SMPTE EG 2021-4:2009
Content previously included in SMPTE 2021M-2008

SMPTE ENGINEERING GUIDELINE

Broadcast Exchange Format (BXF) — Schema Documentation

Copyright © 2009 by THE SOCIETY OF
MOTION PICTURE AND TELEVISION ENGINEERS
3 Barker Avenue, White Plains, NY 10607
(914) 761-1100

Approved
December 4, 2009

Table of Contents

© SMPTE 2009 – All rights reserved

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 32NF.

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.

SMPTE 2021 (BXF) is now broken into several parts. A brief outline of the parts can be found in SMPTE 2021-0, the Document Roadmap to this suite of documents.

© SMPTE 2009 – All rights reserved

1. Scope

The Broadcast eXchange Format (BXF) defines the format and content of XML Messages for the interchange of data and metadata among professional systems, as follows:

1. Broadcast schedules, including playout and record schedules
2. As run information
3. Content metadata, such as Content ID, Title, Duration, etc.
4. Content management requests such as dub and purge requests
5. Requests for transfer of content some of which will result in the transfer of Content essence between professional systems.
6. Ports as used by TCP/IP for the exchange of messages

The primary systems envisioned as users of this standard are:

Program Management Systems
Broadcast Traffic Systems
Master Control Automation Systems
Content Distribution Systems

This particular document focuses on documentation of the BXF schemas.

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.

© SMPTE 2009 – All rights reserved

3. Document Elements

The SMPTE 2021 suite is comprised of the following elements, which form an integral piece of this Standard. Additionally, the schema files may be found at http://smpte-ra.org/schemas/2021/2008/BXF. (Accessible only by appropriately-designed software applications, for schema validation. Not intended to be human-accessible.)

a) Prose document S2021-3-2009.pdf (this file) [Normative]

b) XML schema s2021-2009.xml [Normative]

c) HTML schema guide s2021-2009.html [Informative]

4. Normative References

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below.

SMPTE 2021-1, Broadcast Exchange Format (BXF) — General Information and Informative Notes, December 4, 2009

5. Description of BXF Schema (Informative)

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 easily accessible browsers such as Microsft's Windows® Internet Explorer®, Apple's Safari, and other third party tools. In addition to the XML Schema Files (.XSD) the user can also browse the schema using the .html files.

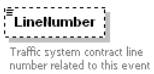
Depending on the tools you use, different parts of the schema may appear in different formatting. The section below describes the meaning of various parts of the schema as you would see them in the .html version.

5.1 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:

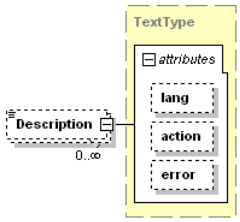
Single element – mandatory: Indicated by a rectangle with a solid border. The element name is inside the shape.

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

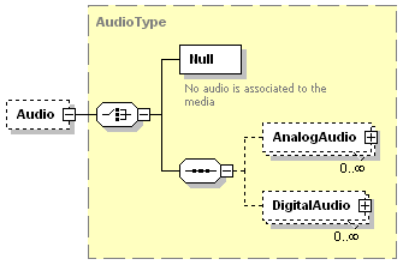


© SMPTE 2009 – All rights reserved

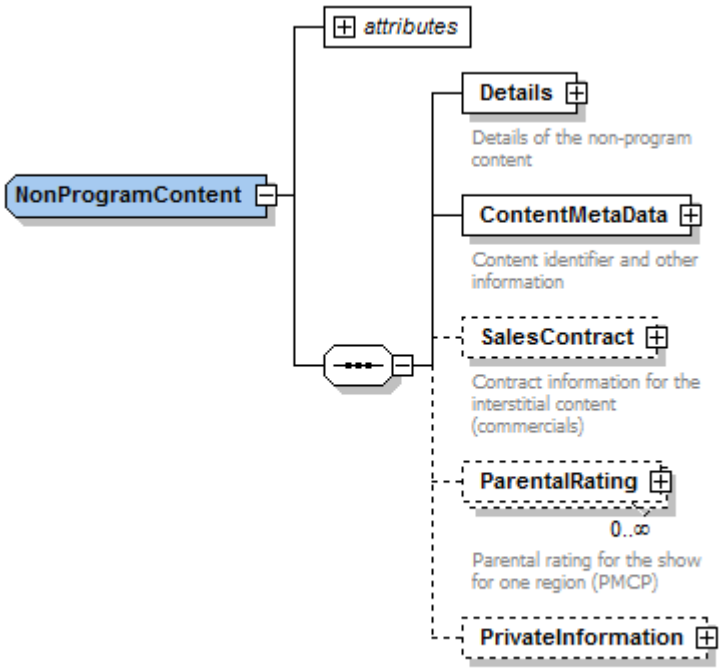
Multiple elements: Indicated by a rectangle with a solid border with a number range representing the minimum and maximum number of occurrences possible. In the example, 0 to infinity (0..∞) is shown.



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.

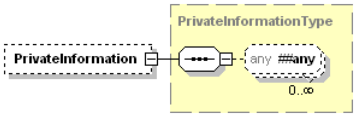


Complex type: Indicated by a partial hexagon and a child element symbol.

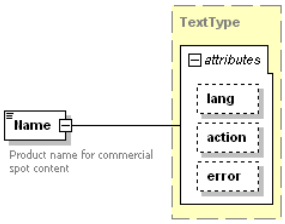


© SMPTE 2009 – All rights reserved

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

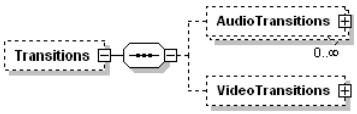


Attributes: Indicated by the word 'attributes'

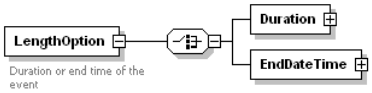


The relationships between components are represented by symbols for sequence and choice.

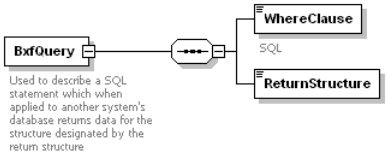
Sequence: The sequence compositor shows that all elements occur in sequence.



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

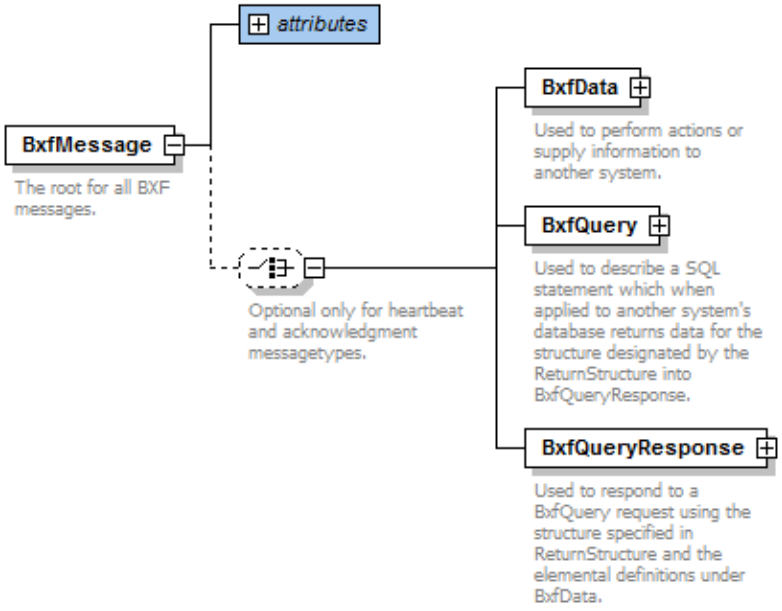


Solid lines: Solid lines connecting elements represent mandatory connections within the schema diagrams.



© SMPTE 2009 – All rights reserved

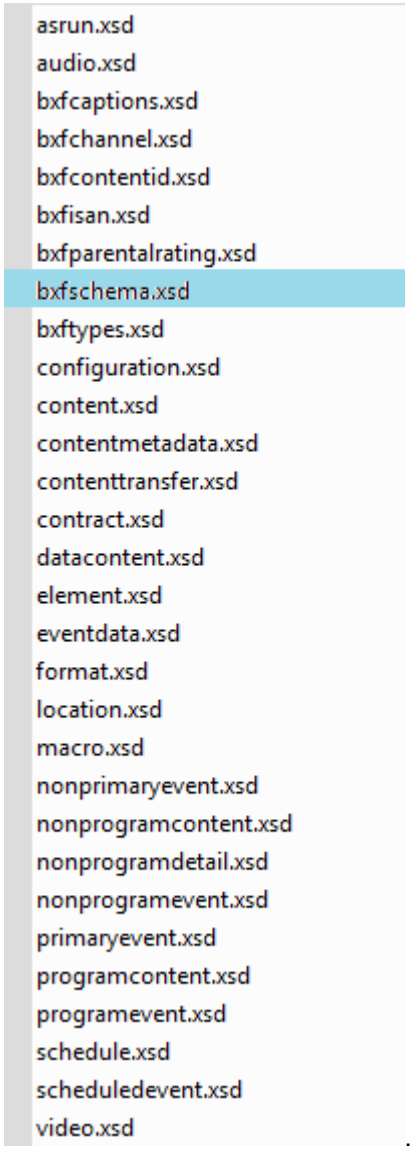
Dashed lines: Dashed lines between elements represent optional connections within the schema diagrams.



© SMPTE 2009 – All rights reserved

5.2 Schema File List

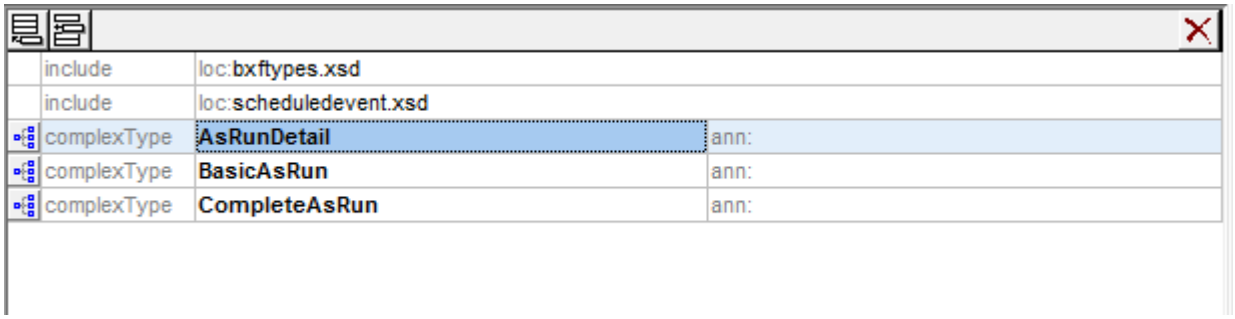
The Schema is actually composed of 30 files listed below. The root file (starting point) is bxfshema.xsd and all other files are referenced from this file. A brief description of each file is given below in alphabetical order. This same description may also be contained in the schema for major elements, but some elements do not contain a description and were segregated into separate files for the convenience of managing the schema.



© SMPTE 2009 – All rights reserved

5.2.1 AsRun.XSD

Contains:

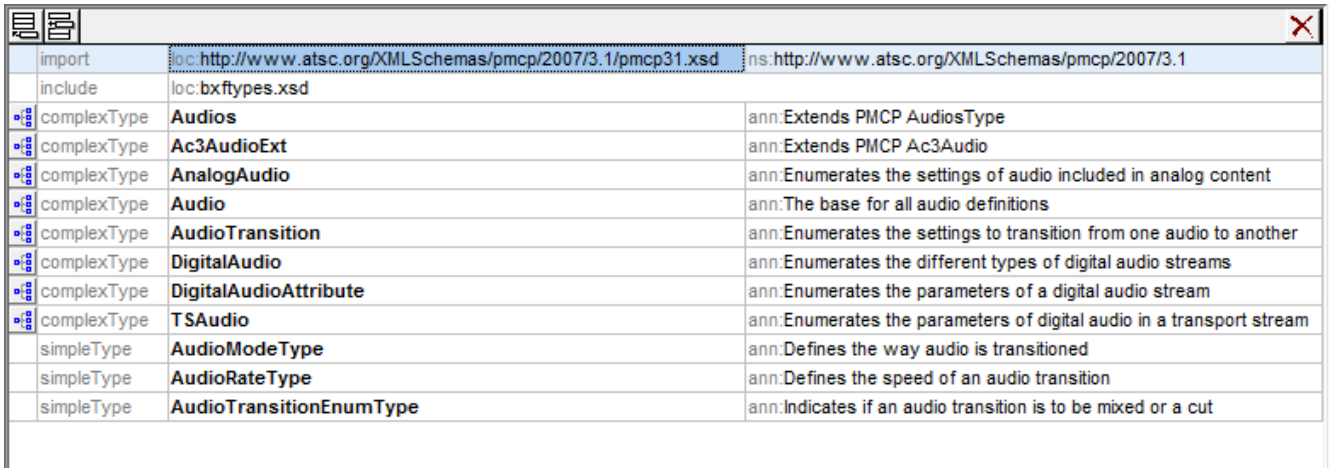


	include	loc:bxftypes.xsd	
	include	loc:scheduledevent.xsd	
	complexType	**AsRunDetail**	ann:
	complexType	**BasicAsRun**	ann:
	complexType	**CompleteAsRun**	ann:

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.

5.2.2 Audio.XSD

Contains:

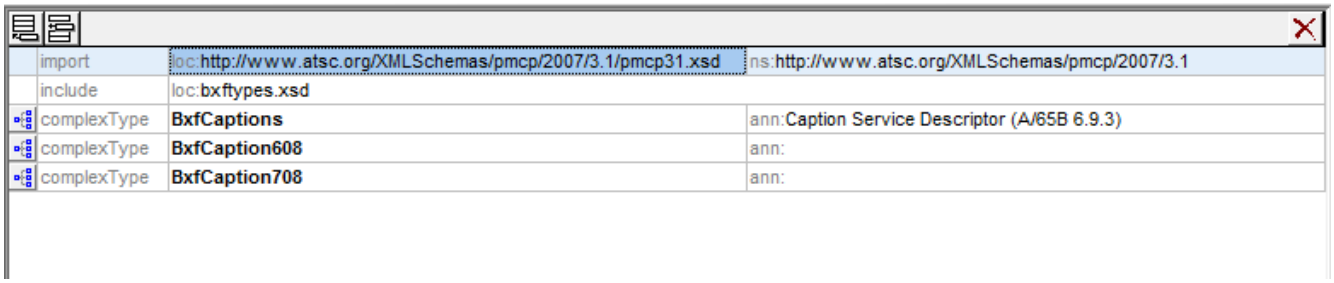


	import	loc:http://www.atsc.org/XMLSchemas/pmcp/2007/3.1/pmcp31.xsd	ns:http://www.atsc.org/XMLSchemas/pmcp/2007/3.1
	include	loc:bxftypes.xsd	
	complexType	**Audios**	ann:Extends PMCP AudiosType
	complexType	**Ac3AudioExt**	ann:Extends PMCP Ac3Audio
	complexType	**AnalogAudio**	ann:Enumerates the settings 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
	complexType	**DigitalAudioAttribute**	ann:Enumerates the parameters of a digital audio stream
	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.

5.2.3 BxfCaptions.XSD

Contains:



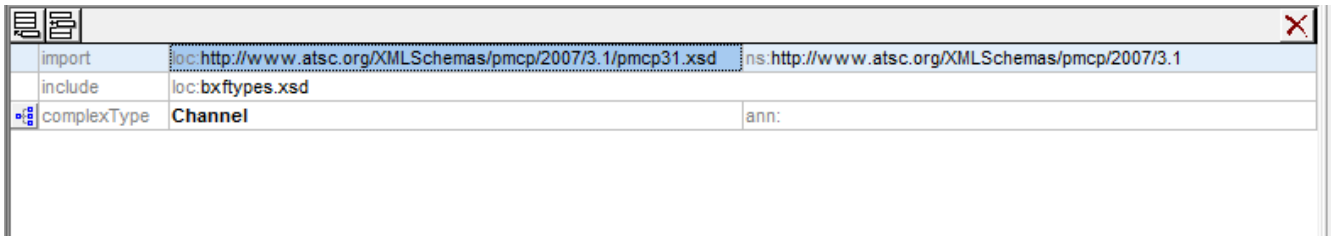
	import	loc:http://www.atsc.org/XMLSchemas/pmcp/2007/3.1/pmcp31.xsd	ns:http://www.atsc.org/XMLSchemas/pmcp/2007/3.1
	include	loc:bxftypes.xsd	
	complexType	**BxfCaptions**	ann:Caption Service Descriptor (A/65B 6.9.3)
	complexType	**BxfCaption608**	ann:
	complexType	**BxfCaption708**	ann:

Caption Service Descriptor (A/65B 6.9.3).

© SMPTE 2009 – All rights reserved

5.2.4 BxfChannel.XSD

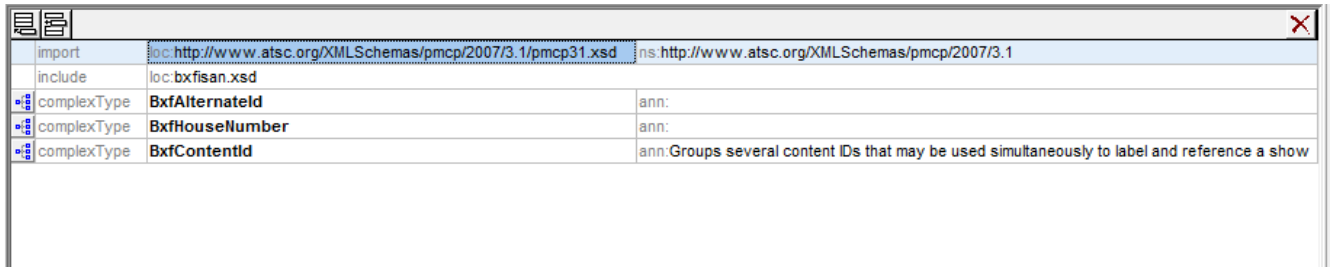
Contains:



Extends ATSC's PMCP 3.1 definition of a channel.

5.2.5 BxfContentId.XSD

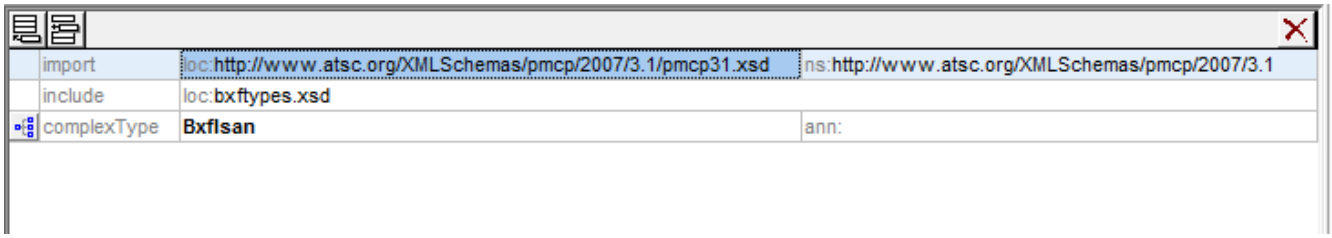
Contains:



Groups several Content IDs that may be used simultaneously to label and reference a show.

5.2.6 BxfISAN.XSD

Contains:

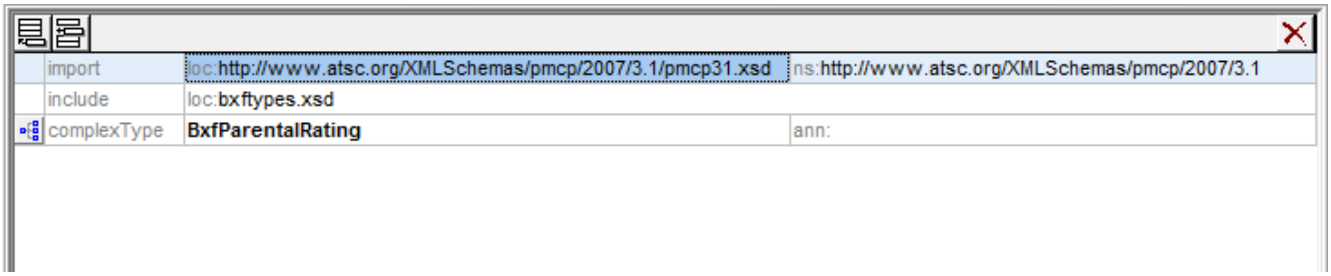


Used to define entry of an ISAN value into ContentID. Go to www.isan.org for more information on the use of ISAN with content identification.

© SMPTE 2009 – All rights reserved

5.2.7 BxfParentalRating.XSD

Contains:



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

5.2.8 BxfSchema.XSD

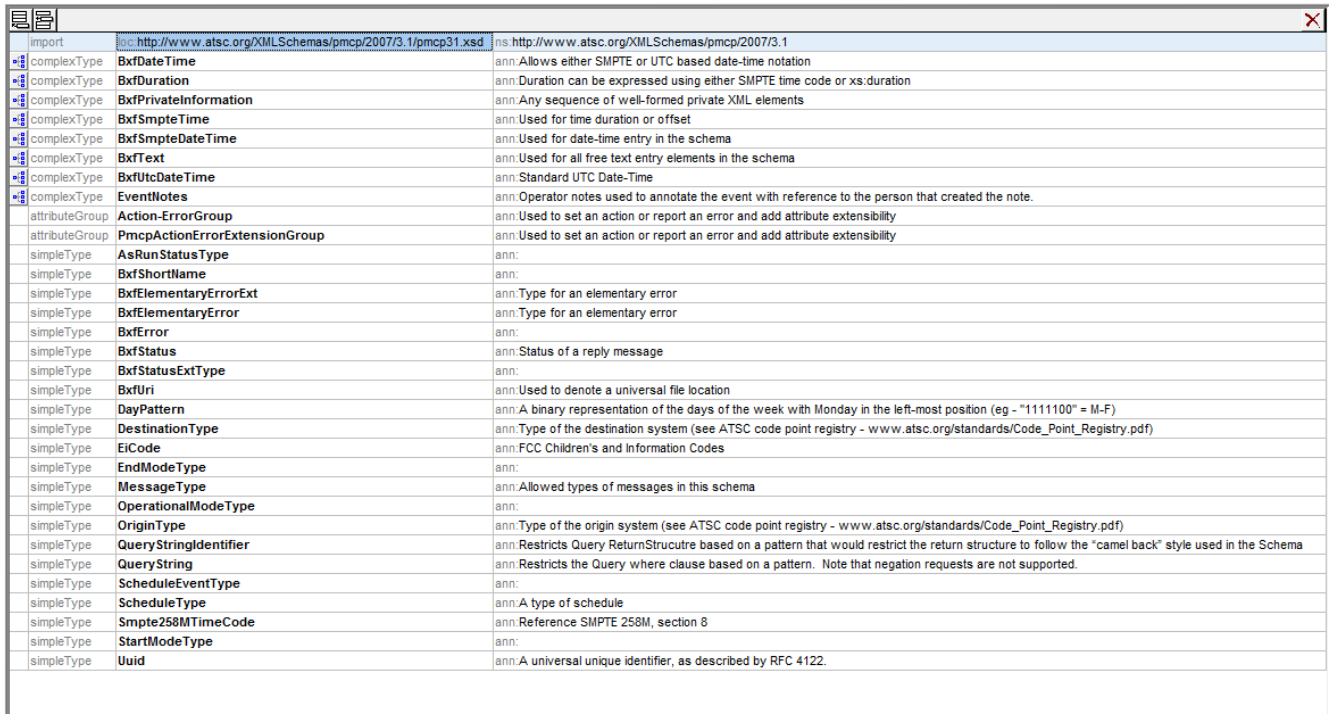
Contains:

The root for all BXF messages.

© SMPTE 2009 – All rights reserved

5.2.9 BxfTypes.XSD

Contains:

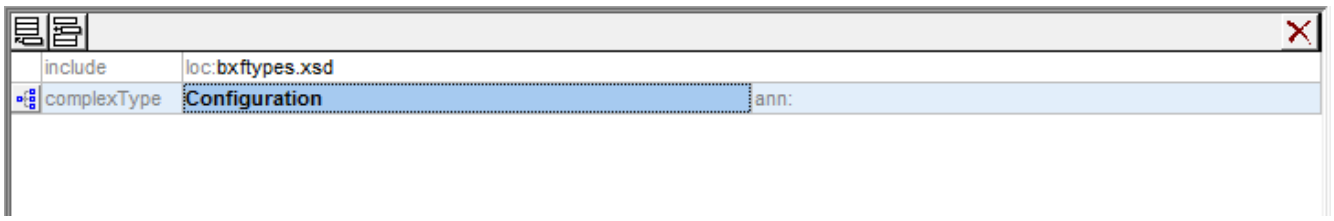


import	loc:http://www.atsc.org/XMLSchemas/pmcp/2007/3.1/pmcp31.xsd	ns:http://www.atsc.org/XMLSchemas/pmcp/2007/3.1
complexType	**BxfDateTime**	ann:Allows either SMPTE or UTC based date-time notation
complexType	**BxfDuration**	ann:Duration can be expressed using either SMPTE time code or xs:duration
complexType	**BxfPrivateInformation**	ann:Any sequence of well-formed private XML elements
complexType	**BxfSmpteTime**	ann:Used for time duration or offset
complexType	**BxfSmpteDateTime**	ann:Used for date-time entry in the schema
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
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
simpleType	**StartModeType**	ann:
simpleType	**Uuid**	ann:A universal unique identifier, as described by RFC 4122.

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

5.2.10 Configuration.XSD

Contains:



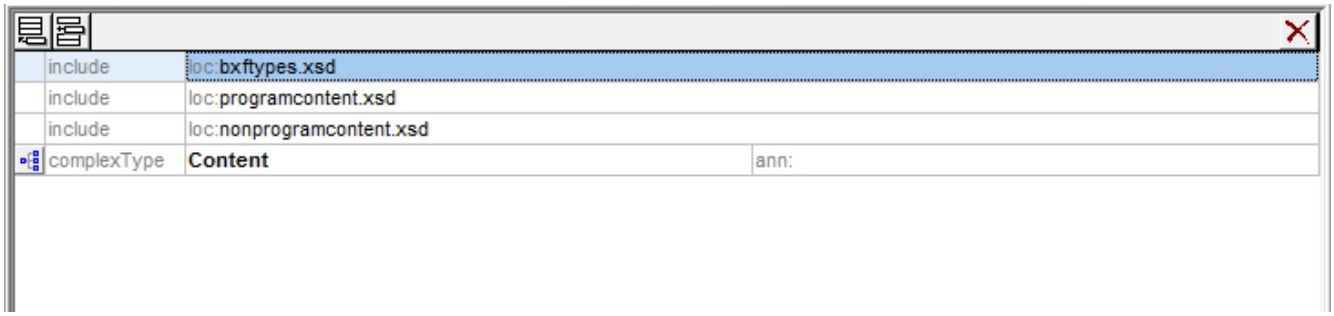
include	loc:**bxftypes.xsd**	
complexType	**Configuration**	ann:

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

© SMPTE 2009 – All rights reserved

5.2.11 Content.XSD

Contains:

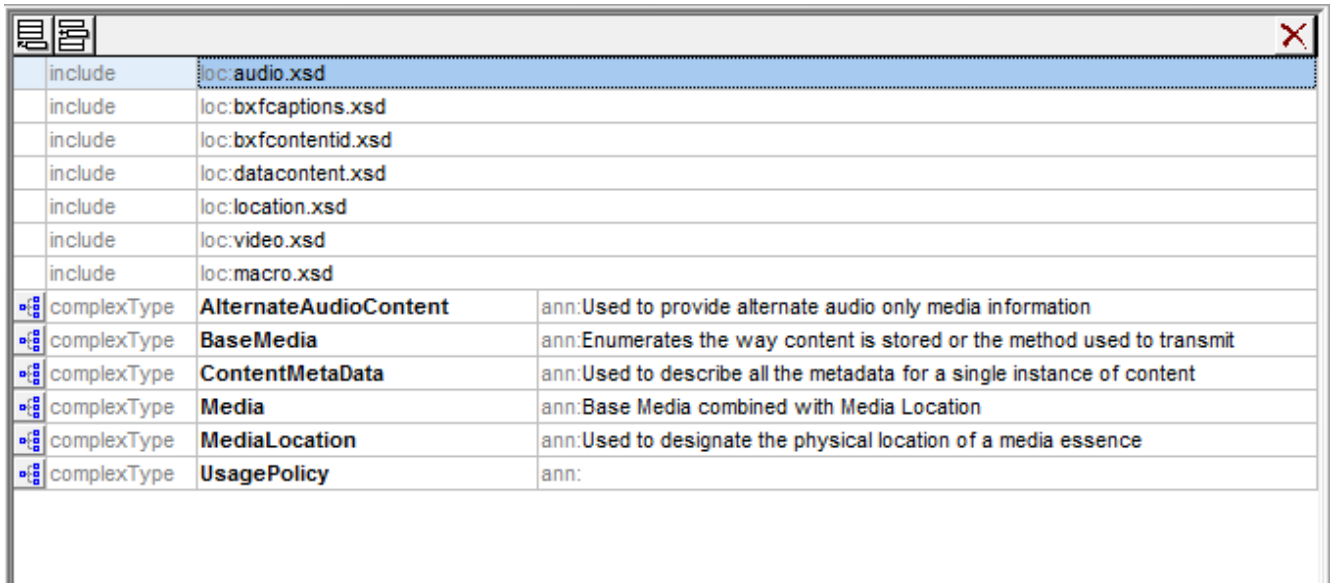


	include	loc:bxftypes.xsd	
	include	loc:programcontent.xsd	
	include	loc:nonprogramcontent.xsd	
	complexType	**Content**	ann:

Used to describe the content at a specific location.

5.2.12 ContentMetadata.XSD

Contains:



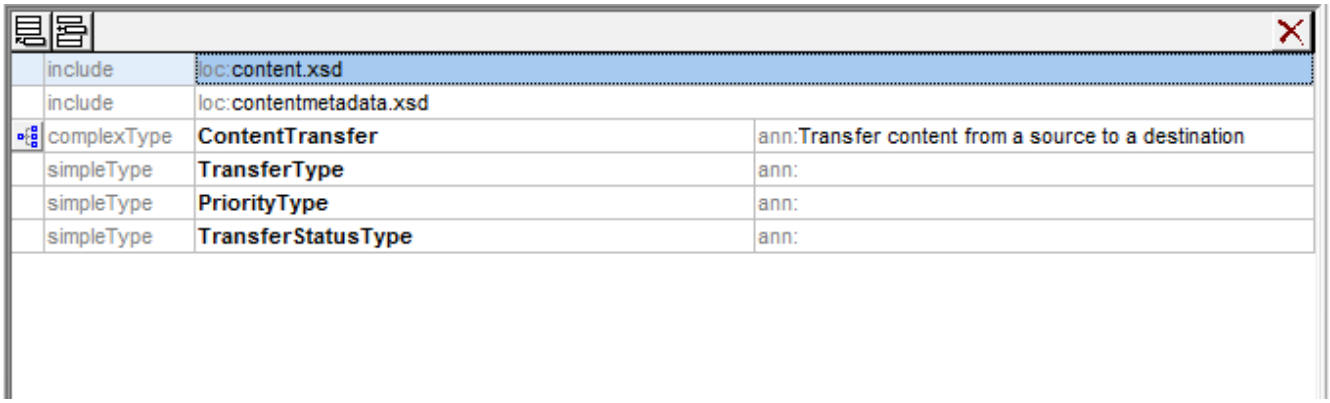
	include	loc:audio.xsd	
	include	loc:bxfcaptions.xsd	
	include	loc:bxfcontentid.xsd	
	include	loc:datacontent.xsd	
	include	loc:location.xsd	
	include	loc:video.xsd	
	include	loc:macro.xsd	
	complexType	**AlternateAudioContent**	ann:Used to provide alternate audio only media information
	complexType	**BaseMedia**	ann:Enumerates the way content is stored or the method used to transmit
	complexType	**ContentMetaData**	ann:Used to describe all the metadata for a single instance of content
	complexType	**Media**	ann:Base Media combined with Media Location
	complexType	**MediaLocation**	ann:Used to designate the physical location of a media essence
	complexType	**UsagePolicy**	ann:

Content identification and other details.

© SMPTE 2009 – All rights reserved

5.2.13 ContentTransfer.XSD

Contains:

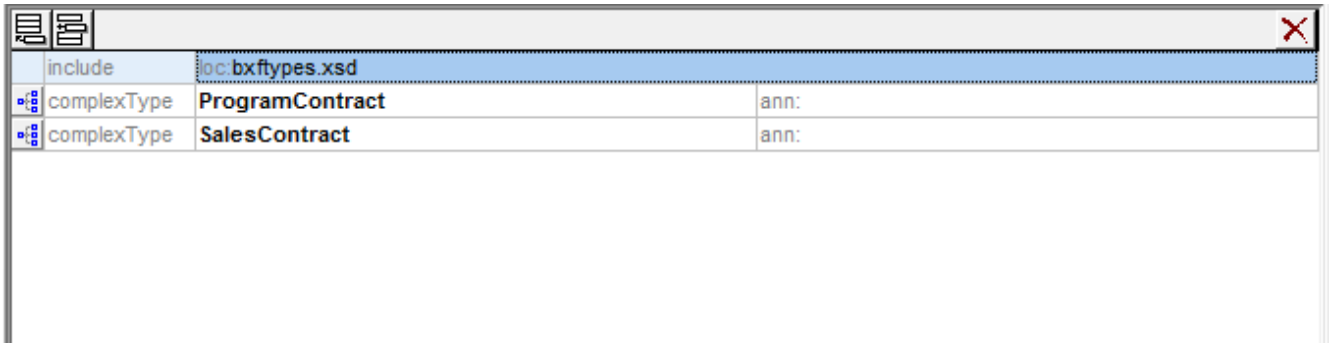


	include	loc:content.xsd	
	include	loc:contentmetadata.xsd	
complexType	**ContentTransfer**	ann:Transfer content from a source to a destination	
simpleType	**TransferType**	ann:	
simpleType	**PriorityType**	ann:	
simpleType	**TransferStatusType**	ann:	

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

5.2.14 Contract.XSD

Contains:

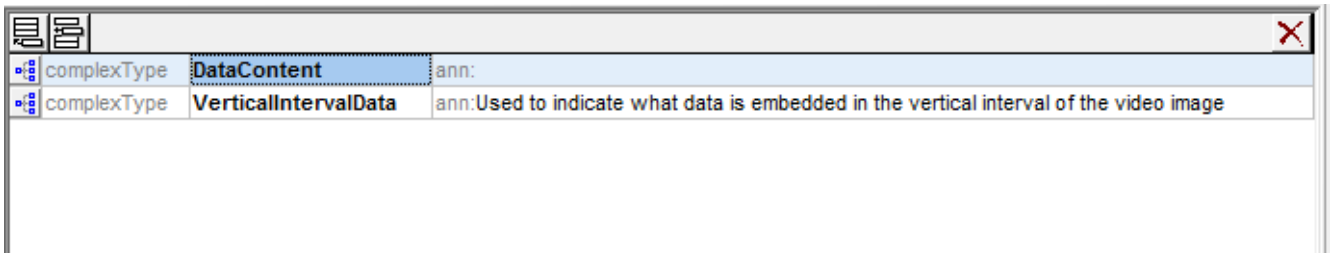


include	loc:bxftypes.xsd	
complexType	**ProgramContract**	ann:
complexType	**SalesContract**	ann:

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).

5.2.15 DataContent.XSD

Contains:



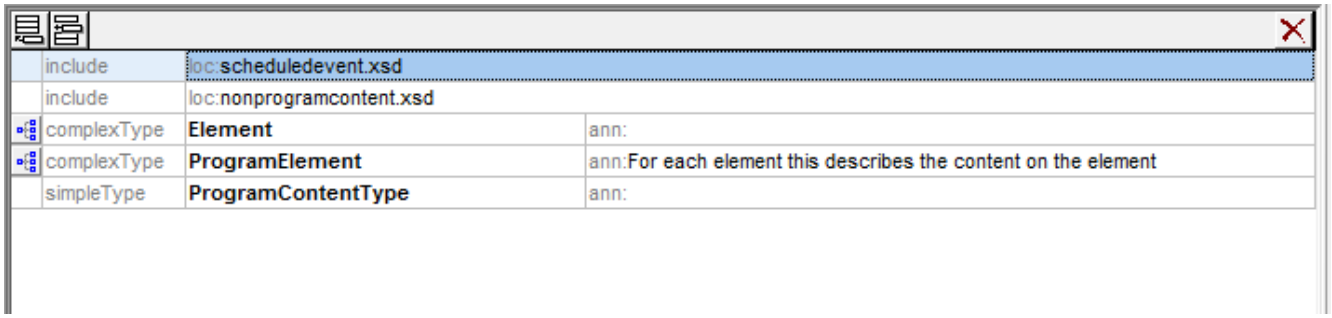
complexType	**DataContent**	ann:
complexType	**VerticalIntervalData**	ann:Used to indicate what data is embedded in the vertical interval of the video image

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

© SMPTE 2009 – All rights reserved

5.2.16 Element.XSD

Contains:

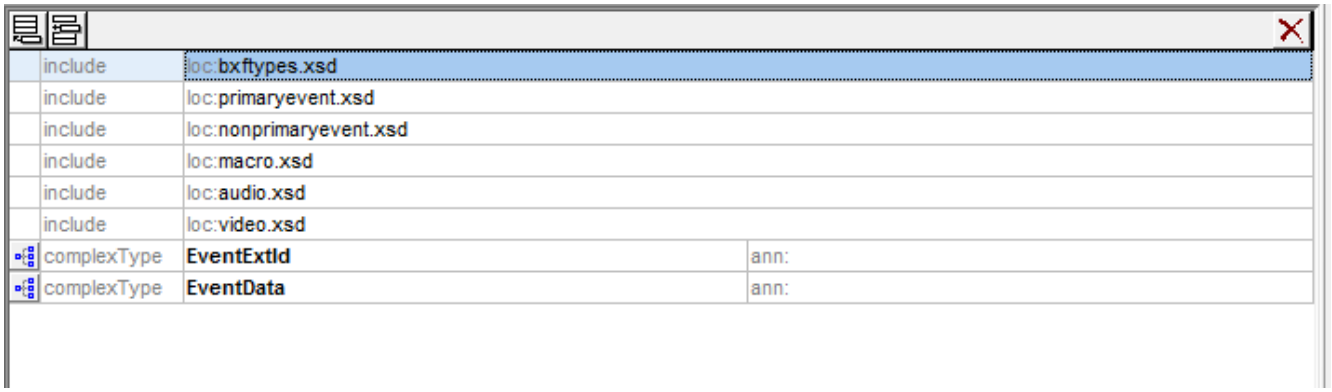


include	loc:scheduledevent.xsd		
include	loc:nonprogramcontent.xsd		
complexType	**Element**	ann:	
complexType	**ProgramElement**	ann:For each element this describes the content on the element	
simpleType	**ProgramContentType**	ann:	

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.

5.2.17 EventData.XSD

Contains:

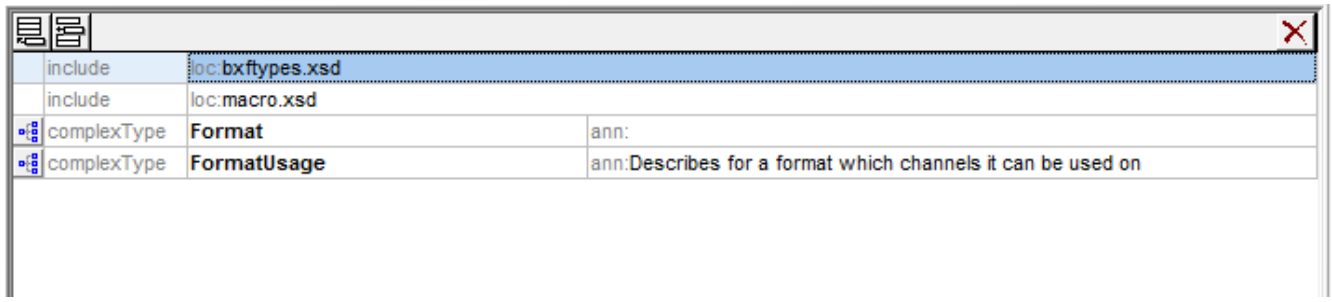


include	loc:bxftypes.xsd		
include	loc:primaryevent.xsd		
include	loc:nonprimaryevent.xsd		
include	loc:macro.xsd		
include	loc:audio.xsd		
include	loc:video.xsd		
complexType	**EventExtId**	ann:	
complexType	**EventData**	ann:	

Specifies the data specific to a particular airing of a complete show or a single event.

5.2.18 Format.XSD

Contains:



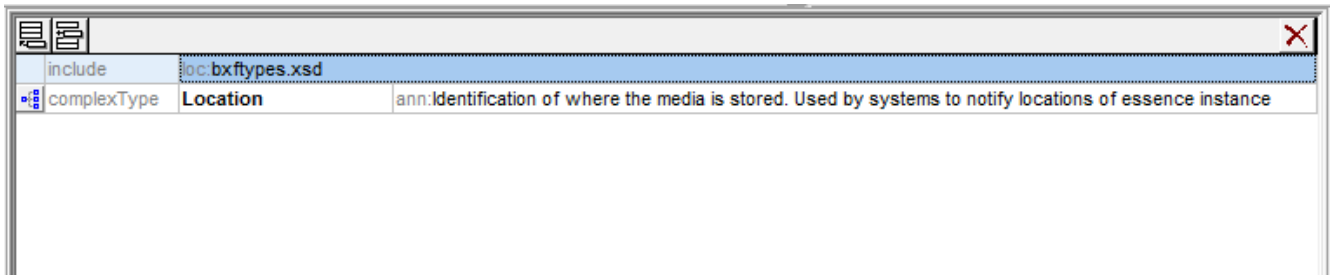
include	loc:bxftypes.xsd		
include	loc:macro.xsd		
complexType	**Format**	ann:	
complexType	**FormatUsage**	ann:Describes for a format which channels it can be used on	

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

© SMPTE 2009 – All rights reserved

5.2.19 Location.XSD

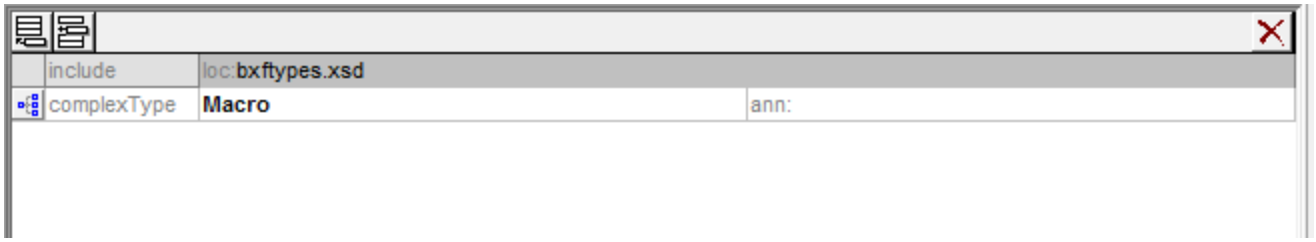
Contains:



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

5.2.20 Macro.XSD

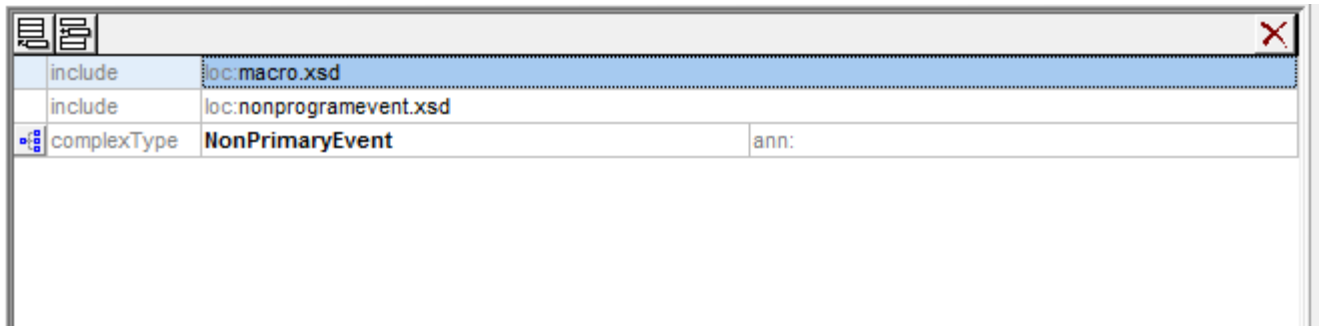
Contains:



Used to describe a MacroEvent under EventData.

5.2.21 NonPrimaryEvent.XSD

Contains:

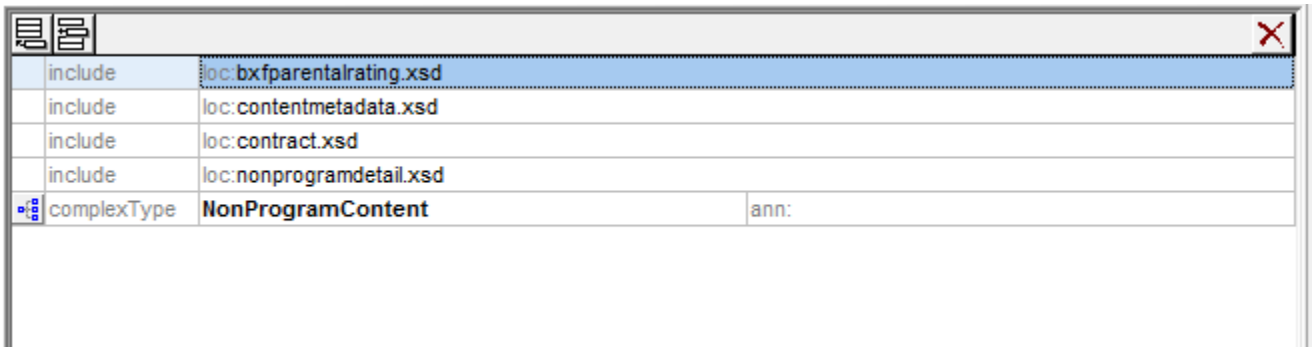


Used to describe those events that are not the primary content of a transport stream or playlist. Secondary events happen at the same time or in conjunction with the broadcast of the primary video and audio streams and may be started and completed using offsets from the start of the primary events.

© SMPTE 2009 – All rights reserved

5.2.22 NonProgramContent.XSD

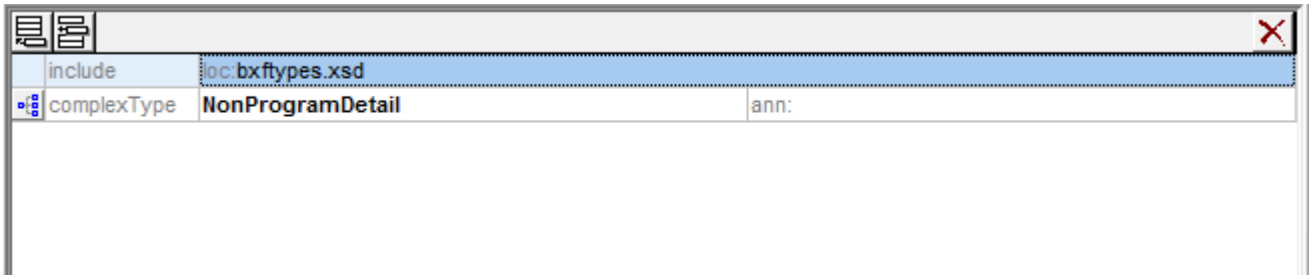
Contains:



Content that is typically short in nature and is scheduled in breaks between the segments of a program such as commercials, promos, ids, etc.

5.2.23 NonProgramDetail.XSD

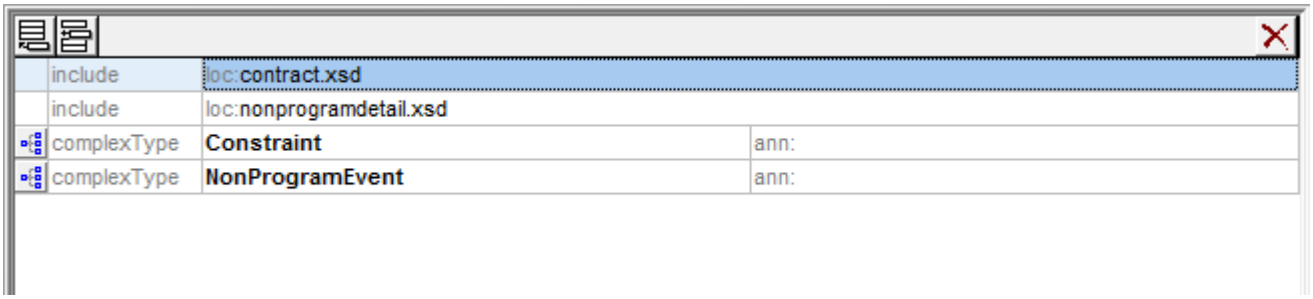
Contains:



Details of the non-program content.

5.2.24 NonProgramEvent.XSD

Contains:

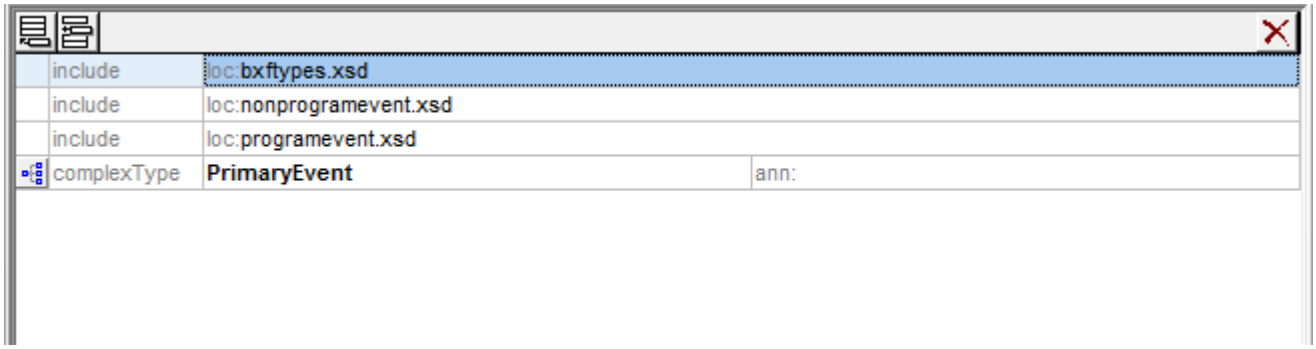


Describes an event that contains NonProgramContent such as commercials and other interstitials, typically of short duration.

© SMPTE 2009 – All rights reserved

5.2.25 PrimaryEvent.XSD

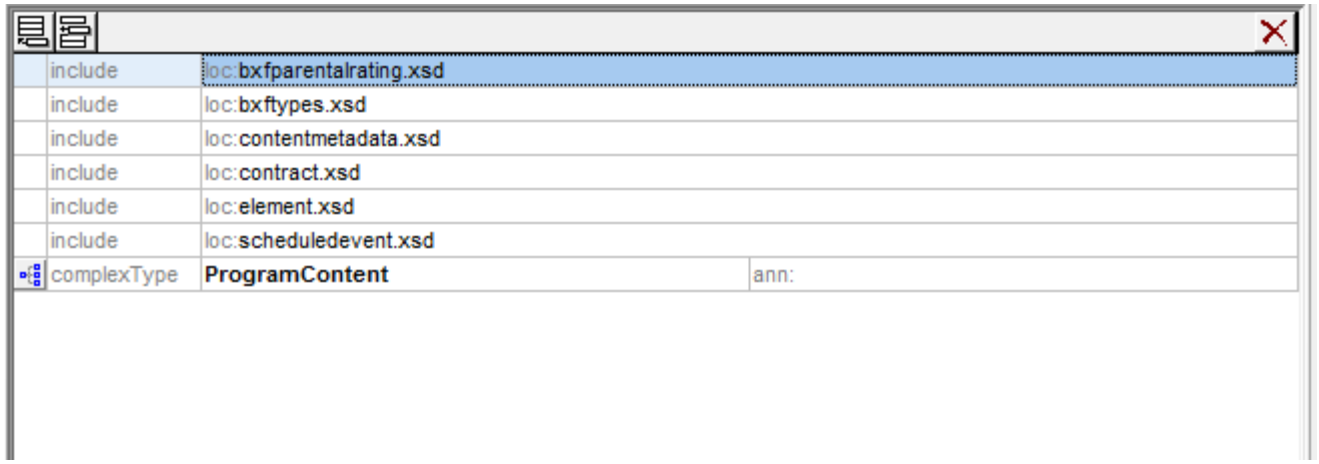
Contains:



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

5.2.26 ProgramContent.XSD

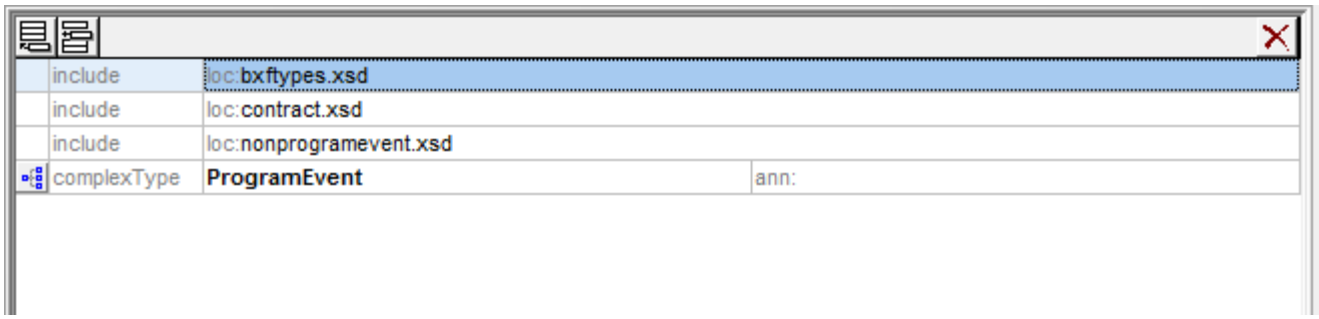
Contains:



Used to describe the full length content of a show.

5.2.27 ProgramEvent.XSD

Contains:



Describes an event that contains ProgramContent.

© SMPTE 2009 – All rights reserved

5.2.28 Schedule.XSD

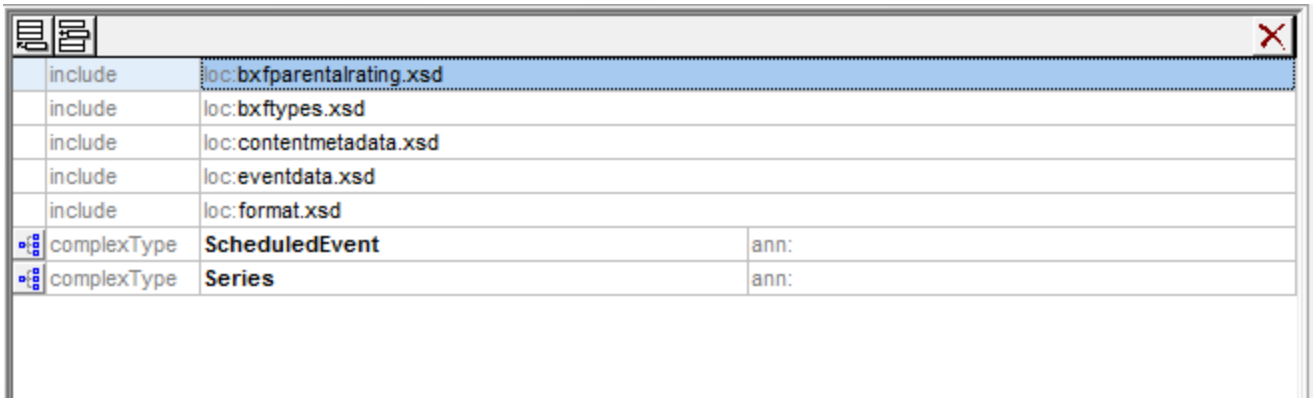
Contains:

	include	loc:asrun.xsd	
	include	loc:bxfchannel.xsd	
	include	loc:bxftypes.xsd	
	include	loc:scheduledevent.xsd	
	complexType	**Schedule**	ann:A schedule

Used to describe a specific list of content in a linear playout sequence.

5.2.29 ScheduledEvent.XSD

Contains:

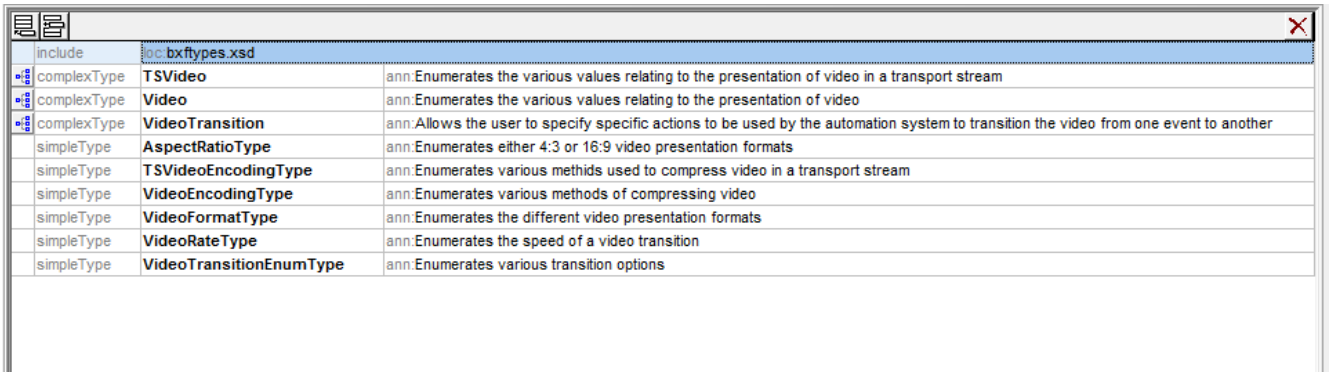


	include	loc:bxfparentalrating.xsd	
	include	loc:bxftypes.xsd	
	include	loc:contentmetadata.xsd	
	include	loc:eventdata.xsd	
	include	loc:format.xsd	
	complexType	**ScheduledEvent**	ann:
	complexType	**Series**	ann:

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

5.2.30 Video.XSD

Contains:



	include	loc:bxftypes.xsd	
	complexType	**TSVideo**	ann:Enumerates the various values relating to the presentation of video in a transport stream
	complexType	**Video**	ann:Enumerates the various values relating to the presentation of video
	complexType	**VideoTransition**	ann:Allows the user to specify specific actions to be used by the automation system to transition the video from one event to another
	simpleType	**AspectRatioType**	ann:Enumerates either 4:3 or 16:9 video presentation formats
	simpleType	**TSVideoEncodingType**	ann:Enumerates various methids used to compress video in a transport stream
	simpleType	**VideoEncodingType**	ann:Enumerates various methods of compressing video
	simpleType	**VideoFormatType**	ann:Enumerates the different video presentation formats
	simpleType	**VideoRateType**	ann:Enumerates the speed of a video transition
	simpleType	**VideoTransitionEnumType**	ann:Enumerates various transition options

Enumerates the various values relating to the presentation of video.

© SMPTE 2009 – All rights reserved