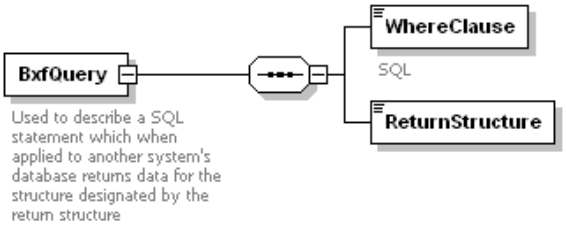
Sequence: The sequence compositor shows that all elements occur in sequence.



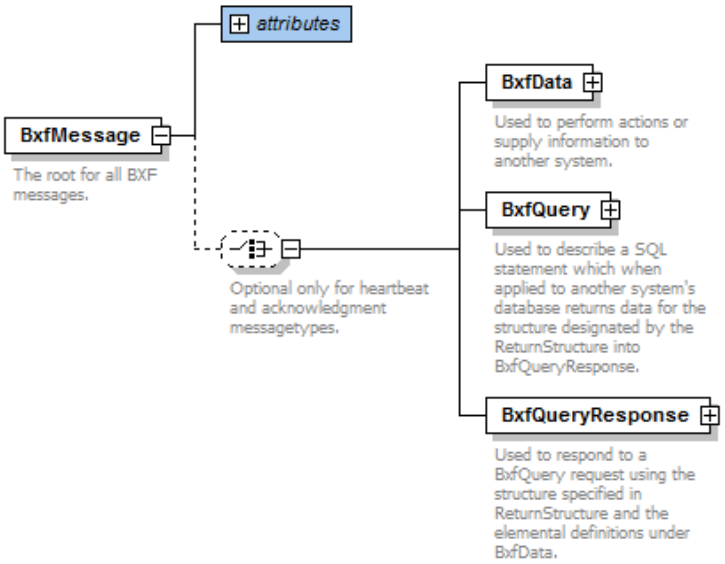
Choice: The choice compositor shows the 'or' relationship between associated components (only one choice may be made).



Solid lines: Solid lines connecting elements represent mandatory connections within the schema diagrams.

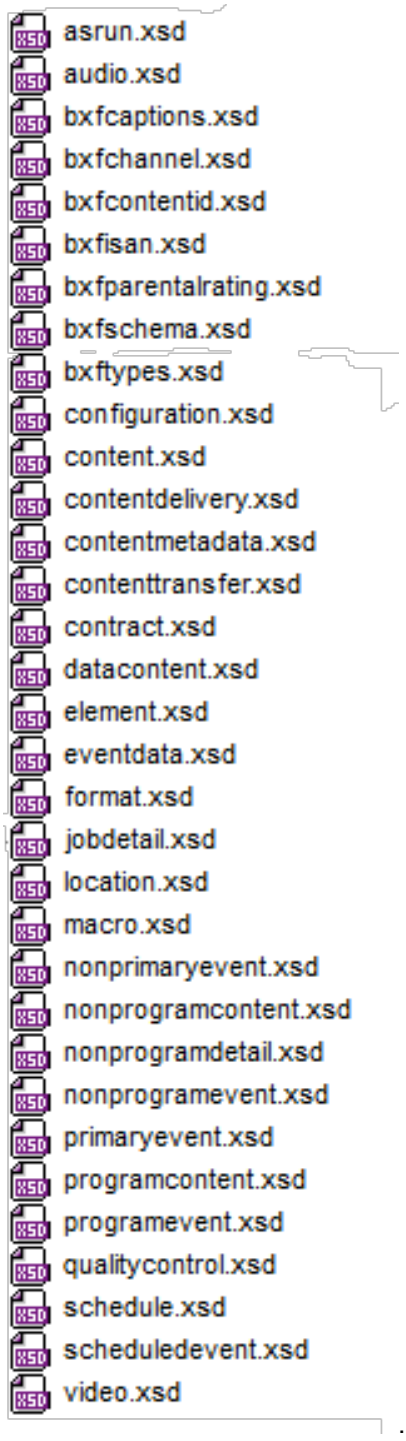


Dashed lines: Dashed lines between elements represent optional connections within the schema diagrams.



4.1 Schema File List

The Schema is actually composed of 33 files listed below. The root file (starting point) is bxfshema.xsd and all other files are referenced from this file. A brief description of each file is given below in alphabetical order. This same description may also be contained in the schema for major elements, but some elements do not contain a description and were segregated into separate files for the convenience of managing the schema. Note that no new XSDs have been added as part of version 7.0, but there are several new elements added into contentmetadata.xsd, video.xsd and contentdelivery.xsd. There are also a documentation that has been clarified, a few typos and enumeration values that have been fixed to be consistent throughout the schema.



4.2 Header Change in BXF 7.0

All XSD file headers have the same change regarding copyright and targetNameSpace:

```
<!-- Copyright 2019 Society of Motion Picture and Television Engineers. All rights reserved. -->

<xs:schema xmlns="http://smpte-ra.org/schemas/2021/2019/BXF"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:pmcp="http://www.atsc.org/XMLSchemas/pmcp/2007/3.1" targetNamespace="http://smpte-
ra.org/schemas/2021/2019/BXF" elementFormDefault="qualified" attributeFormDefault="unqualified"
version="7.000">
```

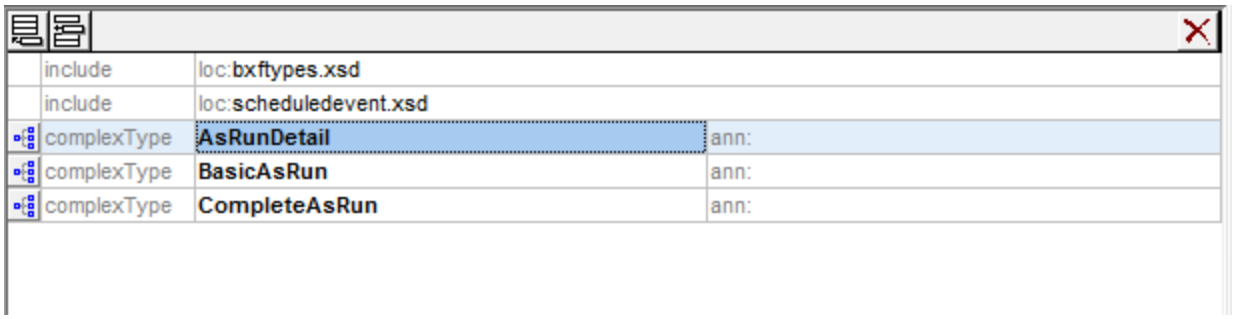
Most of the XSDs (27) had only their header changed and are listed below. There are six (6) XSD's with more substantial changes and these changes are illustrated below.

Asrun.XSD
Audio.XSD
BXFCaptions.XSD
BXFChannel.XSD
BXFContentID.XSD
BXFISAN.XSD
BXFParentalRating.XSD
BXFSchema.XSD
Configuration.XSD
Content.XSD
ContentTransfer.XSD
Contract.XSD
DataContent.XSD
Element.XSD
EventData.XSD
Format.XSD
Location.XSD
Macro.XSD
NonProgramContent.XSD
NonProgramDetail.XSD
NonProgramEvent.XSD
PrimaryEvent.XSD
ProgramContent.XSD
ProgramEvent.XSD
QualityControl.XSD
Schedule.XSD
ScheduleEvent.XSD

Schema Details and Changes for Version 7.0

4.2.1 Asrun.XSD

Contains:

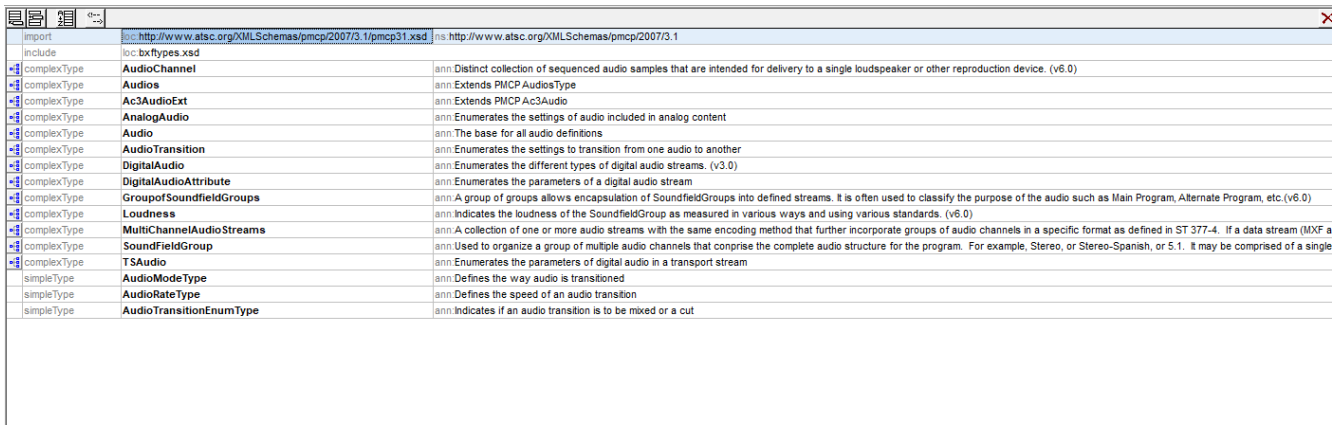


	include	loc:bxftypes.xsd	
	include	loc:scheduledevent.xsd	
complexType	**AsRunDetail**		ann:
complexType	**BasicAsRun**		ann:
complexType	**CompleteAsRun**		ann:

Used to describe the exact timing of events on a schedule after the event has been aired, including any errors or other problems that occurred during the broadcast or transmission of the content.

4.2.2 Audio.XSD

Contains:

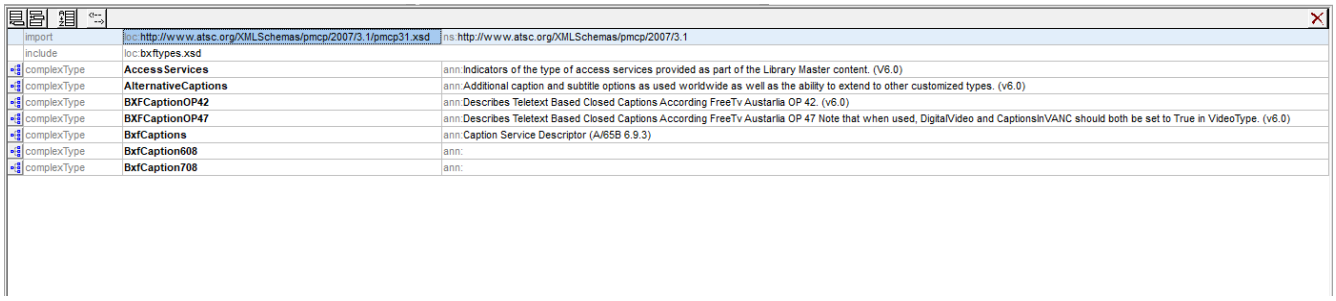


import	loc:http://www.atsc.org/XMLSchemas/pmcp/2007/3.1/pmcp31.xsd	ns:http://www.atsc.org/XMLSchemas/pmcp/2007/3.1	
include	loc:bxftypes.xsd		
complexType	**AudioChannel**	ann:Distinct collection of sequenced audio samples that are intended for delivery to a single loudspeaker or other reproduction device. (v6.0)	
complexType	**Audios**	ann:Extends PMCP AudiosType	
complexType	**Ac3AudioExt**	ann:Extends PMCP Ac3Audio	
complexType	**AnalogAudio**	ann:Enumerates the settings of audio included in analog content	
complexType	**Audio**	ann:The base for all audio definitions	
complexType	**AudioTransition**	ann:Enumerates the settings to transition from one audio to another	
complexType	**DigitalAudio**	ann:Enumerates the different types of digital audio streams. (v3.0)	
complexType	**DigitalAudioAttribute**	ann:Enumerates the parameters of a digital audio stream	
complexType	**GroupofSoundfieldGroups**	ann:A group of groups allows encapsulation of SoundfieldGroups into defined streams. It is often used to classify the purpose of the audio such as Main Program, Alternate Program, etc.(v6.0)	
complexType	**Loudness**	ann:Indicates the loudness of the SoundfieldGroup as measured in various ways and using various standards. (v6.0)	
complexType	**MultiChannelAudioStreams**	ann:A collection of one or more audio streams with the same encoding method that further incorporate groups of audio channels in a specific format as defined in ST 377-4. If a data stream (MXF a	
complexType	**SoundFieldGroup**	ann:Used to organize a group of multiple audio channels that conprise the complete audio structure for the program. For example, Stereo, or Stereo-Spanish, or 5.1. It may be comprised of a single	
complexType	**TSAudio**	ann:Enumerates the parameters of digital audio in a transport stream	
simpleType	**AudioModeType**	ann:Defines the way audio is transitioned	
simpleType	**AudioRateType**	ann:Defines the speed of an audio transition	
simpleType	**AudioTransitionEnumType**	ann:Indicates if an audio transition is to be mixed or a cut	

The basis for all audio definitions.

4.2.3 BxfCaptions.XSD

Contains:

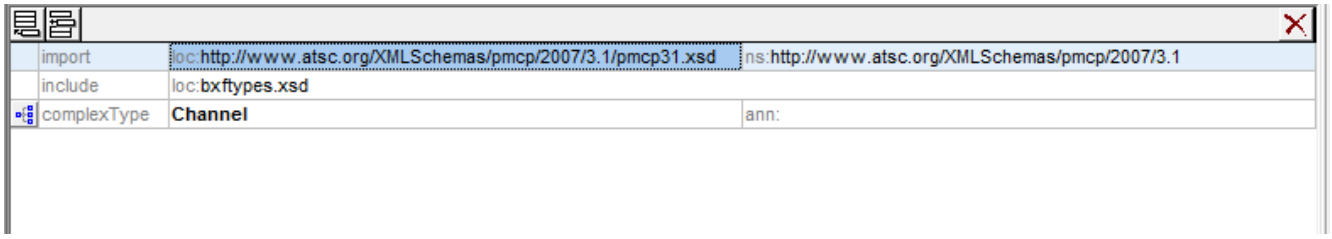


import	loc:http://www.atsc.org/XMLSchemas/pmcp/2007/3.1/pmcp31.xsd	ns:http://www.atsc.org/XMLSchemas/pmcp/2007/3.1	
include	loc:bxftypes.xsd		
complexType	**AccessServices**	ann:Indicators of the type of access services provided as part of the Library Master content. (V6.0)	
complexType	**AlternativeCaptions**	ann:Additional caption and subtitle options as used worldwide as well as the ability to extend to other customized types. (v6.0)	
complexType	**BXFCaptionOP42**	ann:Describes Teletext Based Closed Captions According FreeTv Austarlia OP 42. (v6.0)	
complexType	**BXFCaptionOP47**	ann:Describes Teletext Based Closed Captions According FreeTv Austarlia OP 47 Note that when used, DigitalVideo and CaptionsInVANC should both be set to True in VideoType. (v6.0)	
complexType	**BxfCaptions**	ann:Caption Service Descriptor (A/65B 6.9.3)	
complexType	**BxfCaption608**	ann:	
complexType	**BxfCaption708**	ann:	

Caption Service Descriptor (A/65B 6.9.3) plus Australia's OP42, OP47 and UK formats are now include (v6.0) along with the ability to extend.

4.2.4 BxfChannel.XSD

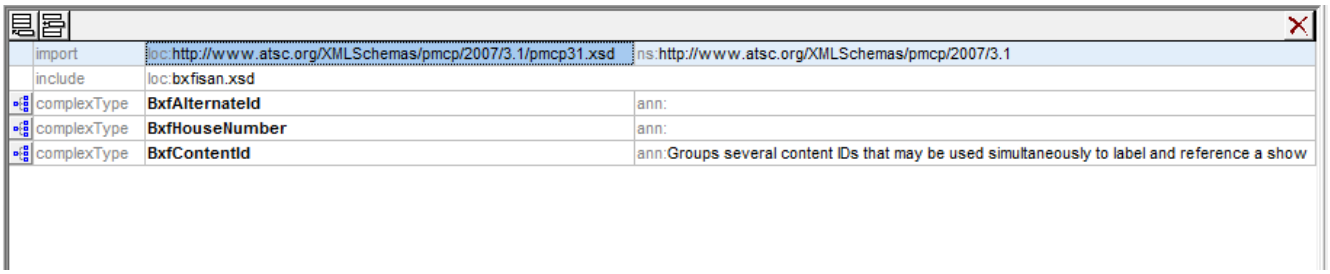
Contains:



Extends ATSC's PMCP 3.1 definition of a channel.

4.2.5 BxfContentId.XSD

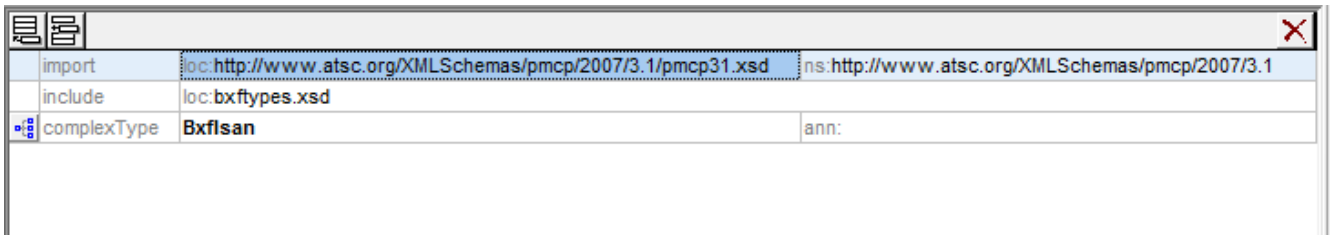
Contains:



Groups several Content IDs that may be used simultaneously to label and reference a show. In Version 2, support was added for the reuse of House Numbers by adding "duration of effectiveness" as supported under ATSC's A57/B standard.

4.2.6 BxfISAN.XSD

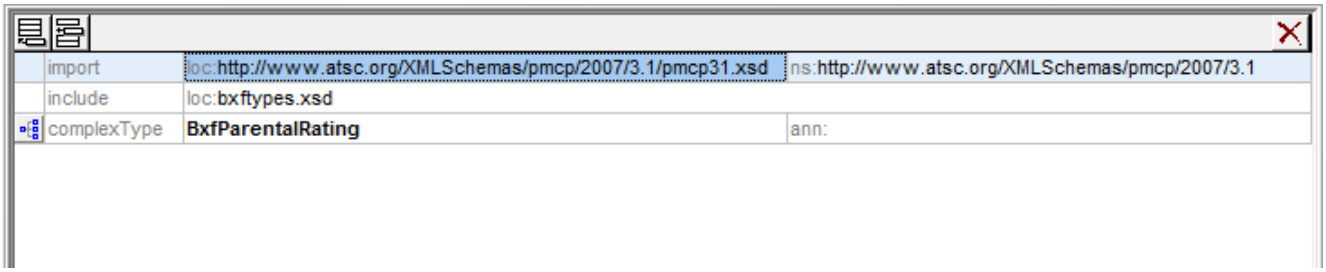
Contains:



Used to define entry of an ISAN value into ContentID. Go to www.isan.org for more information on the use of ISAN with content identification.

4.2.7 BxfParentalRating.XSD

Contains:

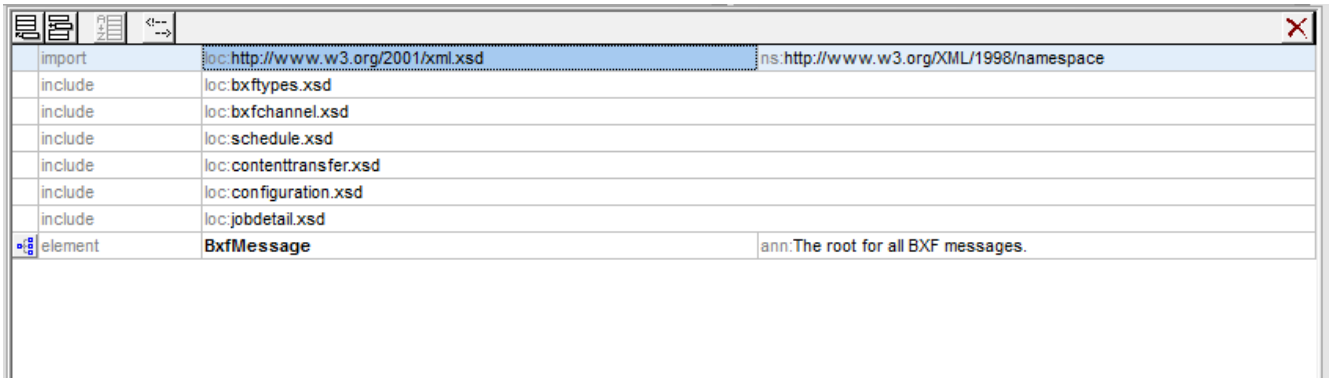


	import	loc:http://www.atsc.org/XMLSchemas/pmcp/2007/3.1/pmcp31.xsd	ns:http://www.atsc.org/XMLSchemas/pmcp/2007/3.1
	include	loc:bxftypes.xsd	
	complexType	**BxfParentalRating**	ann:

Used to define entry of parental rating values as an extension of ATSC's PMCP 3.1.

4.2.8 BxfSchema.XSD

Contains:

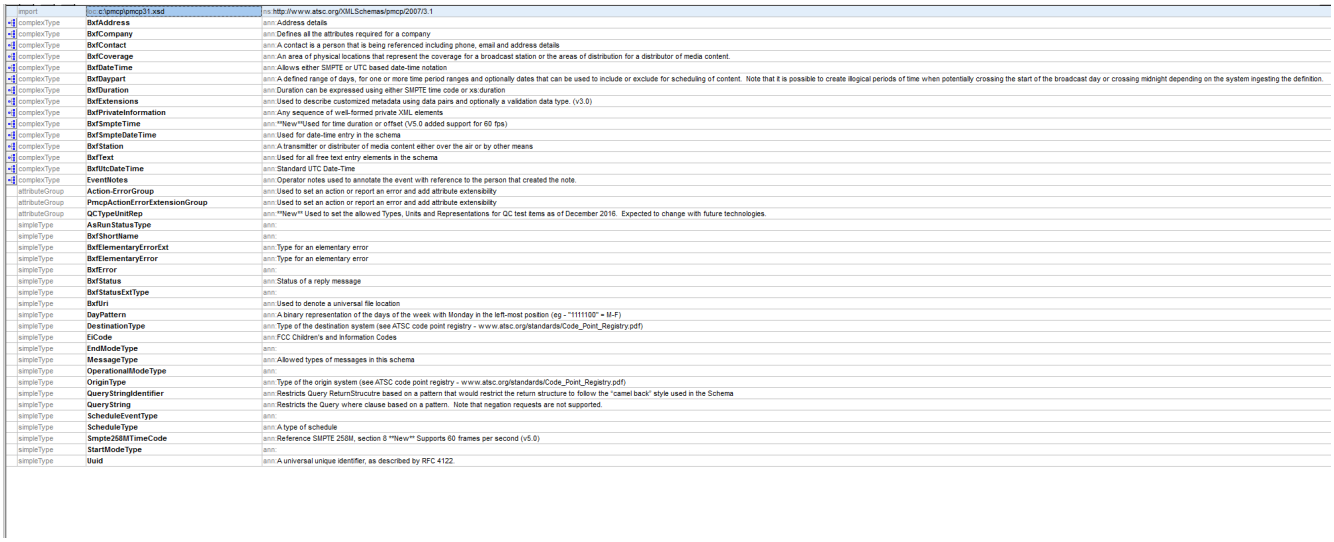


	import	loc:http://www.w3.org/2001/xml.xsd	ns:http://www.w3.org/XML/1998/namespace
	include	loc:bxftypes.xsd	
	include	loc:bxfchannel.xsd	
	include	loc:schedule.xsd	
	include	loc:contenttransfer.xsd	
	include	loc:configuration.xsd	
	include	loc:jobdetail.xsd	
	element	**BxfMessage**	ann:The root for all BXF messages.

The root for all BXF messages.

4.2.9 BxfTypes.XSD

Contains:



import	tns:c:\pmcp\pmcp31.xsd	ns: http://www.atsc.org/XMLSchemas/pmcp/2007/3.1
complexType	**BxfAddress**	ann: Address details
complexType	**BxfCompany**	ann: Defines all the attributes required for a company
complexType	**BxfContact**	ann: A contact is a person that is being referenced including phone, email and address details
complexType	**BxfCoverage**	ann: An area of physical locations that represent the coverage for a broadcast station or the areas of distribution for a distributor of media content.
complexType	**BxfDateTime**	ann: Allows either SMPTE or UTC based date-time notation
complexType	**BxfDaypart**	ann: A defined range of days, for one or more time period ranges and optionally dates that can be used to include or exclude for scheduling of content. Note that it is possible to create illogical periods of time when potentially crossing the start of the broadcast day or crossing midnight depending on the system ingesting the definition.
complexType	**BxfDuration**	ann: Duration can be expressed using either SMPTE time code or xs:duration
complexType	**BxfExtensions**	ann: Used to describe customized metadata using data pairs and optionally a validation data type. (v3.0)
complexType	**BxfPrivateInformation**	ann: Any sequence of well-formed private XML elements
complexType	**BxfSmpteTime**	ann: **New** Used for time duration or offset (V5.0 added support for 60 fps)
complexType	**BxfSmpteDateTime**	ann: Used for date-time entry in the schema
complexType	**BxfStation**	ann: A transmitter or distributer of media content either over the air or by other means
complexType	**BxfText**	ann: Used for all free text entry elements in the schema
complexType	**BxfUtcDateTime**	ann: Standard UTC Date-Time
complexType	**EventNotes**	ann: Operator notes used to annotate the event with reference to the person that created the note.
attributeGroup	**Action-ErrorGroup**	ann: Used to set an action or report an error and add attribute extensibility
attributeGroup	**PmcpActionErrorExtensionGroup**	ann: Used to set an action or report an error and add attribute extensibility
attributeGroup	**QCTypeUnitRep**	ann: **New** Used to set the allowed Types, Units and Representations for QC test items as of December 2016. Expected to change with future technologies.
simpleType	**AsRunStatusType**	ann:
simpleType	**BxfShortName**	ann:
simpleType	**BxfElementaryErrorExt**	ann: Type for an elementary error
simpleType	**BxfElementaryError**	ann: Type for an elementary error
simpleType	**BxfError**	ann:
simpleType	**BxfStatus**	ann: Status of a reply message
simpleType	**BxfStatusExtType**	ann:
simpleType	**BxfUri**	ann: Used to denote a universal file location
simpleType	**DayPattern**	ann: A binary representation of the days of the week with Monday in the left-most position (eg - "1111100" = M-F)
simpleType	**DestinationType**	ann: Type of the destination system (see ATSC code point registry - www.atsc.org/standards/Code_Point_Registry.pdf)
simpleType	**EiCode**	ann: FCC Children's and Information Codes
simpleType	**EndModeType**	ann:
simpleType	**MessageType**	ann: Allowed types of messages in this schema
simpleType	**OperationalModeType**	ann:
simpleType	**OriginType**	ann: Type of the origin system (see ATSC code point registry - www.atsc.org/standards/Code_Point_Registry.pdf)
simpleType	**QueryStringIdentifier**	ann: Restricts Query ReturnStrucutre based on a pattern that would restrict the return structure to follow the "camel back" style used in the Schema
simpleType	**QueryString**	ann: Restricts the Query where clause based on a pattern. Note that negation requests are not supported.
simpleType	**ScheduleEventType**	ann:
simpleType	**ScheduleType**	ann: A type of schedule
simpleType	**Smpte258MTimeCode**	ann: Reference SMPTE 258M, section 8 **New** Supports 60 frames per second (v5.0)
simpleType	**StartModeType**	ann:
simpleType	**Uuid**	ann: A universal unique identifier, as described by RFC 4122.

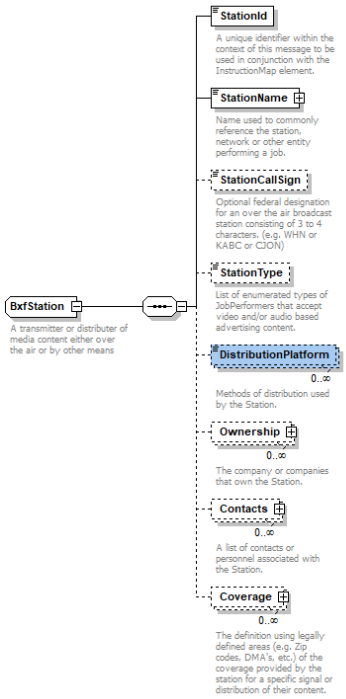
Used to organize all the utility elements that are used by most of the other schema files.

4.2.9.1 BXF 7.0 Changes

Description of change: Under BxfStation, DistributionPlatform was modified to be unbounded and the annotation was changed slightly.

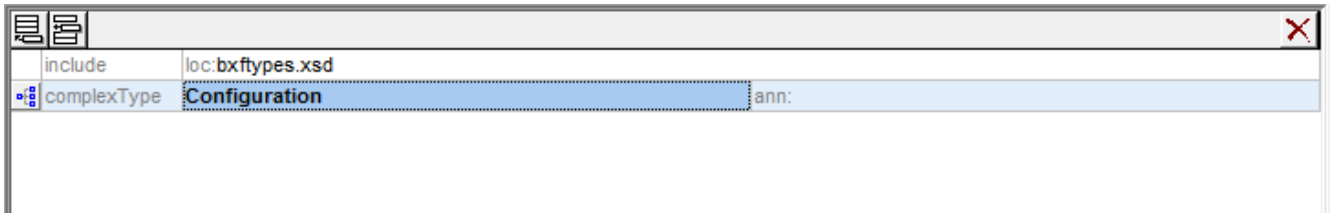
Text representations:

```
<xs:element name="DistributionPlatform" minOccurs="0" maxOccurs="unbounded">
<xs:annotation>
<xs:documentation>Methods of distribution used by the Station.</xs:documentation>
</xs:annotation>
      <xs:simpleType>
            <xs:restriction base="xs:string">
                  <xs:enumeration value="AM"/>
                  <xs:enumeration value="FM"/>
                  <xs:enumeration value="Internet"/>
                  <xs:enumeration value="Mobile"/>
                  <xs:enumeration value="TV"/>
                  <xs:enumeration value="Other"/>
            </xs:restriction>
      /xs:simpleType>
</xs:element>
```



4.2.10 Configuration.XSD

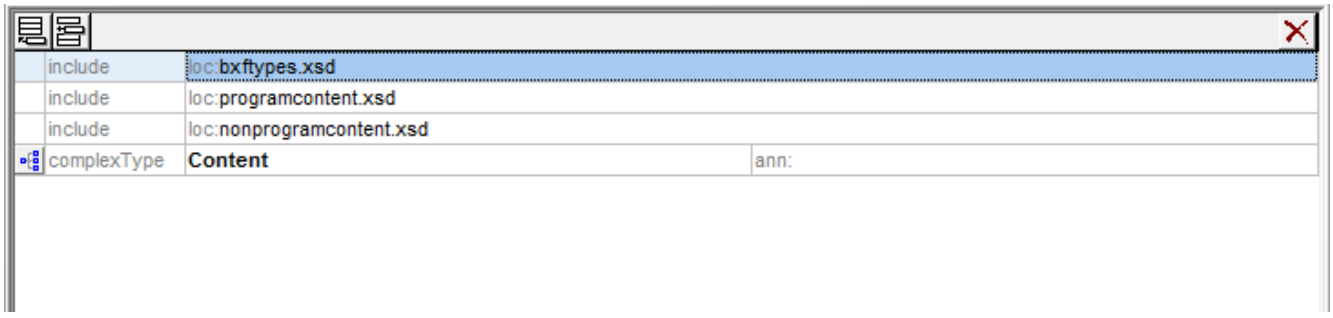
Contains:



Used to describe the configuration values of a system, to be shared with other BXF-compliant systems.

4.2.11 Content.XSD

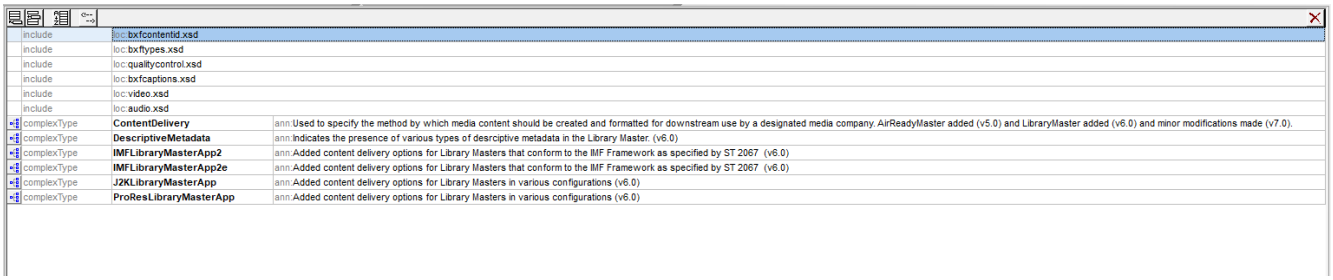
Contains:



Used to describe the content at a specific location.

4.2.12 ContentDelivery.XSD

Contains:



include	loc:bxfcontentid.xsd	
include	loc:bxftypes.xsd	
include	loc:qualitycontrol.xsd	
include	loc:bxfcaptions.xsd	
include	loc:video.xsd	
include	loc:audio.xsd	
complexType	**ContentDelivery**	ann:Used to specify the method by which media content should be created and formatted for downstream use by a designated media company. AirReadyMaster added (v5.0) and LibraryMaster added (v6.0) and minor modifications made (v7.0).
complexType	**DescriptiveMetadata**	ann:Indicates the presence of various types of descriptive metadata in the Library Master. (v6.0)
complexType	**IMFLibraryMasterApp2**	ann:Added content delivery options for Library Masters that conform to the IMF Framework as specified by ST 2067 (v6.0)
complexType	**IMFLibraryMasterApp2e**	ann:Added content delivery options for Library Masters that conform to the IMF Framework as specified by ST 2067 (v6.0)
complexType	**J2KLibraryMasterApp**	ann:Added content delivery options for Library Masters in various configurations (v6.0)
complexType	**ProResLibraryMasterApp**	ann:Added content delivery options for Library Masters in various configurations (v6.0)

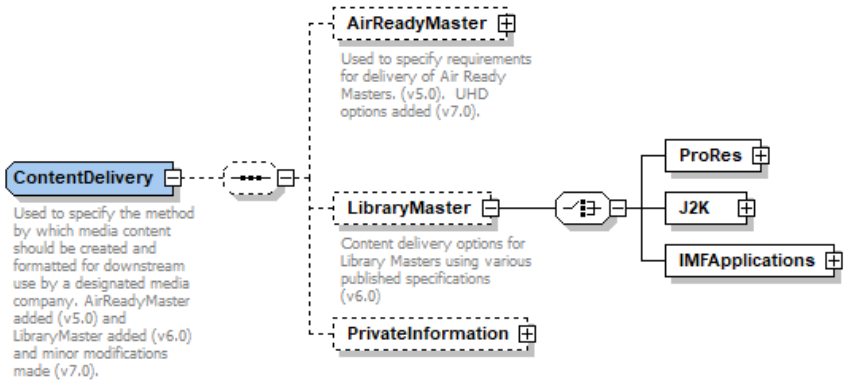
Used to specify the method by which media content should be created and formatted for downstream use by a designated media company. Media is often formatted in different manors depending on the planned use for that media downstream. ContentDelivery now supports both media designated to be aired as well as media content that is considered a Library Master, but may have additional modification before used for air. AirReadyMaster was released in v5.0 and the corresponding document for that version should be consulted for details. LibraryMaster was added in release v6.0 and this version has several new enhancements as well as some fixes.

4.2.12.1 BXF 7.0 Changes

Description of change: Description updated to included notation that changes were made for version 7.0. A new UHD Delivery option (UHDDeliverySpecification) was added for AirReadyMaster based on the NABA DPP specification. In addition, the J2KLibraryMasterApp was modified to clarify the options under J2K by modifying the ImageEssence to be more restrictive, linking to a new extension base, J2KImageEssence that also included a new J2KChromaSubsampling and J2KEncodingProfile. There were also minor changes to the IMFImageEssenceApp2E. (see Video.XSD for details).

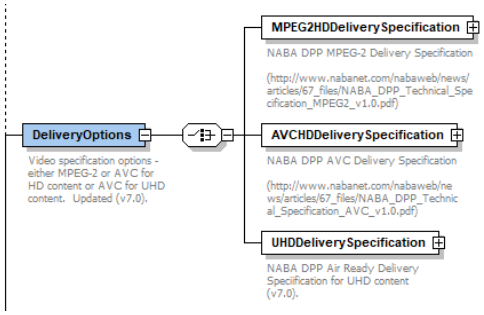
Text representations:

```
<xs:complexType name="ContentDelivery">
<xs:annotation>
<xs:documentation>Used to specify the method by which media content should be created and formatted for downstream use by a designated media company. AirReadyMaster added (v5.0) and LibraryMaster added (v6.0) and minor modifications made (v7.0).</xs:documentation>
</xs:annotation>

<xs:element name="AirReadyMaster" minOccurs="0">
<xs:annotation>
<xs:documentation>Used to specify requirements for delivery of Air Ready Masters. (v5.0). UHD options added. (v7.0)</xs:documentation>
</xs:annotation>
```




```
<xs:element name="DeliveryOptions">
<xs:annotation>
```

```
<xs:documentation>Video specification options - either MPEG-2 or AVC for HD content or AVC for UHD content.  Updated
(v7.0).</xs:documentation>
</xs:annotation>
      <xs:complexType>
            <xs:choice>
                  <xs:element name="MPEG2HDDeliverySpecification">
                  …
                  </xs:element>
                  <xs:element name="AVCHDDeliverySpecification">
                  …
                  </xs:element>
                  <xs:element name="UHDDeliverySpecification">
                  <xs:annotation>
                  <xs:documentation>NABA DPP Air Ready Delivery Speciification for UHD content (v7.0).</xs:documentation>
                  </xs:annotation>
                   (… see below)
                  </xs:element>
            </xs:choice>
      </xs:complexType>
</xs:element>
```

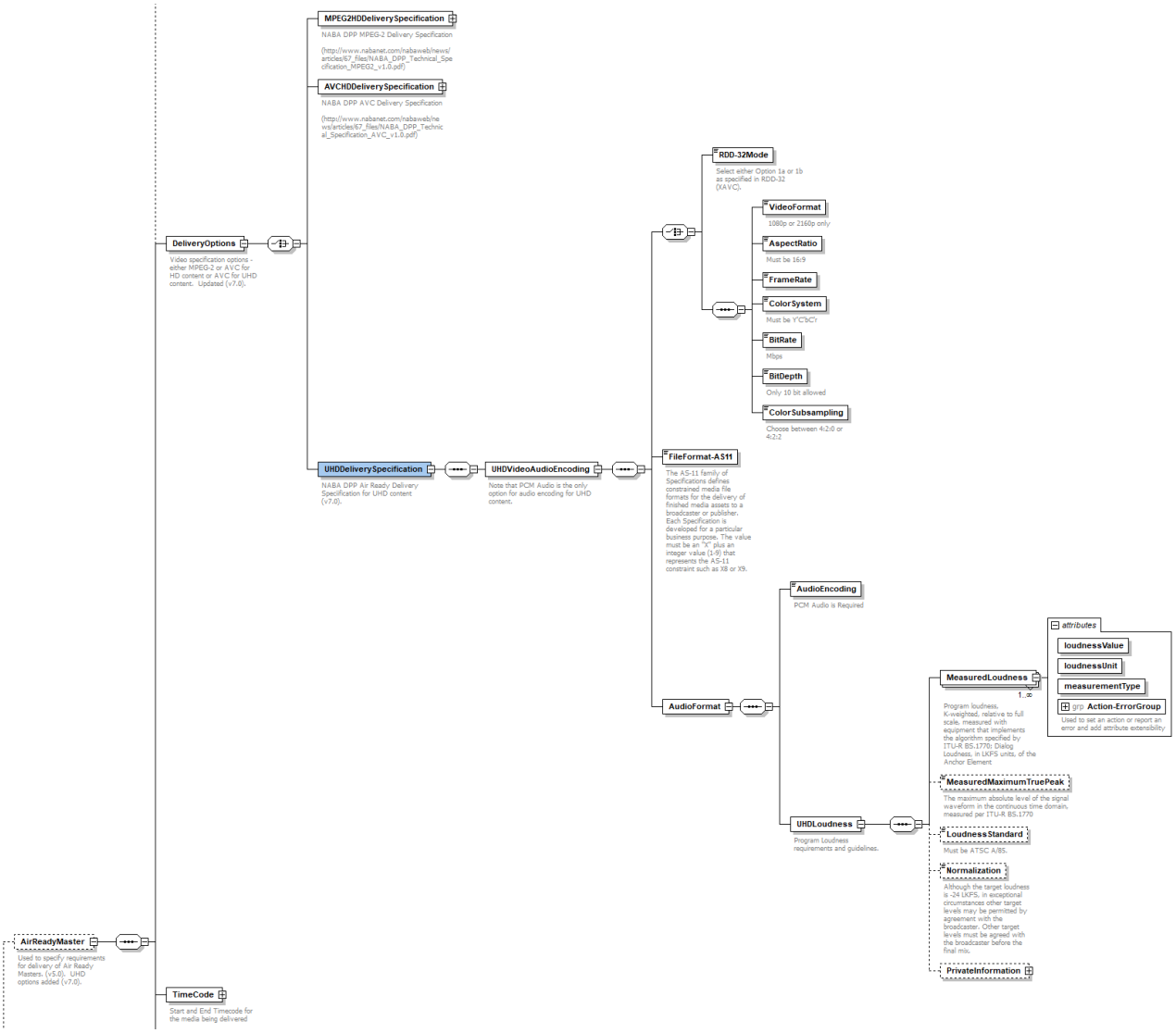



```
<xs:element name="UHDDeliverySpecification">
<xs:annotation>
<xs:documentation>NABA DPP Air Ready Delivery Speciification for UHD content (v7.0).</xs:documentation>
</xs:annotation>
      <xs:complexType>
            <xs:sequence>
                  <xs:element name="UHDVideoAudioEncoding">
                  <xs:annotation>
                  <xs:documentation>Note that PCM Audio is the only option for audio encoding for UHD content.</xs:documentation>
                  </xs:annotation>
                        <xs:complexType>
                              <xs:sequence>
                                    <xs:choice>
                                          <xs:element name="RDD-32Mode">
                                          <xs:annotation>
                                          <xs:documentation>Select either Option 1a or 1b as speciified in RDD-32
(XAVC).</xs:documentation>
                                          </xs:annotation>
                                                <xs:simpleType>
                                                      <xs:restriction base="xs:string">
                                                            <xs:enumeration value="Option 1a"/>
                                                            <xs:enumeration value="Option 1b"/>
                                                      </xs:restriction>
                                                </xs:simpleType>
                                          </xs:element>
                                          <xs:sequence>
                                                <xs:element name="VideoFormat">
                                                <xs:annotation>
                                                <xs:documentation> 1080p or 2160p only</xs:documentation>
                                                </xs:annotation>
                                                      <xs:simpleType>
                                                            <xs:restriction base="xs:string">
                                                                  <xs:enumeration value="1080p"/>
                                                                  <xs:enumeration value="2160p"/>
                                                            </xs:restriction>
                                                      </xs:simpleType>
                                                </xs:element>
                                                <xs:element name="AspectRatio" default="16:9">
```

```
                        <xs:annotation>
                        <xs:documentation>Must be 16:9</xs:documentation>
                        </xs:annotation>
                              <xs:simpleType>
                                    <xs:restriction base="xs:string">
                                          <xs:enumeration value="16:9"/>
                                    </xs:restriction>
                              </xs:simpleType>
                        </xs:element>
                        <xs:element name="FrameRate">
                              <xs:simpleType>
                                    <xs:restriction base="xs:string">
                                          <xs:enumeration value="60"/>
                                          <xs:enumeration value="60*1000/1001"/>
                                          <xs:enumeration value="120"/>
                                          <xs:enumeration value="120*1000/1001"/>
                                    </xs:restriction>
                              </xs:simpleType>
                        </xs:element>
                        <xs:element name="ColorSystem" default="Y'C'bC'r">
                        <xs:annotation>
                        <xs:documentation>Must be Y'C'bC'r</xs:documentation>
                        </xs:annotation>
                              <xs:simpleType>
                                    <xs:restriction base="xs:string">
                                          <xs:enumeration value="Y'C'bC'r"/>
                                    </xs:restriction>
                              </xs:simpleType>
                        </xs:element>
                        <xs:element name="BitRate" type="xs:integer">
                        <xs:annotation>
                        <xs:documentation>Mbps</xs:documentation>
                        </xs:annotation>
                        </xs:element>
                        <xs:element name="BitDepth" default="10">
                        <xs:annotation>
                        <xs:documentation>Only 10 bit allowed</xs:documentation>
                        </xs:annotation>
                              <xs:simpleType>
                                    <xs:restriction base="xs:integer">
                                          <xs:enumeration value="10"/>
                                    </xs:restriction>
                              </xs:simpleType>
                        </xs:element>
                        <xs:element name="ColorSubsampling">
                        <xs:annotation>
                        <xs:documentation>Choose between 4:2:0 or 4:2:2</xs:documentation>
                        </xs:annotation>
                              <xs:simpleType>
                                    <xs:restriction base="xs:string">
                                          <xs:enumeration value="4:2:0"/>
                                          <xs:enumeration value="4:2:2"/>
                                    </xs:restriction>
                              </xs:simpleType>
                        </xs:element>
                  </xs:sequence>
            </xs:choice>
            <xs:element name="FileFormat-AS11">
            <xs:annotation>
            <xs:documentation>The AS-11 family of Specifications defines constrained media file formats for the
delivery of finished media assets to a broadcaster or publisher. Each Specification is developed for a particular business purpose. The value
must be an "X" plus an integer value (1-9) that represents the AS-11 constraint such as X8 or X9.</xs:documentation>
            </xs:annotation>
                  <xs:simpleType>
                        <xs:restriction base="xs:string">
                              <xs:enumeration value="X1"/>
                              <xs:enumeration value="X2"/>
                              <xs:enumeration value="X3"/>
                              <xs:enumeration value="X4"/>
                              <xs:enumeration value="X5"/>
                              <xs:enumeration value="X6"/>
                              <xs:enumeration value="X7"/>
                              <xs:enumeration value="X8"/>
                              <xs:enumeration value="X9"/>
```

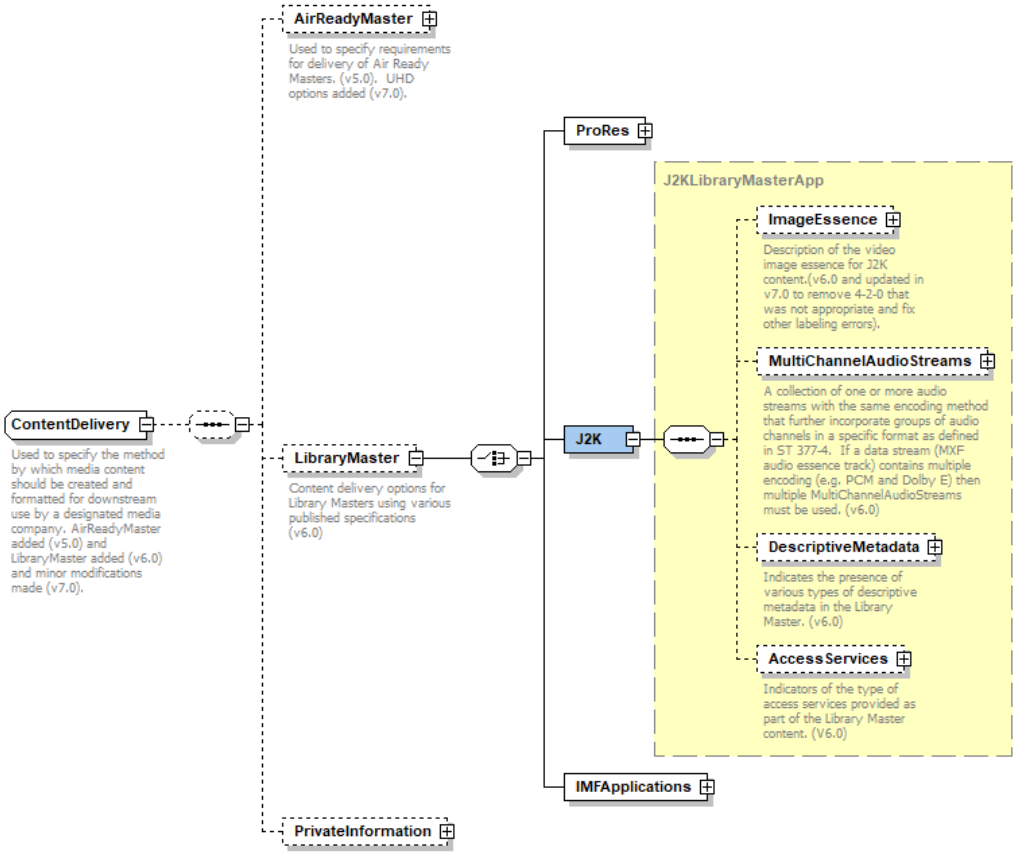
```
                                        </xs:restriction>
                                    </xs:simpleType>
                                </xs:element>
                                <xs:element name="AudioFormat">
                                    <xs:complexType>
                                        <xs:sequence>
                                            <xs:element name="AudioEncoding" default="PCM">
                                            <xs:annotation>
                                            <xs:documentation>PCM Audio is Required</xs:documentation>
                                            </xs:annotation>
                                                <xs:simpleType>
                                                    <xs:restriction base="xs:string">
                                                        <xs:enumeration value="PCM"/>
                                                    </xs:restriction>
                                                </xs:simpleType>
                                            </xs:element>
                                            <xs:element name="UHDLoudness">
                                            <xs:annotation>
                                            <xs:documentation>Program Loudness requirements and
guidelines.</xs:documentation>
                                            </xs:annotation>
                                                <xs:complexType>
                                                    <xs:sequence>
                                                        <xs:element name="MeasuredLoudness" maxOccurs="unbounded">
                                                        <xs:annotation>
                                                        <xs:documentation>Program loudness, K-weighted, relative to full
scale, measured with equipment that implements the algorithm specified by ITU-R BS.1770; Dialog Loudness, in LKFS units, of the Anchor
Element</xs:documentation>
                                                        </xs:annotation>
                                                            <xs:complexType>
                                                            <xs:attribute name="loudnessValue" use="required">
                                                                <xs:simpleType>
                                                                    <xs:restriction base="xs:nonPositiveInteger">
                                                                        <xs:minInclusive value="-146"/>
                                                                        <xs:maxInclusive value="0"/>
                                                                    </xs:restriction>
                                                                </xs:simpleType>
                                                            </xs:attribute>
                                                            <xs:attribute name="loudnessUnit" use="required">
                                                                <xs:simpleType>
                                                                    <xs:restriction base="xs:string">
                                                                        <xs:enumeration value="dBFS"/>
                                                                    </xs:restriction>
                                                                </xs:simpleType>
                                                            </xs:attribute>
                                                            <xs:attribute name="measurementType" use="required">
                                                                <xs:simpleType>
                                                                    <xs:restriction base="xs:string">
                                                                        <xs:enumeration value="Program loudness"/>
                                                                        <xs:enumeration value="Max short-term
loudness"/>
                                                                        <xs:enumeration value="Max momentary
loudness"/>
                                                                    </xs:restriction>
                                                                </xs:simpleType>
                                                            </xs:attribute>
                                                            <xs:attributeGroup ref="Action-ErrorGroup"/>
                                                            </xs:complexType>
                                                        </xs:element>
                                                        <xs:element name="MeasuredMaximumTruePeak" default="-2"
minOccurs="0">
                                                        <xs:annotation>
                                                        <xs:documentation>The maximum absolute level of the signal
waveform in the continuous time domain, measured per ITU-R BS.1770</xs:documentation>
                                                        </xs:annotation>
                                                            <xs:simpleType>
                                                                <xs:restriction base="xs:nonPositiveInteger">
                                                                    <xs:minInclusive value="-146"/>
                                                                    <xs:maxInclusive value="0"/>
                                                                </xs:restriction>
                                                            </xs:simpleType>
                                                        </xs:element>
                                                        <xs:element name="LoudnessStandard" default="ATSC A/85"
minOccurs="0">
                                                        <xs:annotation>
```

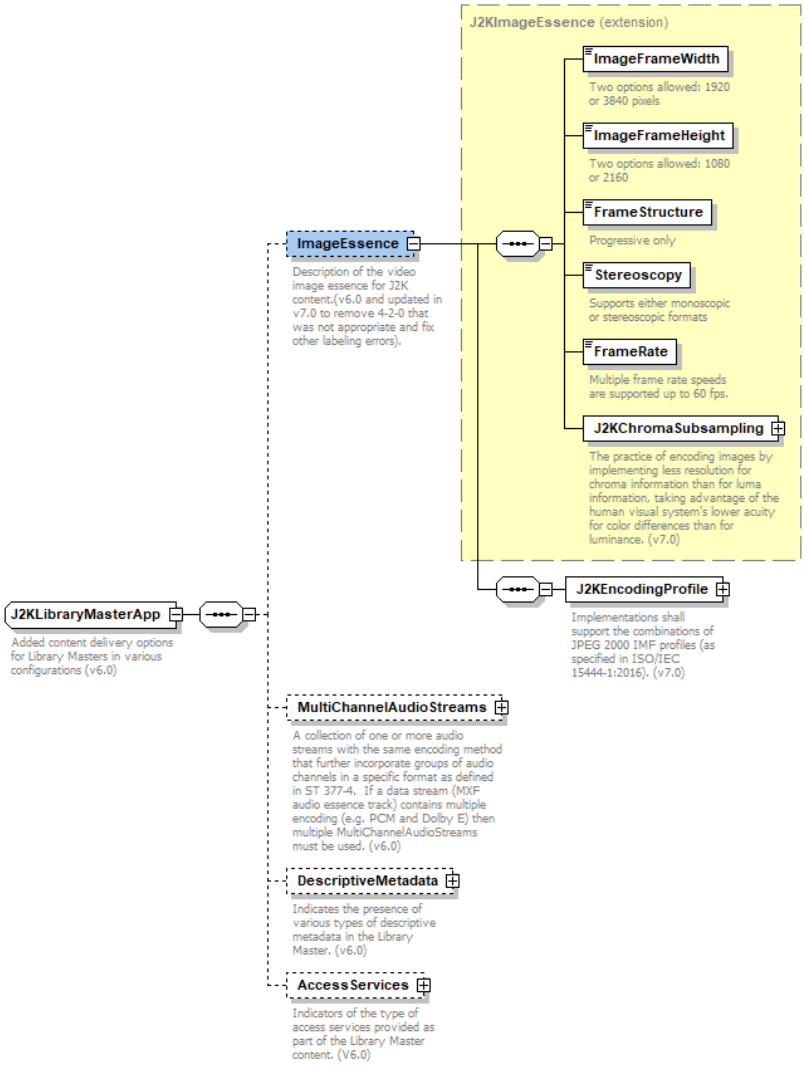
```
                                                    <xs:documentation>Must be ATSC A/85.</xs:documentation>
                                                    </xs:annotation>
                                                        <xs:simpleType>
                                                            <xs:restriction base="xs:string">
                                                                <xs:enumeration value="ATSC A/85"/>
                                                            </xs:restriction>
                                                        </xs:simpleType>
                                                    </xs:element>
                                                    <xs:element name="Normalization" type="xs:nonPositiveInteger"
default="-24" minOccurs="0">
                                                    <xs:annotation>
                                                    <xs:documentation>Although the target loudness is -24 LKFS, in
exceptional circumstances other target levels may be permitted by agreement with the broadcaster. Other target levels must be agreed with
the broadcaster before the final mix.</xs:documentation>
                                                    </xs:annotation>
                                                    </xs:element>
                                                    <xs:element name="PrivateInformation" type="BxfPrivateInformation"
minOccurs="0"/>
                                                </xs:sequence>
                                            </xs:complexType>
                                        </xs:element>
                                    </xs:sequence>
                                </xs:complexType>
                            </xs:element>
                        </xs:sequence>
                    </xs:complexType>
                </xs:element>
            </xs:sequence>
        </xs:complexType>
    </xs:element>
```




```
<xs:element name="ImageEssence" minOccurs="0">
<xs:annotation>
<xs:documentation>Description of the video image essence for J2K content.(v6.0 and updated in v7.0 to remove 4-2-0 that was not appropriate and fix other labeling errors). </xs:documentation>
</xs:annotation>
      <xs:complexType>
            <xs:complexContent>
                  <xs:extension base="J2KImageEssence">
                        <xs:sequence>
                              <xs:element name="J2KEncodingProfile" type="J2KEncodingProfile">
                              <xs:annotation>
                              <xs:documentation>Implementations shall support the combinations of JPEG 2000 IMF profiles (as specified in ISO/IEC 15444-1:2016). (v7.0)</xs:documentation>
                              </xs:annotation>
                              </xs:element>
                        </xs:sequence>
                  </xs:extension>
            </xs:complexContent>
      </xs:complexType>
</xs:element>

<xs:element name="MultiChannelAudioStreams" type="MultiChannelAudioStreams" minOccurs="0">
<xs:annotation>
```

<xs:documentation>A collection of one or more audio streams with the same encoding method that further incorporate groups of audio channels in a specific format as defined in ST 377-4. If a data stream (MXF audio essence track) contains multiple encoding (e.g. PCM and Dolby E) then multiple MultiChannelAudioStreams must be used. (v6.0)</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="DescriptiveMetadata" type="DescriptiveMetadata" minOccurs="0">
<xs:annotation>
<xs:documentation>Indicates the presence of various types of descriptive metadata in the Library Master. (v6.0)</xs:documentation>
</xs:annotation>
</xs:element>





4.2.13 ContentMetadata.XSD

Contains:

include	loc:audio.xsd	
include	loc:bxfcaptions.xsd	
include	loc:bxfcontentid.xsd	
include	loc:datacontent.xsd	
include	loc:location.xsd	
include	loc:video.xsd	
include	loc:macro.xsd	
include	loc:bxftypes.xsd	
include	loc:qualitycontrol.xsd	
include	loc:contentdelivery.xsd	
complexType	**AlternateAudioContent**	ann:Used to provide alternate audio only media information
complexType	**BaseMedia**	ann:Enumerates the way content is stored or the method used to transmit
complexType	**BillBoard**	ann:Used to describe the different attributes of one or more BillBoards
complexType	**ContentDetail**	ann:Description of people, events, sports results, and word tags to search for things that represent this media (v5.0).
complexType	**ContentMetaData**	ann:Used to describe all the metadata for a single instance of content. (Note that this element name might be expected to be "ContentMetadata", but was left unchanged from previous versions in order to preserve backward compatibility. This is a documented exception as of v3.0)
complexType	**Media**	ann:Base Media combined with Media Location
complexType	**MediaLocation**	ann:Used to designate the physical location of a media essence and its quality
complexType	**UsagePolicy**	ann:

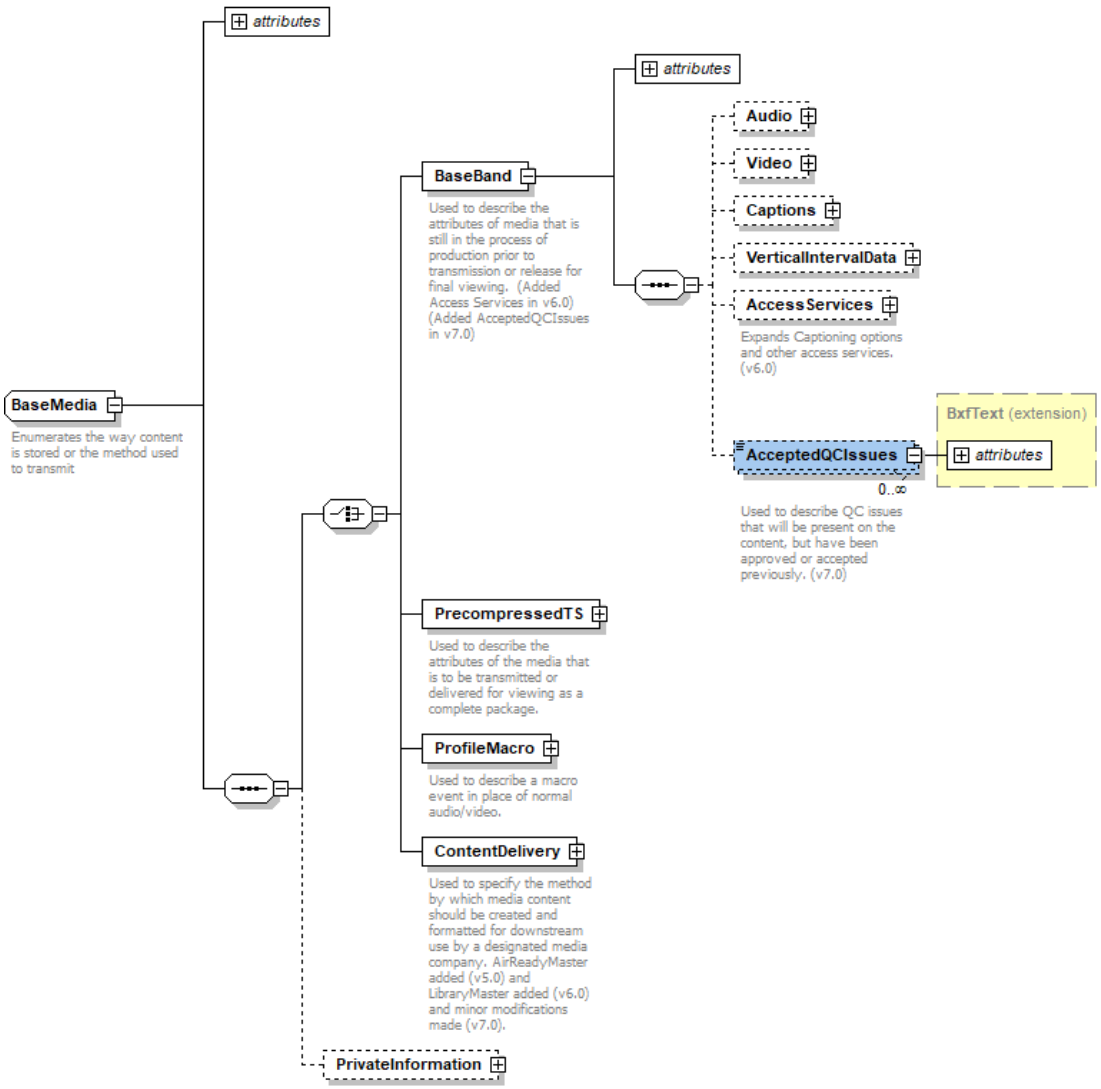
Content identification and other details related to media and media location.

4.2.13.1 BXF 7.0 Changes

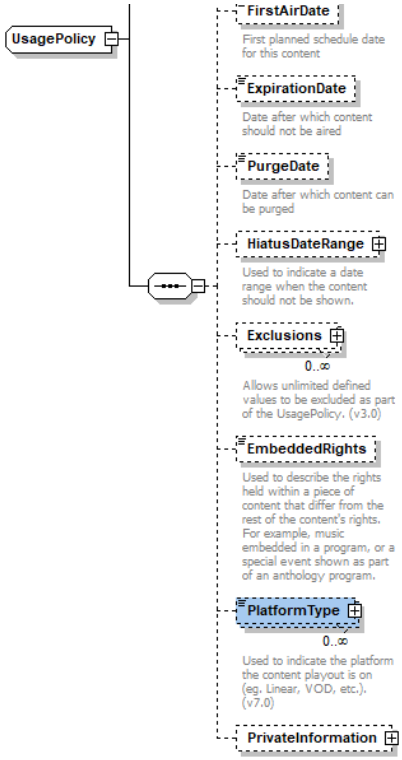
Description of change: Added a new element to BaseMedia/BaseBand called AcceptedQCIssues to indicate that any QC issues associated with the media have already been approved and accepted through previous evaluation. User can add any text to describe one or multiple situations to be reviewed. Also updated description for ContentDelivery to indicate enhancements in v7.0. UsagePolicy under ContentMetadata received a new element, PlatformType, used to indicate the platform the content is expected to playout on (e.g. Linear, VOD, etc.).

Text representation:

```
<xs:element name="AcceptedQCIssues" minOccurs="0" maxOccurs="unbounded">
<xs:annotation>
<xs:documentation>Used to describe QC issues that will be present on the content, but have been approved or accepted previously.
(v7.0)</xs:documentation>
</xs:annotation>
      <xs:complexType>
            <xs:complexContent>
                  <xs:extension base="BxfText"/>
            </xs:complexContent>
      </xs:complexType>
</xs:element>
```

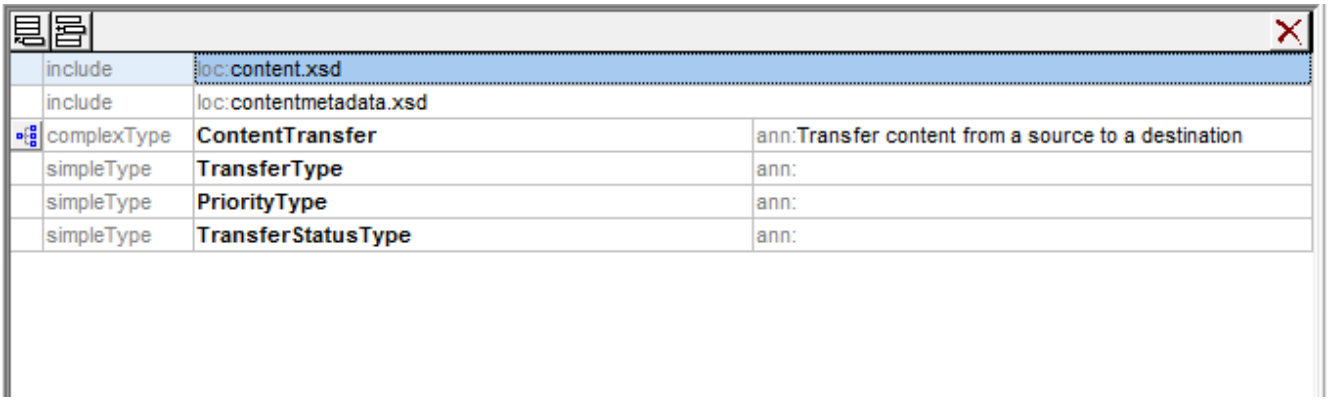


```
<xs:element name="PlatformType" type="BxfText" minOccurs="0" maxOccurs="unbounded">
<xs:annotation>
<xs:documentation>Used to indicate the platform the content playout is on (eg. Linear, VOD, etc.). (v7.0)</xs:documentation>
</xs:annotation>
</xs:element>
```



4.2.14 ContentTransfer.XSD

Contains:

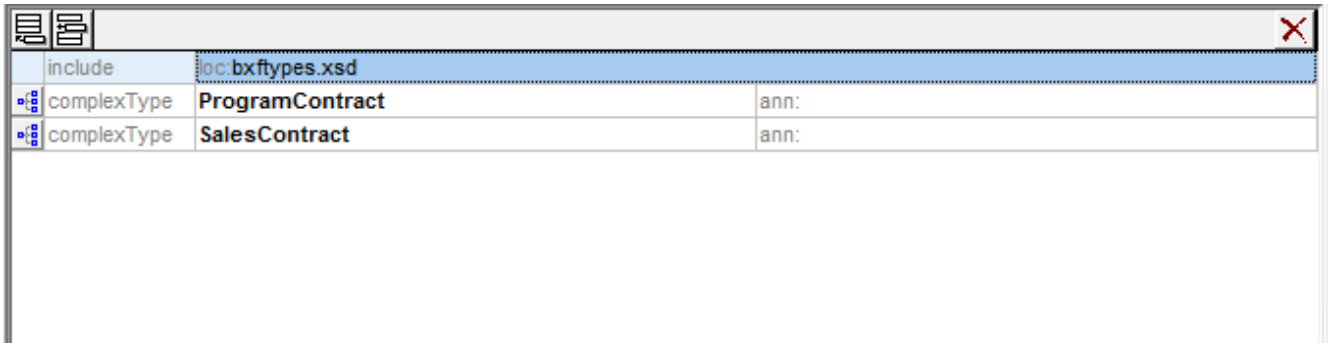


include	loc:content.xsd	
include	loc:contentmetadata.xsd	
complexType	**ContentTransfer**	ann:Transfer content from a source to a destination
simpleType	**TransferType**	ann:
simpleType	**PriorityType**	ann:
simpleType	**TransferStatusType**	ann:

Used to transfer media from one location to another location, or to transcode it.

4.2.15 Contract.XSD

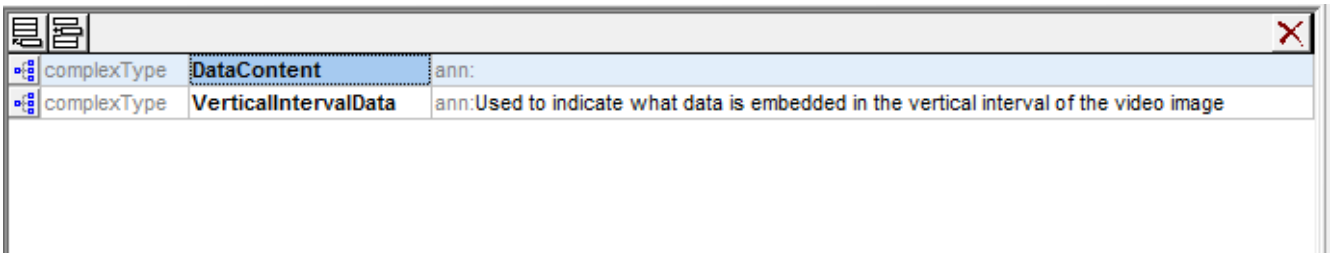
Contains:



ProgramContract - used if the program is purchased, it may be linked to a rights contract. SalesContract – used for contract information for the interstitial content (commercials).

4.2.16 DataContent.XSD

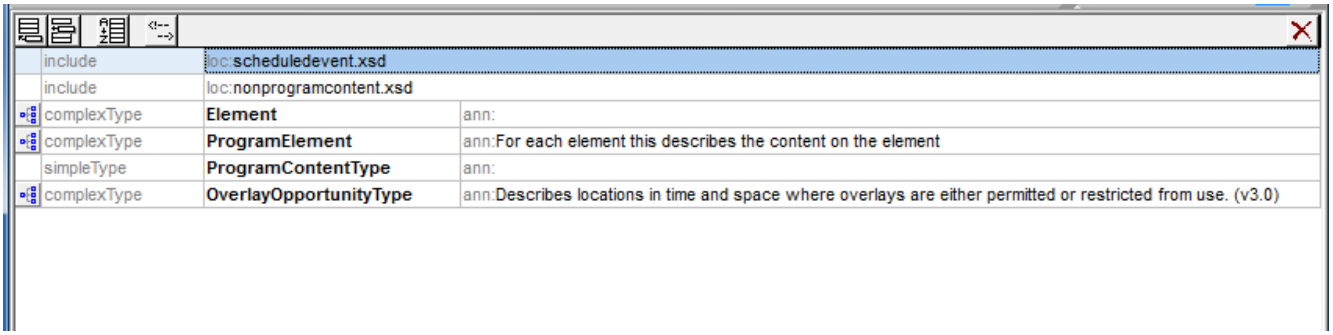
Contains:



Used to define data that can be added to the transport stream.

4.2.17 Element.XSD

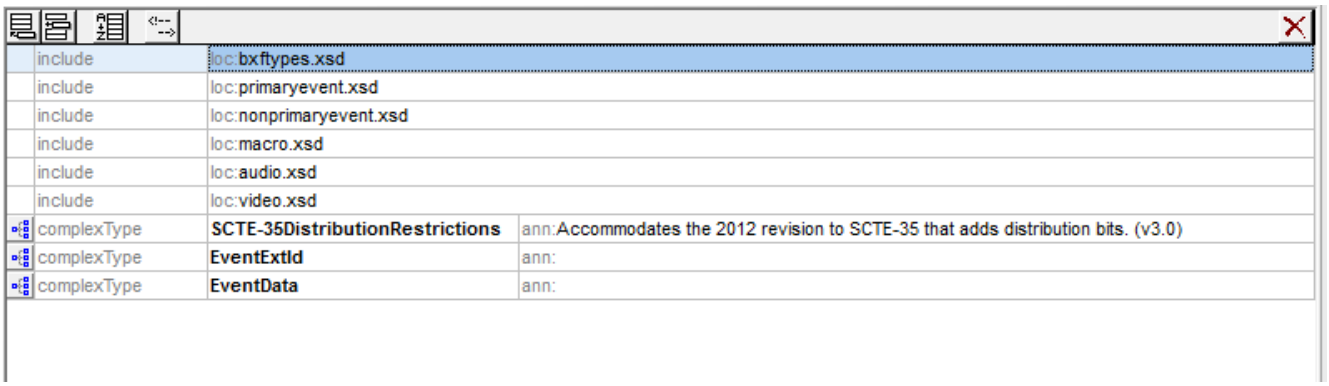
Contains:



If the program is being delivered in segmented form, this describes each segment's content, position and offset from the start of the program as well as other embedded content such as inserted barter content.

4.2.18 EventData.XSD

Contains:

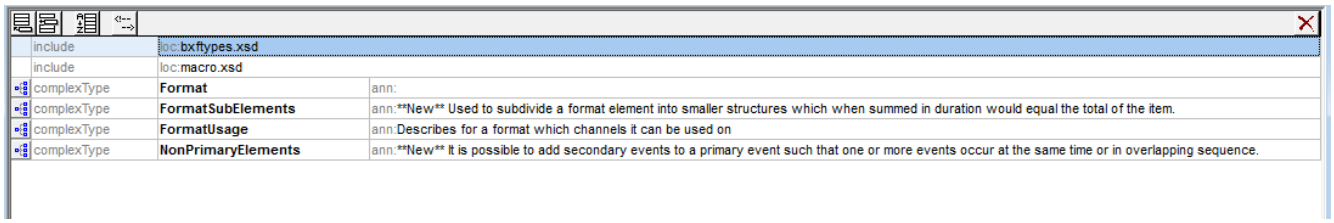


include	loc:bxftypes.xsd		
include	loc:primaryevent.xsd		
include	loc:nonprimaryevent.xsd		
include	loc:macro.xsd		
include	loc:audio.xsd		
include	loc:video.xsd		
complexType	**SCTE-35DistributionRestrictions**	ann:Accommodates the 2012 revision to SCTE-35 that adds distribution bits. (v3.0)	
complexType	**EventExtId**	ann:	
complexType	**EventData**	ann:	

Specifies the data specific to a particular airing of a complete show or a single event. In Version 2, support for multiple titles and descriptions in a single message has been added in order to allow multi-language support.

4.2.19 Format.XSD

Contains:

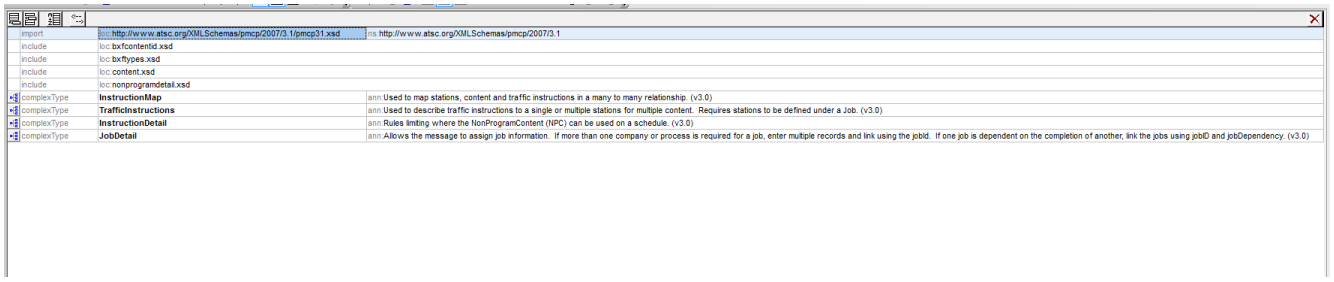


include	loc:bxftypes.xsd	
include	loc:macro.xsd	
complexType	**Format**	ann:
complexType	**FormatSubElements**	ann:**New** Used to subdivide a format element into smaller structures which when summed in duration would equal the total of the item.
complexType	**FormatUsage**	ann:Describes for a format which channels it can be used on
complexType	**NonPrimaryElements**	ann:**New** It is possible to add secondary events to a primary event such that one or more events occur at the same time or in overlapping sequence.

The definition of the skeletal structure of a program as used by the traffic system to construct a schedule grid.

4.2.20 JobDetail.XSD

Contains:



import	loc:http://www.atsc.org/XMLSchemas/pmcp/2007/3.1/pmcp31.xsd	ns:http://www.atsc.org/XMLSchemas/pmcp/2007/3.1
include	loc:bxfcontentid.xsd	
include	loc:bxftypes.xsd	
include	loc:content.xsd	
include	loc:nonprogramdetail.xsd	
complexType	**InstructionMap**	ann:Used to map stations, content and traffic instructions in a many to many relationship. (v3.0)
complexType	**TrafficInstructions**	ann:Used to describe traffic instructions to a single or multiple stations for multiple content. Requires stations to be defined under a Job. (v3.0)
complexType	**InstructionDetail**	ann:Rules limiting where the NonProgramContent (NPC) can be used on a schedule. (v3.0)
complexType	**JobDetail**	ann:Allows the message to assign job information. If more than one company or process is required for a job, enter multiple records and link using the jobId. If one job is dependent on the completion of another, link the jobs using jobID and jobDependency. (v3.0)

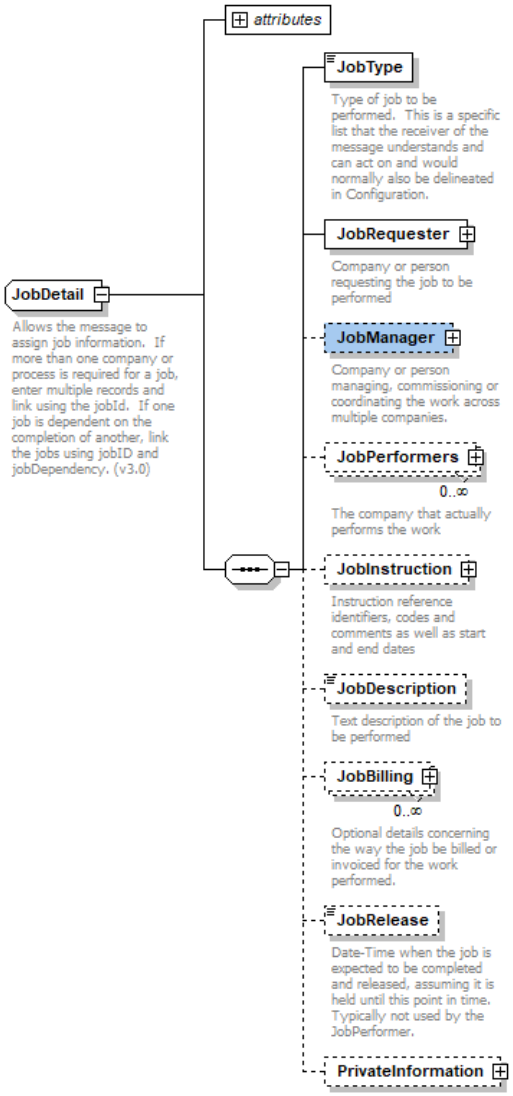
Allows the message to assign job information. If more than one company or process is required for a job, enter multiple records and link using the jobId. If one job is dependent on the completion of another, link the jobs using jobID and jobDependency.

4.2.20.1 BXF 7.0 Changes

Description of change: Minor change to the description used for JobManager to include the term “commissioning”.

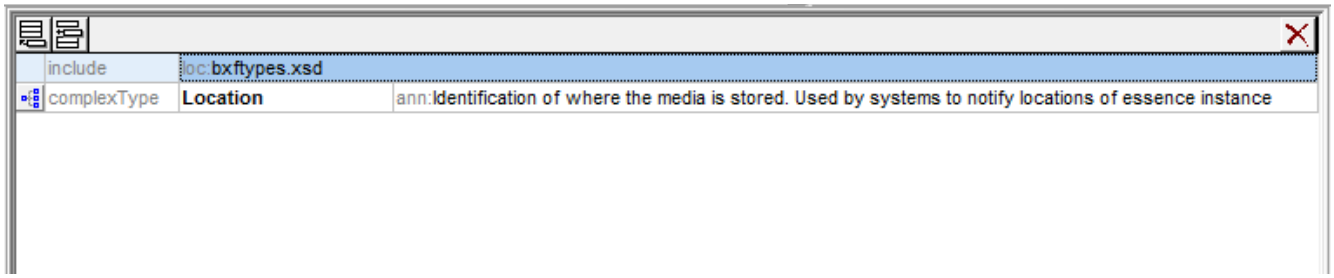
Text representation:

```
<xs:element name="JobManager" type="BxfCompany" minOccurs="0">
<xs:annotation>
<xs:documentation>Company or person managing, commissioning or coordinating the work across multiple companies.</xs:documentation>
</xs:annotation>
</xs:element>
```



4.2.21 Location.XSD

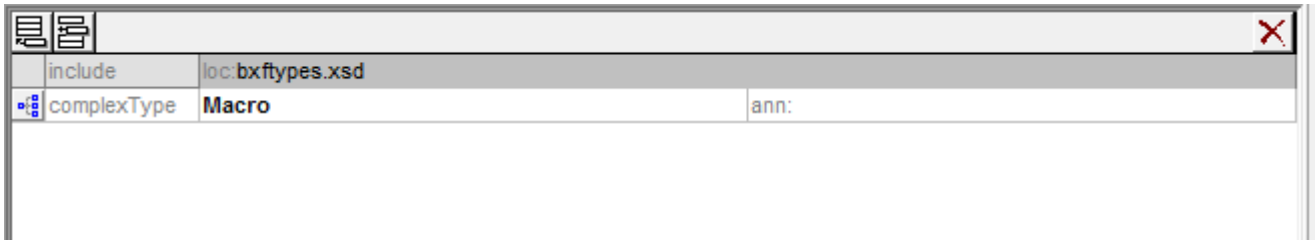
Contains:



Identification of where the media is stored. Used by systems to notify locations of content.

4.2.22 Macro.XSD

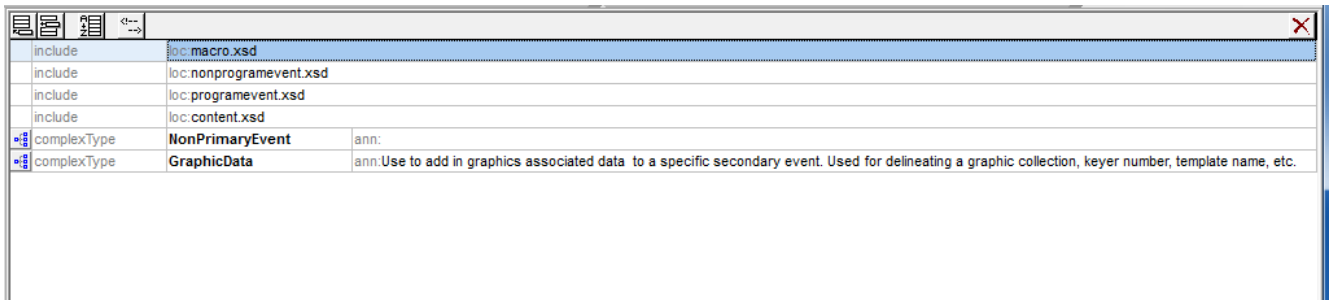
Contains:



Used to describe a MacroEvent under EventData.

4.2.23 NonPrimaryEvent.XSD

Contains:



Used to describe those events that are not the primary content of a transport stream or playlist. Secondary events happen at the same time or in conjunction with the broadcast of the primary video and audio streams and may be started and completed using offsets from the start of the primary events.

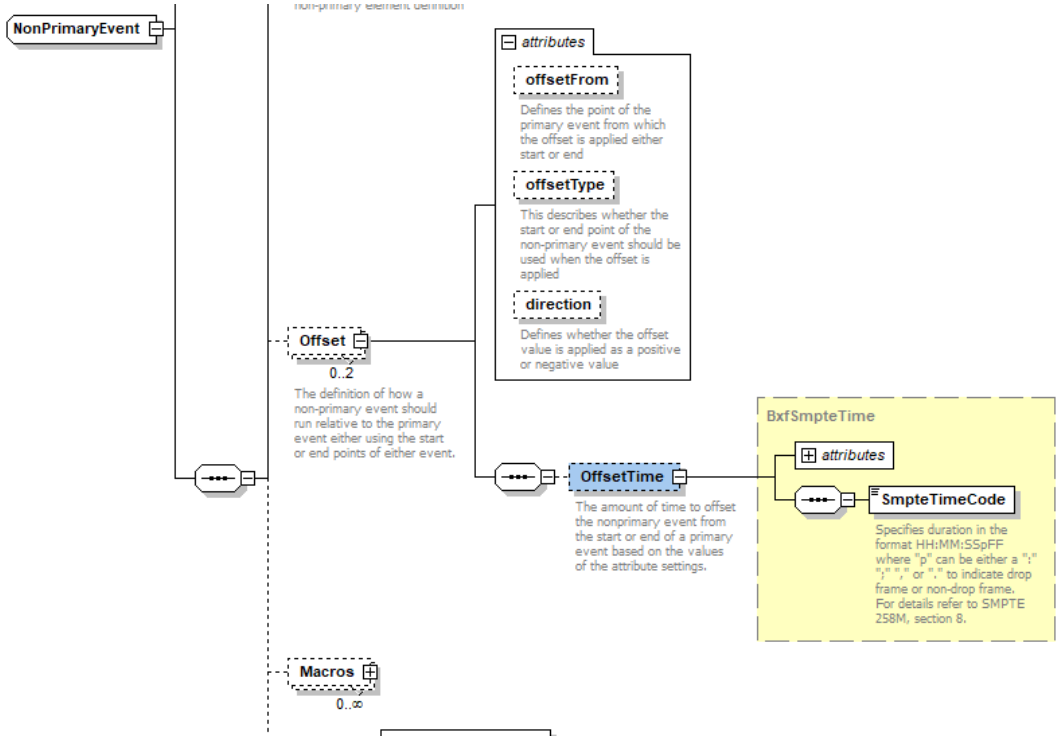
4.2.23.1 BXF 7.0 Changes

Description of change: Minor change to the description used for Offset/OffsetTime to clarify its use.

Text representation:

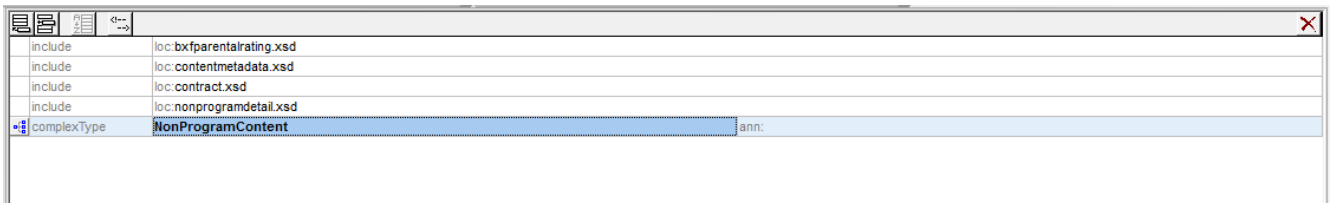
```
<xs:element name="OffsetTime" type="BxfSmpteTime" minOccurs="0">
```

<xs:annotation>
<xs:documentation>The amount of time to offset the nonprimary event from the start or end of a primary event based on the values of the attribute settings.</xs:documentation>
</xs:annotation>
</xs:element>



4.2.24 NonProgramContent.XSD

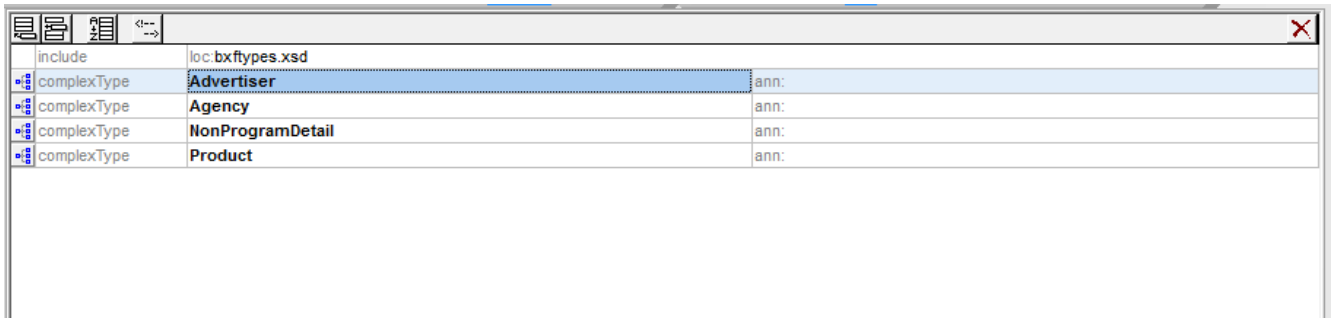
Contains:



Non-program content typically describes short form content such as commercials, psa's, id's and other events that are not considered full length program content.

4.2.25 NonProgramDetail.XSD

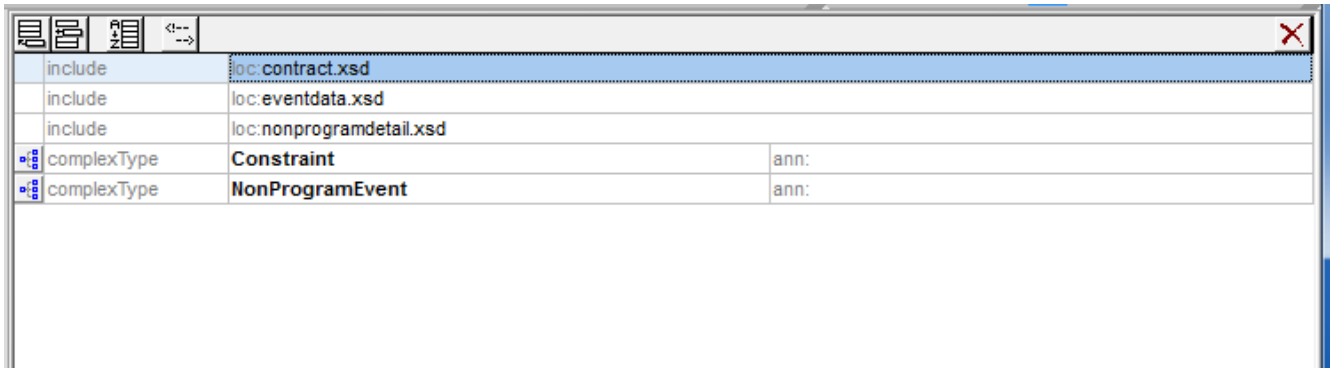
Contains:



Details of the non-program content.

4.2.26 NonProgramEvent.XSD

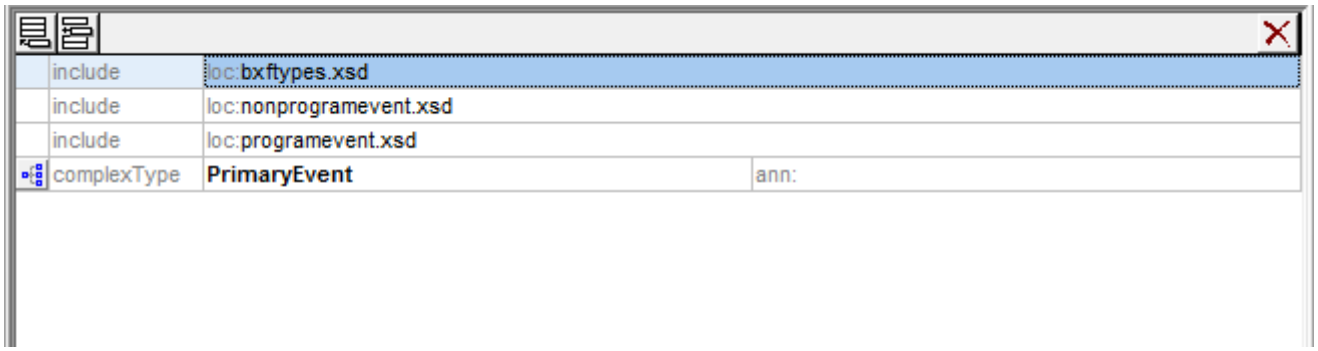
Contains:



Describes an event that contains NonProgramContent such as commercials and other interstitials, typically of short duration.

4.2.27 PrimaryEvent.XSD

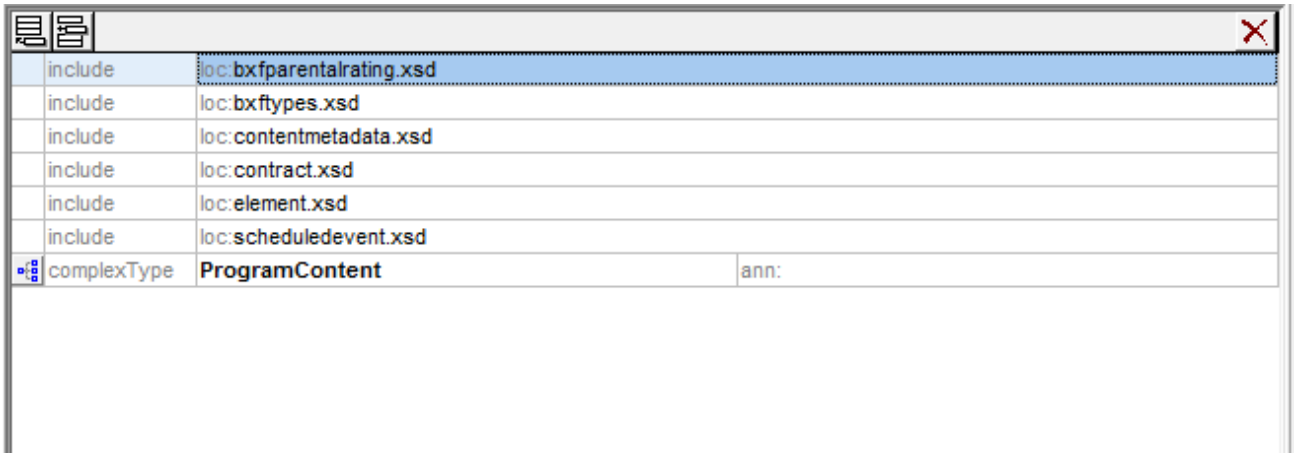
Contains:



Describes an event that contains the primary audio and video content for the transport stream or playlist.

4.2.28 ProgramContent.XSD

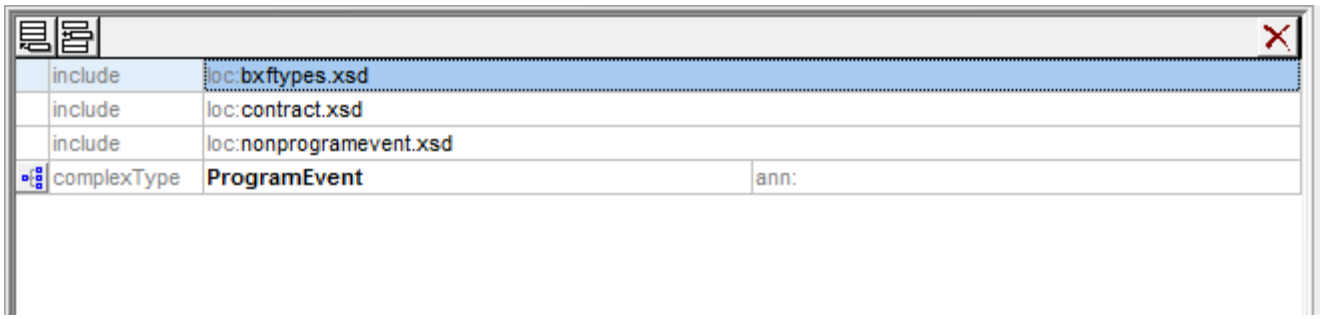
Contains:



Used to describe the full-length content of a show.

4.2.29 ProgramEvent.XSD

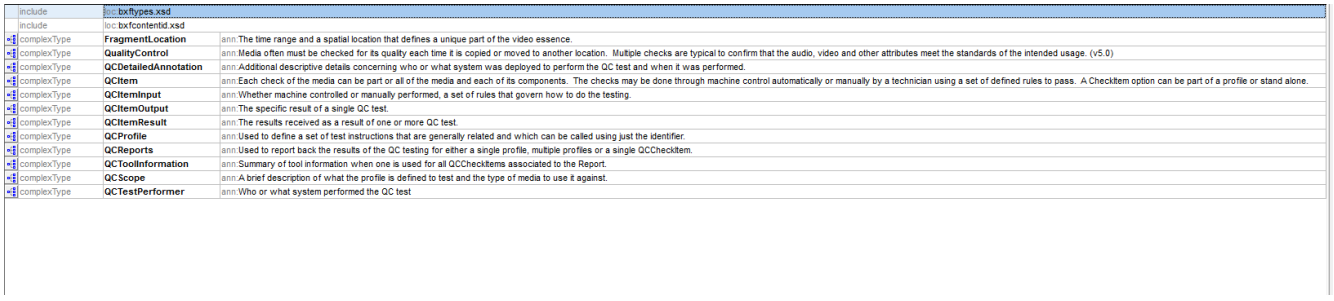
Contains:



Describes an event that contains ProgramContent.

4.2.30 QualityControl.XSD

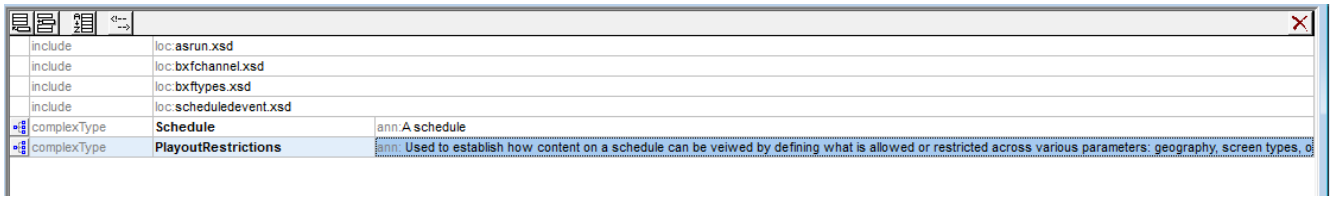
Contains:



Media often must be checked for its quality each time it is copied or moved to another location. Multiple checks are typical to confirm that the audio, video and other attributes meet the standards of the intended usage. QualityControl is accessible at the top choice level of BxfData in order to allow the creation of specific profiles without regard to specific media being tested. It is also found under Media/MediaLocation as an element that allows for the selection and reporting back on a specific media at a specific location.

4.2.31 Schedule.XSD

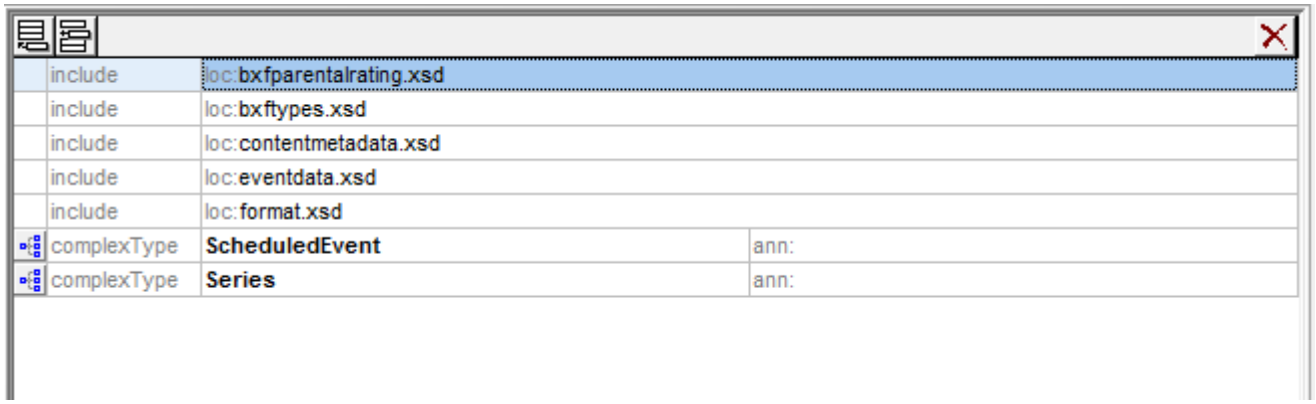
Contains:



Used to describe a specific list of content in a linear playout sequence. In Version 2, support has been added to communicate schedule changes in real time by a new node, RealTimeDetail. This allows the indication of which event is the current event playing as well as the events that had played out previously and those that will playout next.

4.2.32 ScheduledEvent.XSD

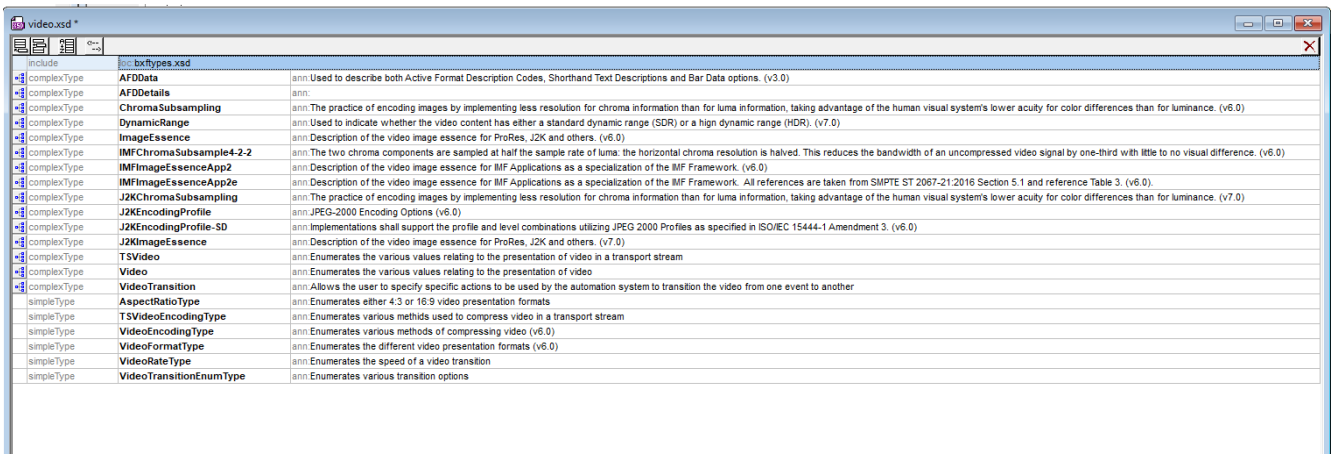
Contains:



Used to describe a single event within a specific list of content arranged in a linear playout sequence.

4.2.33 Video.XSD

Contains:



Enumerates the various values relating to the presentation of video.

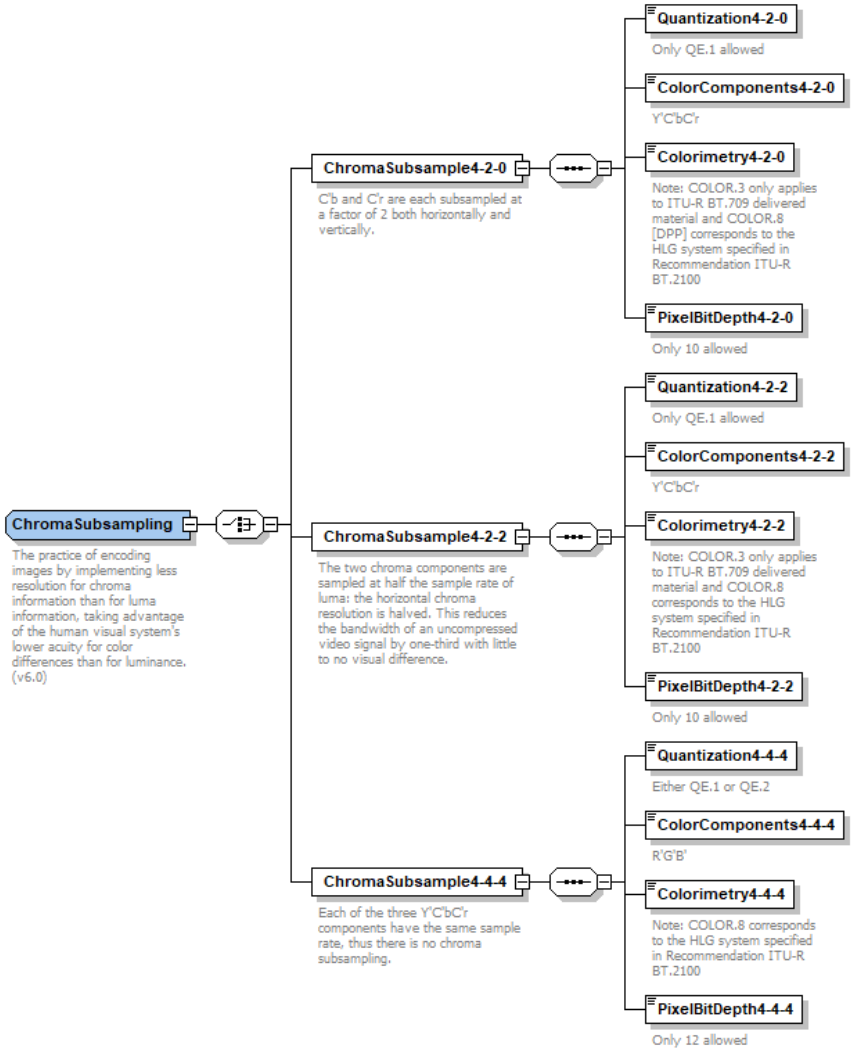
4.2.33.1 BXF 7.0 Changes

Description of change: ChromaSubsample4-2-0 and ChromaSubsample4-4-4 descriptions had typos and were fixed. ColorComponents4-2-0, ColorComponents4-2-2 and ColorComponent4-4-4 had errors in the description, the enumeration and the default value and were fixed. Colorimetry4-2-0 added an clarification to the description that COLOR.8 was "[DPP]". Also modified was the IMFImageEssenceApp2E with an enhanced description and fixes below it for color values. Video has three new elements added, DynamicRange, used to indicate whether the video has either a standard dynamic range (SDR) or a high dynamic range (HDR) with appropriate values for either PQ or HLG. The other two clarified previous released elements and their descriptions for J2KChromaSubsampling and J2KImageEssence used under ContentDelivery (see that XSD for details of location). Lastly, Video has a new attribute, includesSlate, used to indicate that a slate is included as part of the video content.

Text representation:

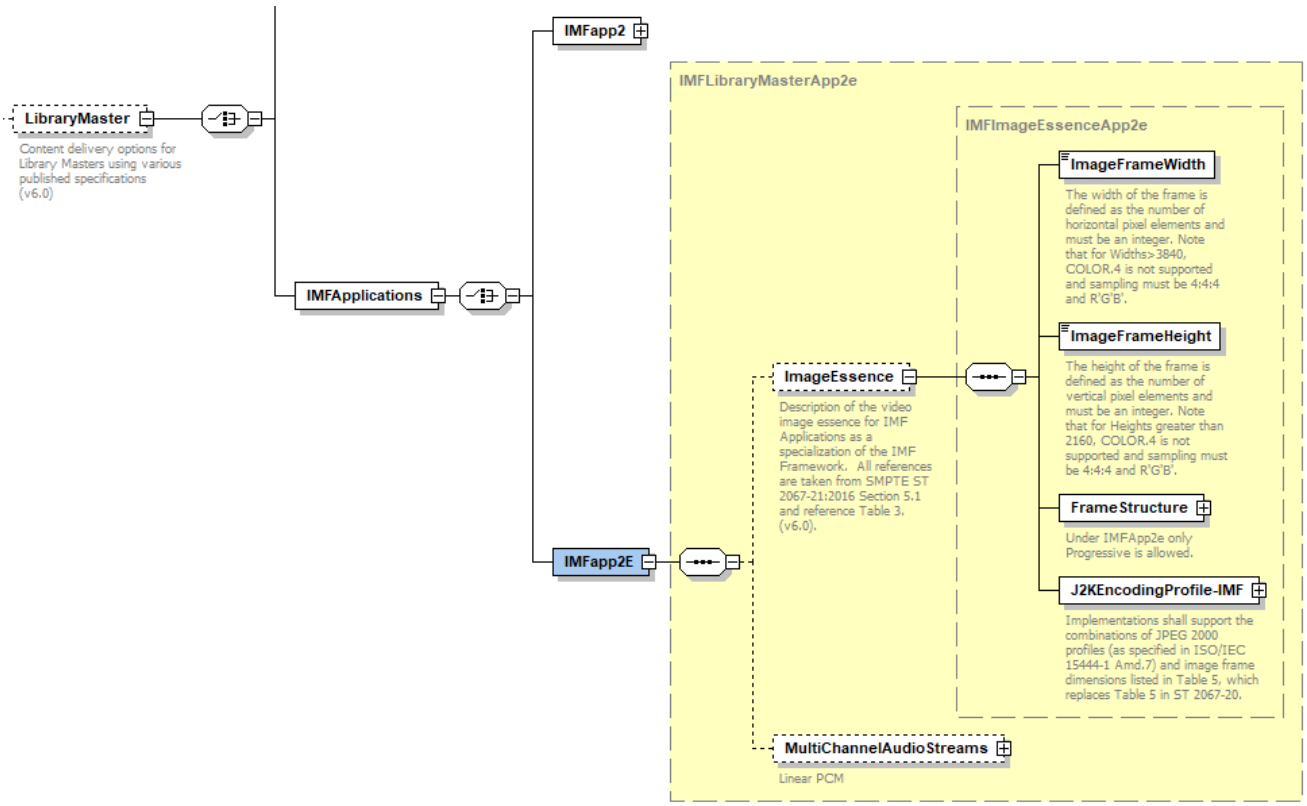
```
<xs:element name="ChromaSubsample4-2-0">
<xs:annotation>
<xs:documentation>C'b and C'r are each subsampled at a factor of 2 both horizontally and vertically.</xs:documentation>
</xs:annotation>

<xs:element name="ColorComponents4-2-0" default="Y'C'bC'r">
<xs:annotation>
<xs:documentation>Y'C'bC'r</xs:documentation>
</xs:annotation>
      <xs:simpleType>
            <xs:restriction base="xs:string">
                  <xs:enumeration value="Y'C'bC'r"/>
            </xs:restriction>
      </xs:simpleType>
</xs:element>

<xs:element name="Colorimetry4-2-0">
<xs:annotation>
<xs:documentation>Note: COLOR.3 only applies to ITU-R BT.709 delivered material and COLOR.8 [DPP] corresponds to the HLG system specified in Recommendation ITU-R BT.2100</xs:documentation>
</xs:annotation>


<xs:element name="ColorComponents4-2-2" default="Y'C'bC'r">
<xs:annotation>
<xs:documentation>Y'C'bC'r</xs:documentation>
</xs:annotation>
      <xs:simpleType>
            <xs:restriction base="xs:string">
                  <xs:enumeration value="Y'C'bC'r"/>
            </xs:restriction>
```

```
        </xs:simpleType>
</xs:element>

<xs:element name="ChromaSubsample4-4-4">
<xs:annotation>
<xs:documentation>Each of the three Y'C'bC'r components have the same sample rate, thus there is no chroma subsampling.</xs:documentation>
</xs:annotation>

<xs:element name="ColorComponents4-4-4" default="R'G'B'">
<xs:annotation>
<xs:documentation>R'G'B'</xs:documentation>
</xs:annotation>
        <xs:simpleType>
                <xs:restriction base="xs:string">
                        <xs:enumeration value="R'G'B'"/>
                </xs:restriction>
        </xs:simpleType>
</xs:element>
```



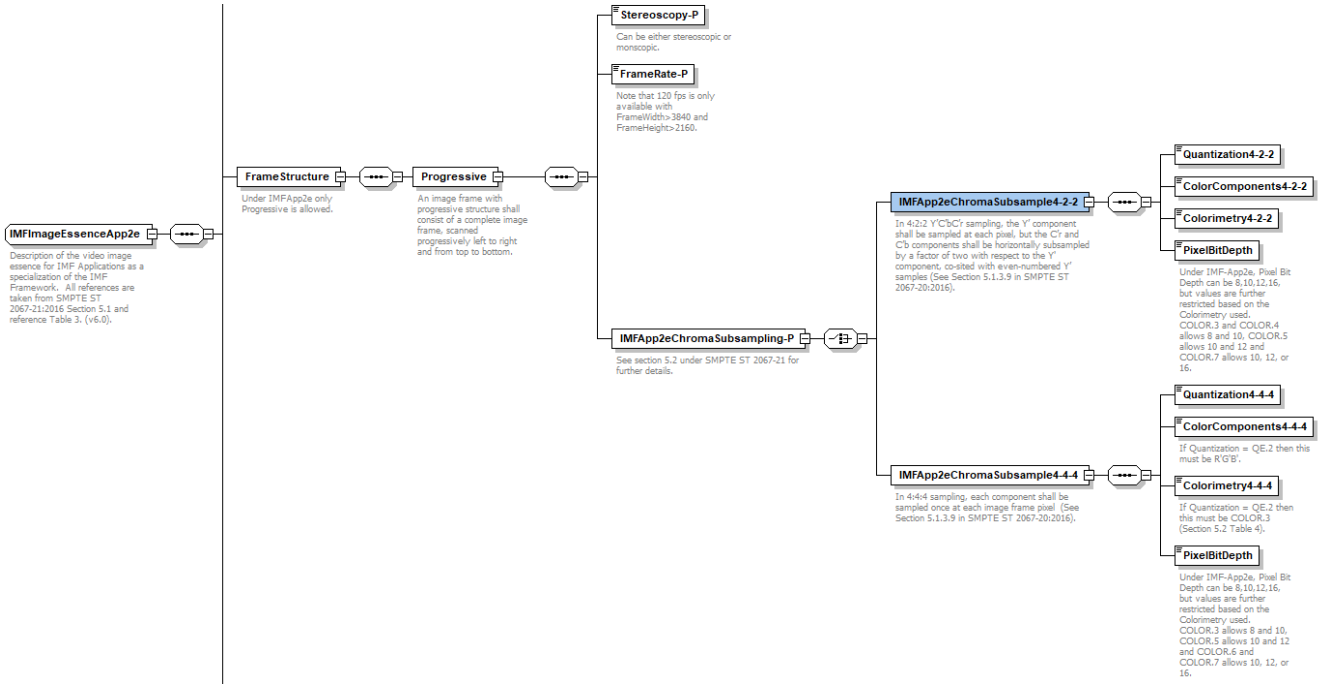

```
<xs:complexType name="IMFImageEssenceApp2e">
<xs:annotation>
<xs:documentation>Description of the video image essence for IMF Applications as a specialization of the IMF Framework.  All references are taken from SMPTE ST 2067-21:2016 Section 5.1 and reference Table 3. (v6.0).</xs:documentation>
</xs:annotation>
```

```
<xs:element name="ImageFrameWidth">
<xs:annotation>
<xs:documentation>The width of the frame is defined as the number of horizontal pixel elements and must be an integer. Note that for Widths>3840, COLOR.4 is not supported and sampling must be 4:4:4 and R'G'B'.</xs:documentation>
</xs:annotation>

<xs:element name="ImageFrameHeight">
<xs:annotation>
<xs:documentation>The height of the frame is defined as the number of vertical pixel elements and must be an integer. Note that for Heights greater than 2160, COLOR.4 is not supported and sampling must be 4:4:4 and R'G'B'.</xs:documentation>
</xs:annotation>
```




```
<xs:element name="IMFApp2eChromaSubsample4-2-2">
<xs:annotation>
<xs:documentation>In 4:2:2 Y'C'bC'r sampling, the Y' component shall be sampled at each pixel, but the C'r and C'b components shall be horizontally subsampled by a factor of two with respect to the Y' component, co-sited with even-numbered Y' samples (See Section 5.1.3.9 in SMPTE ST 2067-20:2016).</xs:documentation>
</xs:annotation>

<xs:element name="ColorComponents4-2-2" default="Y'C'bC'r">
    <xs:simpleType>
        <xs:restriction base="xs:string">
            <xs:enumeration value="Y'C'bC'r"/>
        </xs:restriction>
    </xs:simpleType>
</xs:element>

<xs:element name="IMFApp2eChromaSubsample4-4-4">
<xs:annotation>
<xs:documentation>In 4:4:4 sampling, each component shall be sampled once at each image frame pixel  (See Section 5.1.3.9 in SMPTE ST 2067-20:2016).</xs:documentation>
</xs:annotation>
```

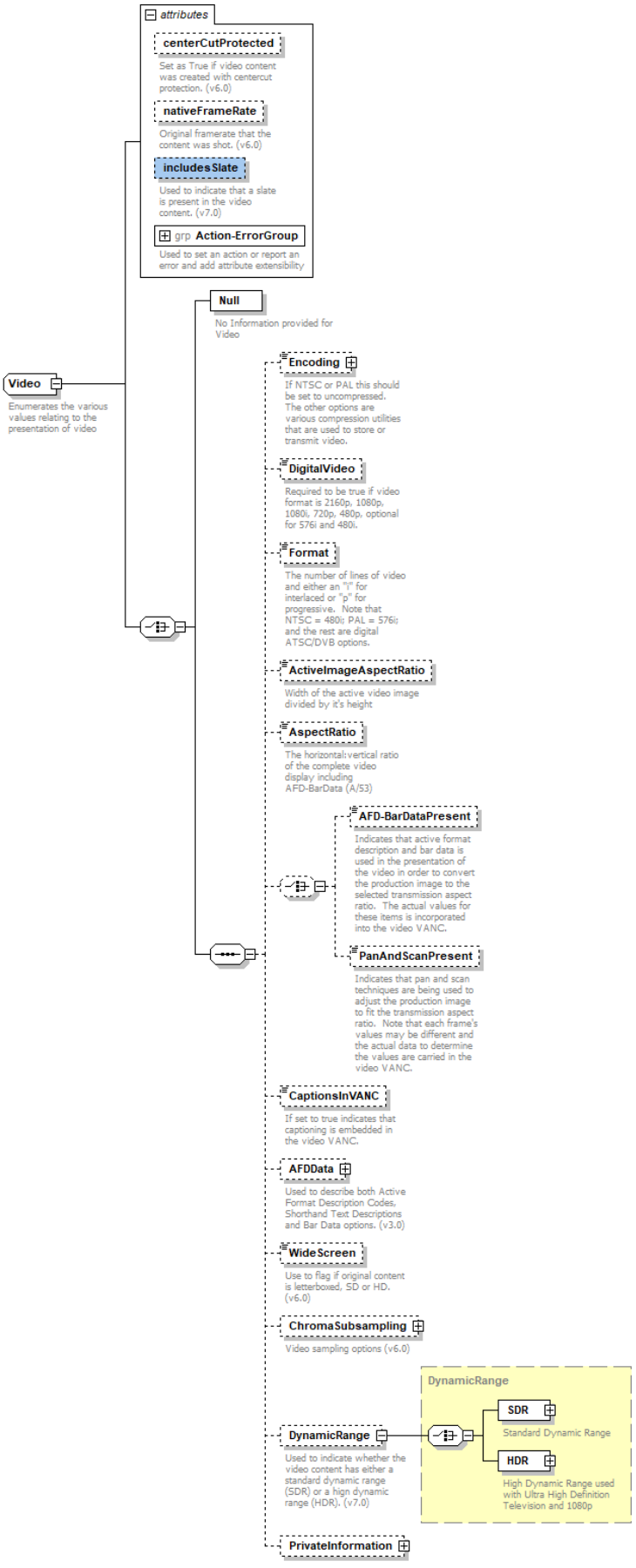
```
<xs:element name="ColorComponents4-4-4" default="R'G'B'">
<xs:annotation>
<xs:documentation>If Quantization = QE.2 then this must be R'G'B'.</xs:documentation>
</xs:annotation>
      <xs:simpleType>
            <xs:restriction base="xs:string">
                  <xs:enumeration value="R'G'B'"/>
            </xs:restriction>
      </xs:simpleType>
</xs:element>
<xs:element name="Colorimetry4-4-4">
<xs:annotation>
<xs:documentation>If Quantization = QE.2 then this must be COLOR.3 (Section 5.2 Table 4).</xs:documentation>
</xs:annotation>
```




```
<xs:complexType name="Video">
<xs:annotation>
<xs:documentation>Enumerates the various values relating to the presentation of video</xs:documentation>
</xs:annotation>
      <xs:choice>
            <xs:element name="Null">
            <xs:annotation>
            <xs:documentation>No Information provided for Video</xs:documentation>
            </xs:annotation>
                  <xs:complexType/>
            </xs:element>
                  <xs:sequence>
                        <xs:element name="Encoding" minOccurs="0">
                        <xs:annotation>
                        <xs:documentation>If NTSC or PAL this should be set to uncompressed.  The other options are various compression utilities that are used to store or transmit video.</xs:documentation>
                        </xs:annotation>
                              <xs:complexType>
                                    <xs:simpleContent>
                                          <xs:extension base="VideoEncodingType">
                                                <xs:attribute name="encodingReference" type="xs:string">
                                                <xs:annotation>
                                                <xs:documentation>Allows the user to annotate the type of encoding method used if not standard.</xs:documentation>
                                                </xs:annotation>
                                                </xs:attribute>
                                          </xs:extension>
                                    </xs:simpleContent>
```

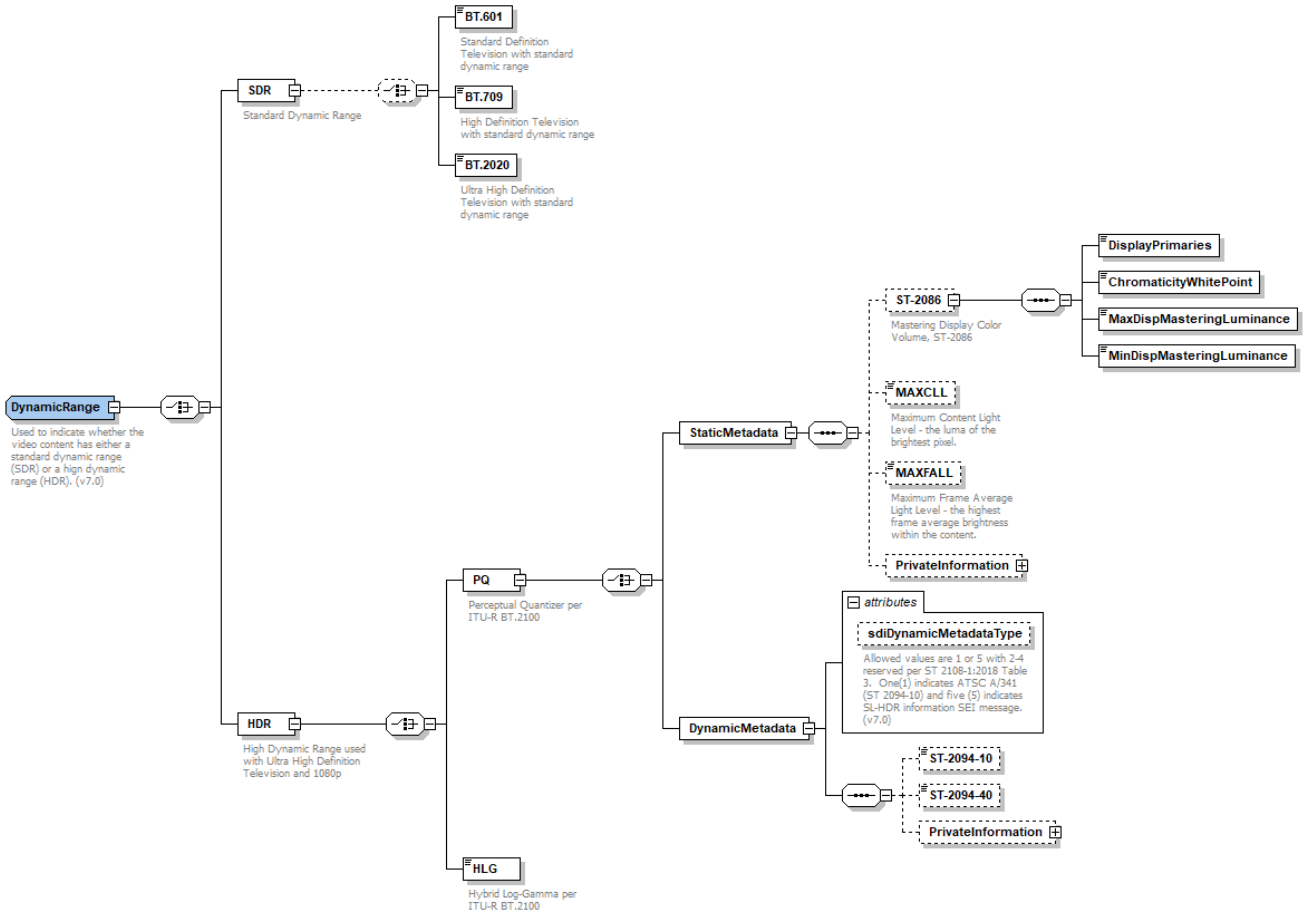
```
                    </xs:complexType>
                </xs:element>
                <xs:element name="DigitalVideo" type="xs:boolean" minOccurs="0">
                <xs:annotation>
                <xs:documentation>Required to be true if video format is 2160p, 1080p, 1080i, 720p, 480p, optional for 576i and
480i.</xs:documentation>
                </xs:annotation>
                </xs:element>
                <xs:element name="Format" minOccurs="0">
                <xs:annotation>
                <xs:documentation>The number of lines of video and either an "i" for interlaced or "p" for progressive.  Note that
NTSC = 480i; PAL = 576i; and the rest are digital ATSC/DVB options.</xs:documentation>
                </xs:annotation>
                    <xs:complexType>
                        <xs:simpleContent>
                            <xs:extension base="VideoFormatType"/>
                        </xs:simpleContent>
                    </xs:complexType>
                </xs:element>
                <xs:element name="ActiveImageAspectRatio" type="xs:float" minOccurs="0">
                <xs:annotation>
                <xs:documentation>Width of the active video image divided by it's height</xs:documentation>
                </xs:annotation>
                </xs:element>
                <xs:element name="AspectRatio" type="AspectRatioType" minOccurs="0">
                <xs:annotation>
                <xs:documentation>The horizontal:vertical ratio of the complete video display including AFD-BarData
(A/53)</xs:documentation>
                </xs:annotation>
                </xs:element>
                    <xs:choice minOccurs="0">
                        <xs:element name="AFD-BarDataPresent" minOccurs="0">
                        <xs:annotation>
                        <xs:documentation>Indicates that active format description and bar data is used in the presentation of the
video in order to convert the production image to the selected transmission aspect ratio.  The actual values for these items is incorporated
into the video VANC.</xs:documentation>
                        </xs:annotation>
                            <xs:complexType>
                                <xs:simpleContent>
                                    <xs:extension base="xs:boolean"/>
                                </xs:simpleContent>
                            </xs:complexType>
                        </xs:element>
                        <xs:element name="PanAndScanPresent" type="xs:boolean" minOccurs="0">
                        <xs:annotation>
                        <xs:documentation>Indicates that pan and scan techniques are being used to adjust the production image
to fit the transmission aspect ratio.  Note that each frame's values may be different and the actual data to determine the values are carried in
the video VANC.</xs:documentation>
                        </xs:annotation>
                        </xs:element>
                    </xs:choice>
                <xs:element name="CaptionsInVANC" type="xs:boolean" minOccurs="0">
                <xs:annotation>
                <xs:documentation>If set to true indicates that captioning is embedded in the video VANC.</xs:documentation>
                </xs:annotation>
                </xs:element>
                <xs:element name="AFDData" type="AFDData" minOccurs="0">
                <xs:annotation>
                <xs:documentation>Used to describe both Active Format Description Codes, Shorthand Text Descriptions and Bar
Data options. (v3.0)</xs:documentation>
                </xs:annotation>
                </xs:element>
                <xs:element name="WideScreen" type="xs:boolean" minOccurs="0">
                <xs:annotation>
                <xs:documentation>Use to flag if original content is letterboxed, SD or HD. (v6.0)</xs:documentation>
                </xs:annotation>
                </xs:element>
                <xs:element name="ChromaSubsampling" minOccurs="0">
                <xs:annotation>
                <xs:documentation>Video sampling options (v6.0)</xs:documentation>
                </xs:annotation>
                    <xs:complexType>
                        <xs:complexContent>
                            <xs:extension base="ChromaSubsampling"/>
```

```
                                    </xs:complexContent>
                                </xs:complexType>
                            </xs:element>
                            <xs:element name="DynamicRange" type="DynamicRange" minOccurs="0">
                            <xs:annotation>
                            <xs:documentation>Used to indicate whether the video content has either a standard dynamic range (SDR) or a hign
dynamic range (HDR). (v7.0)</xs:documentation>
                            </xs:annotation>
                            </xs:element>
                            <xs:element name="PrivateInformation" type="BxfPrivateInformation" minOccurs="0"/>
                        </xs:sequence>
                    </xs:choice>
        <xs:attribute name="centerCutProtected" type="xs:boolean">
        <xs:annotation>
        <xs:documentation>Set as True if video content was created with centercut protection. (v6.0)</xs:documentation>
        </xs:annotation>
        </xs:attribute>
        <xs:attribute name="nativeFrameRate" type="xs:string">
        <xs:annotation>
        <xs:documentation>Original framerate that the content was shot. (v6.0)</xs:documentation>
        </xs:annotation>
        </xs:attribute>
        <xs:attribute name="includesSlate" type="xs:boolean">
        <xs:annotation>
        <xs:documentation>Used to indicate that a slate is present in the video content. (v7.0)</xs:documentation>
        </xs:annotation>
        </xs:attribute>
        <xs:attributeGroup ref="Action-ErrorGroup"/>
</xs:complexType>
```


attributes
centerCutProtected
Set as True if video content was created with centercut protection. (v6.0)
nativeFrameRate
Original framerate that the content was shot. (v6.0)
includesSlate
Used to indicate that a slate is present in the video content. (v7.0)
grp Action-ErrorGroup
Used to set an action or report an error and add attribute extensibility
Video
Enumerates the various values relating to the presentation of video
Null
No Information provided for Video
Encoding
If NTSC or PAL this should be set to uncompressed. The other options are various compression utilities that are used to store or transmit video.
DigitalVideo
Required to be true if video format is 2160p, 1080p, 1080i, 720p, 480p, optional for 576i and 480i.
Format
The number of lines of video and either an "i" for interlaced or "p" for progressive. Note that NTSC = 480i; PAL = 576i; and the rest are digital ATSC/DVB options.
ActiveImageAspectRatio
Width of the active video image divided by it's height
AspectRatio
The horizontal:vertical ratio of the complete video display including AFD-BarData (A/53)
AFD-BarDataPresent
Indicates that active format description and bar data is used in the presentation of the video in order to convert the production image to the selected transmission aspect ratio. The actual values for these items is incorporated into the video VANC.
PanAndScanPresent
Indicates that pan and scan techniques are being used to adjust the production image to fit the transmission aspect ratio. Note that each frame's values may be different and the actual data to determine the values are carried in the video VANC.
CaptionsInVANC
If set to true indicates that captioning is embedded in the video VANC.
AFDData
Used to describe both Active Format Description Codes, Shorthand Text Descriptions and Bar Data options. (v3.0)
WideScreen
Use to flag if original content is letterboxed, SD or HD. (v6.0)
ChromaSubsampling
Video sampling options (v6.0)
DynamicRange
Used to indicate whether the video content has either a standard dynamic range (SDR) or a hign dynamic range (HDR). (v7.0)
DynamicRange
SDR
Standard Dynamic Range
HDR
High Dynamic Range used with Ultra High Definition Television and 1080p
PrivateInformation

```
<xs:complexType name="DynamicRange">
<xs:annotation>
<xs:documentation>Used to indicate whether the video content has either a standard dynamic range (SDR) or a hign dynamic range (HDR).
(v7.0)</xs:documentation>
</xs:annotation>
      <xs:choice>
            <xs:element name="SDR">
            <xs:annotation>
            <xs:documentation>Standard Dynamic Range</xs:documentation>
            </xs:annotation>
                  <xs:complexType>
                        <xs:choice minOccurs="0">
                              <xs:element name="BT.601" type="xs:boolean">
                              <xs:annotation>
                              <xs:documentation>Standard Definition Television with standard dynamic range</xs:documentation>
                              </xs:annotation>
                              </xs:element>
                              <xs:element name="BT.709" type="xs:boolean" default="1">
                              <xs:annotation>
                              <xs:documentation>High Definition Television with standard dynamic range</xs:documentation>
                              </xs:annotation>
                              </xs:element>
                              <xs:element name="BT.2020" type="xs:boolean" default="0">
                              <xs:annotation>
                              <xs:documentation>Ultra High Definition Television with standard dynamic range</xs:documentation>
                              </xs:annotation>
                              </xs:element>
                        </xs:choice>
                  </xs:complexType>
            </xs:element>
            <xs:element name="HDR">
            <xs:annotation>
            <xs:documentation>High Dynamic Range used with Ultra High Definition Television and 1080p</xs:documentation>
            </xs:annotation>
                  <xs:complexType>
                        <xs:choice>
                              <xs:element name="PQ">
                              <xs:annotation>
                              <xs:documentation>Perceptual Quantizer per ITU-R BT.2100</xs:documentation>
                              </xs:annotation>
                                    <xs:complexType>
                                          <xs:choice>
                                                <xs:element name="StaticMetadata">
                                                      <xs:complexType>
                                                            <xs:sequence>
                                                                  <xs:element name="ST-2086" minOccurs="0">
                                                                  <xs:annotation>
                                                                  <xs:documentation>Mastering Display Color Volume, ST-
2086</xs:documentation>
                                                                  </xs:annotation>
                                                                        <xs:complexType>
                                                                              <xs:sequence>
                                                                                    <xs:element name="DisplayPrimaries" type="xs:integer"/>
                                                                                    <xs:element name="ChromaticityWhitePoint"
type="xs:integer"/>
                                                                                    <xs:element name="MaxDispMasteringLuminance"
type="xs:integer"/>
                                                                                    <xs:element name="MinDispMasteringLuminance"
type="xs:double"/>
                                                                              </xs:sequence>
                                                                        </xs:complexType>
                                                                  </xs:element>
                                                                  <xs:element name="MAXCLL" type="xs:double" minOccurs="0">
                                                                  <xs:annotation>
                                                                  <xs:documentation>Maximum Content Light Level - the luma of the brightest
pixel.</xs:documentation>
                                                                  </xs:annotation>
                                                                  </xs:element>
                                                                  <xs:element name="MAXFALL" type="xs:double" minOccurs="0">
                                                                  <xs:annotation>
                                                                  <xs:documentation>Maximum Frame Average Light Level - the highest frame
average brightness within the content.</xs:documentation>
```

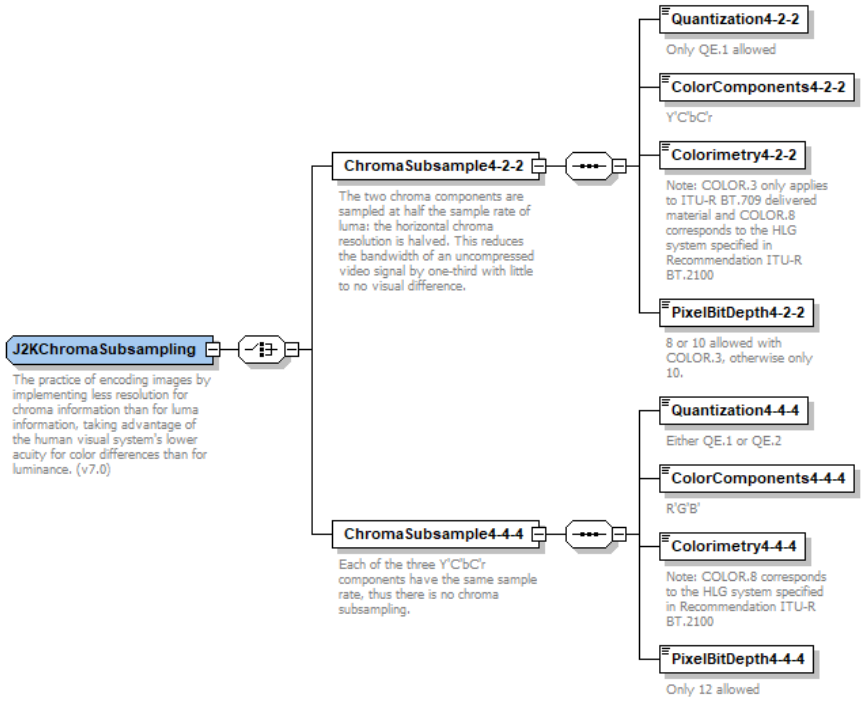
```
                                                </xs:annotation>
                                                </xs:element>
                                                <xs:element name="PrivateInformation" type="BxfPrivateInformation"
minOccurs="0"/>
                                            </xs:sequence>
                                        </xs:complexType>
                                    </xs:element>
                                    <xs:element name="DynamicMetadata">
                                        <xs:complexType>
                                            <xs:sequence>
                                                <xs:element name="ST-2094-10" type="xs:boolean" minOccurs="0"/>
                                                <xs:element name="ST-2094-40" type="xs:boolean" minOccurs="0"/>
                                                <xs:element name="PrivateInformation" type="BxfPrivateInformation"
minOccurs="0"/>
                                            </xs:sequence>
                                        <xs:attribute name="sdiDynamicMetadataType">
                                        <xs:annotation>
                                        <xs:documentation>Allowed values are 1 or 5 with 2-4 reserved per ST 2108-1:2018
Table 3.  One(1) indicates ATSC A/341 (ST 2094-10) and five (5) indicates SL-HDR information SEI message. (v7.0)</xs:documentation>
                                        </xs:annotation>
                                            <xs:simpleType>
                                                <xs:restriction base="xs:integer">
                                                    <xs:enumeration value="1"/>
                                                    <xs:enumeration value="5"/>
                                                </xs:restriction>
                                            </xs:simpleType>
                                        </xs:attribute>
                                        </xs:complexType>
                                    </xs:element>
                                </xs:choice>
                            </xs:complexType>
                        </xs:element>
                        <xs:element name="HLG" type="xs:boolean">
                        <xs:annotation>
                        <xs:documentation>Hybrid Log-Gamma per ITU-R BT.2100</xs:documentation>
                        </xs:annotation>
                        </xs:element>
                    </xs:choice>
                </xs:complexType>
            </xs:element>
        </xs:choice>
</xs:complexType>
```




```
<xs:complexType name="J2KChromaSubsampling">
<xs:annotation>
<xs:documentation>The practice of encoding images by implementing less resolution for chroma information than for luma information, taking advantage of the human visual system's lower acuity for color differences than for luminance. (v7.0)</xs:documentation>
</xs:annotation>
      <xs:choice>
            <xs:element name="ChromaSubsample4-2-2">
            <xs:annotation>
            <xs:documentation>The two chroma components are sampled at half the sample rate of luma: the horizontal chroma resolution is halved. This reduces the bandwidth of an uncompressed video signal by one-third with little to no visual difference.</xs:documentation>
            </xs:annotation>
                  <xs:complexType>
                        <xs:sequence>
                              <xs:element name="Quantization4-2-2" default="QE.1">
                              <xs:annotation>
                              <xs:documentation>Only QE.1 allowed</xs:documentation>
                              </xs:annotation>
                                    <xs:simpleType>
                                          <xs:restriction base="xs:string">
                                                <xs:enumeration value="QE.1"/>
                                          </xs:restriction>
                                    </xs:simpleType>
                              </xs:element>
                              <xs:element name="ColorComponents4-2-2" default="Y'C'bC'r">
                              <xs:annotation>
                              <xs:documentation>Y'C'bC'r</xs:documentation>
                              </xs:annotation>
                                    <xs:simpleType>
                                          <xs:restriction base="xs:string">
                                                <xs:enumeration value="Y'C'bC'r"/>
                                          </xs:restriction>
```

```
                    </xs:simpleType>
                </xs:element>
                <xs:element name="Colorimetry4-2-2">
                <xs:annotation>
                <xs:documentation>Note: COLOR.3 only applies to ITU-R BT.709 delivered material and COLOR.8
corresponds to the HLG system specified in Recommendation ITU-R BT.2100</xs:documentation>
                </xs:annotation>
                    <xs:simpleType>
                        <xs:restriction base="xs:string">
                            <xs:enumeration value="COLOR.3"/>
                            <xs:enumeration value="COLOR.5"/>
                            <xs:enumeration value="COLOR.7"/>
                            <xs:enumeration value="COLOR.8"/>
                        </xs:restriction>
                    </xs:simpleType>
                </xs:element>
                <xs:element name="PixelBitDepth4-2-2" default="10">
                <xs:annotation>
                <xs:documentation>8 or 10 allowed with COLOR.3, otherwise only 10.</xs:documentation>
                </xs:annotation>
                    <xs:simpleType>
                        <xs:restriction base="xs:integer">
                            <xs:enumeration value="8"/>
                            <xs:enumeration value="10"/>
                        </xs:restriction>
                    </xs:simpleType>
                </xs:element>
            </xs:sequence>
        </xs:complexType>
    </xs:element>
    <xs:element name="ChromaSubsample4-4-4">
    <xs:annotation>
    <xs:documentation>Each of the three Y'C'bC'r components have the same sample rate, thus there is no chroma
subsampling.</xs:documentation>
    </xs:annotation>
        <xs:complexType>
            <xs:sequence>
                <xs:element name="Quantization4-4-4">
                <xs:annotation>
                <xs:documentation>Either QE.1 or QE.2</xs:documentation>
                </xs:annotation>
                    <xs:simpleType>
                        <xs:restriction base="xs:string">
                            <xs:enumeration value="QE.1"/>
                            <xs:enumeration value="QE.2"/>
                        </xs:restriction>
                    </xs:simpleType>
                </xs:element>
                <xs:element name="ColorComponents4-4-4" default="R'G'B'">
                <xs:annotation>
                <xs:documentation>R'G'B'</xs:documentation>
                </xs:annotation>
                    <xs:simpleType>
                        <xs:restriction base="xs:string">
                            <xs:enumeration value="R'G'B'"/>
                        </xs:restriction>
                    </xs:simpleType>
                </xs:element>
                <xs:element name="Colorimetry4-4-4">
                <xs:annotation>
                <xs:documentation>Note: COLOR.8 corresponds to the HLG system specified in Recommendation ITU-R
BT.2100</xs:documentation>
                </xs:annotation>
                    <xs:simpleType>
                        <xs:restriction base="xs:string">
                            <xs:enumeration value="COLOR.5"/>
                            <xs:enumeration value="COLOR.7"/>
                            <xs:enumeration value="COLOR.8"/>
                        </xs:restriction>
                    </xs:simpleType>
                </xs:element>
                <xs:element name="PixelBitDepth4-4-4" default="12">
                <xs:annotation>
                <xs:documentation>Only 12 allowed</xs:documentation>
```

```
                        </xs:annotation>
                            <xs:simpleType>
                                <xs:restriction base="xs:integer">
                                    <xs:enumeration value="12"/>
                                </xs:restriction>
                            </xs:simpleType>
                        </xs:element>
                    </xs:sequence>
                </xs:complexType>
            </xs:element>
        </xs:choice>
</xs:complexType>
```




```
<xs:complexType name="J2KImageEssence">
<xs:annotation>
<xs:documentation>Description of the video image essence for ProRes, J2K and others. (v7.0)</xs:documentation>
</xs:annotation>
    <xs:sequence>
        <xs:element name="ImageFrameWidth">
        <xs:annotation>
        <xs:documentation>Two options allowed: 1920 or 3840 pixels</xs:documentation>
        </xs:annotation>
            <xs:simpleType>
                <xs:restriction base="xs:integer">
                    <xs:enumeration value="1920"/>
                    <xs:enumeration value="3840"/>
                </xs:restriction>
            </xs:simpleType>
        </xs:element>
        <xs:element name="ImageFrameHeight">
        <xs:annotation>
        <xs:documentation>Two options allowed: 1080 or 2160</xs:documentation>
        </xs:annotation>
            <xs:simpleType>
                <xs:restriction base="xs:integer">
                    <xs:enumeration value="1080"/>
                    <xs:enumeration value="2160"/>
                </xs:restriction>
            </xs:simpleType>
        </xs:element>
```

```
            <xs:element name="FrameStructure" default="Progressive">
            <xs:annotation>
            <xs:documentation>Progressive only</xs:documentation>
            </xs:annotation>
                  <xs:simpleType>
                        <xs:restriction base="xs:string">
                              <xs:enumeration value="Progressive"/>
                        </xs:restriction>
                  </xs:simpleType>
            </xs:element>
            <xs:element name="Stereoscopy">
            <xs:annotation>
            <xs:documentation>Supports either monoscopic or stereoscopic formats</xs:documentation>
            </xs:annotation>
                  <xs:simpleType>
                        <xs:restriction base="xs:string">
                              <xs:enumeration value="Monoscopic"/>
                              <xs:enumeration value="Stereoscopic"/>
                        </xs:restriction>
                  </xs:simpleType>
            </xs:element>
            <xs:element name="FrameRate">
            <xs:annotation>
            <xs:documentation>Multiple frame rate speeds are supported up to 60 fps.</xs:documentation>
            </xs:annotation>
                  <xs:simpleType>
                        <xs:restriction base="xs:string">
                              <xs:enumeration value="24"/>
                              <xs:enumeration value="24000/1001"/>
                              <xs:enumeration value="25"/>
                              <xs:enumeration value="30"/>
                              <xs:enumeration value="30000/1001"/>
                              <xs:enumeration value="50"/>
                              <xs:enumeration value="60"/>
                              <xs:enumeration value="60000/1001"/>
                        </xs:restriction>
                  </xs:simpleType>
            </xs:element>
            <xs:element name="J2KChromaSubsampling" type="J2KChromaSubsampling">
            <xs:annotation>
            <xs:documentation>The practice of encoding images by implementing less resolution for chroma information than for luma
information, taking advantage of the human visual system's lower acuity for color differences than for luminance. (v7.0)</xs:documentation>
            </xs:annotation>
            </xs:element>
      </xs:sequence>
</xs:complexType>
```