

---

**SMPTE EG 2021-4:2012**

Revision of  
SMPTE EG 2021-4:2009

# **SMPTE ENGINEERING GUIDELINE**

## **Broadcast Exchange Format (BXF) — Schema Documentation**



## Table of Contents

Foreword .....	3
Introduction.....	3
1. Scope .....	4
2. Description of BXF Schema (Informative) .....	4
2.1 Schema Documentation .....	4
2.2 Schema File List .....	8
2.2.1 AsRun.XSD.....	9
2.2.2 Audio.XSD .....	9
2.2.3 BxfCaptions.XSD .....	9
2.2.4 BxfChannel.XSD .....	10
2.2.5 BxfContentId.XSD .....	10
2.2.6 BxfISAN.XSD .....	10
2.2.7 BxfParentalRating.XSD .....	11
2.2.8 BxfSchema.XSD .....	11
2.2.9 BxfTypes.XSD .....	12
2.2.10 Configuration.XSD.....	12
2.2.11 Content.XSD .....	13
2.2.12 ContentMetadata.XSD .....	13
2.2.13 ContentTransfer.XSD .....	14
2.2.14 Contract.XSD.....	14
2.2.15 DataContent.XSD .....	14
2.2.16 Element.XSD .....	15
2.2.17 EventData.XSD.....	15
2.2.18 Format.XSD .....	15
2.2.19 Location.XSD .....	16
2.2.20 Macro.XSD.....	16
2.2.21 NonPrimaryEvent.XSD .....	16
2.2.22 NonProgramContent.XSD .....	17
2.2.23 NonProgramDetail.XSD.....	17
2.2.24 NonProgramEvent.XSD.....	17
2.2.25 PrimaryEvent.XSD .....	18
2.2.26 ProgramContent.XSD .....	18
2.2.27 ProgramEvent.XSD.....	18
2.2.28 Schedule.XSD .....	19
2.2.29 ScheduledEvent.XSD .....	19
2.2.30 Video.XSD.....	19

## 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 EG 2021-4 was prepared by Technology Committee 34CS.

## 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.

## 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. 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 Microsoft'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.

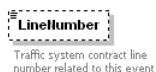
### 2.1 Schema Documentation

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:

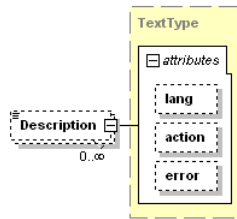
**Single element – mandatory:** Indicated by a rectangle with a solid border. The element name is inside the shape.



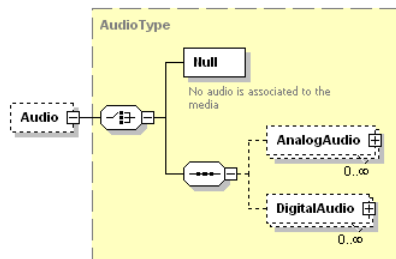
**Single element – optional:** Indicated by a rectangle with a dashed border. The element name is inside the shape.



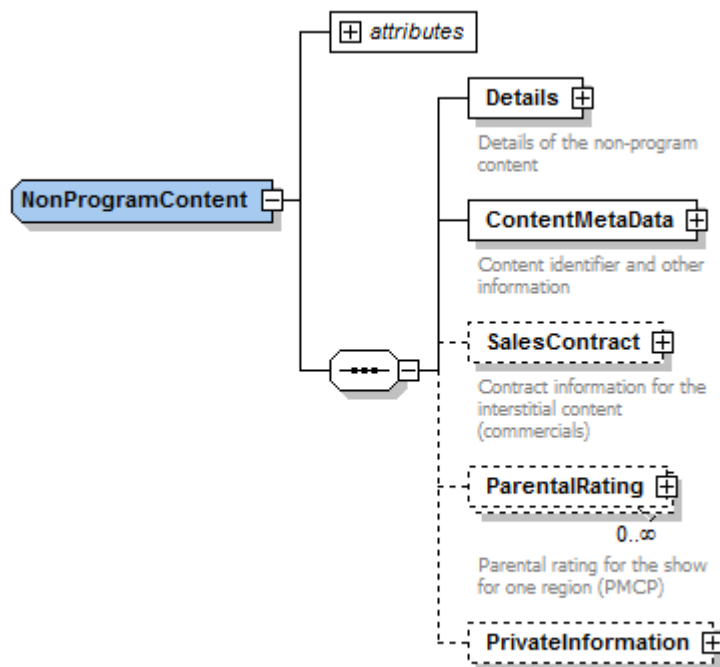
**Multiple elements:** Indicated by a rectangle with a solid border with a number range representing the minimum and maximum number of occurrences possible. In the example, 0 to infinity (0..∞) is shown.



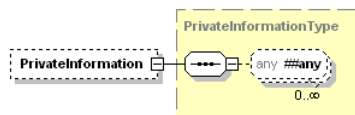
**Elements containing child elements:** Indicated by a [+] or [-] on the element, representing an element containing additional attributes or elements. The [+] indicates that additional elements are available for display. The [-] indicates that the child elements are displayed.



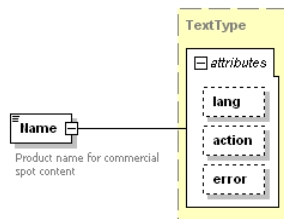
**Complex type:** Indicated by a partial hexagon and a child element symbol.



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

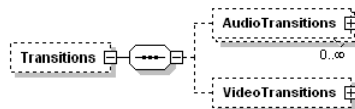


**Attributes:** Indicated by the word 'attributes'

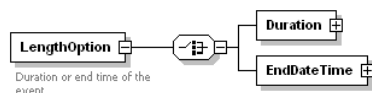


The relationships between components are represented by symbols for sequence and choice.

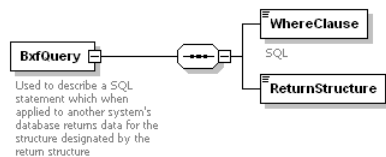
**Sequence:** The sequence compositor shows that all elements occur in sequence.



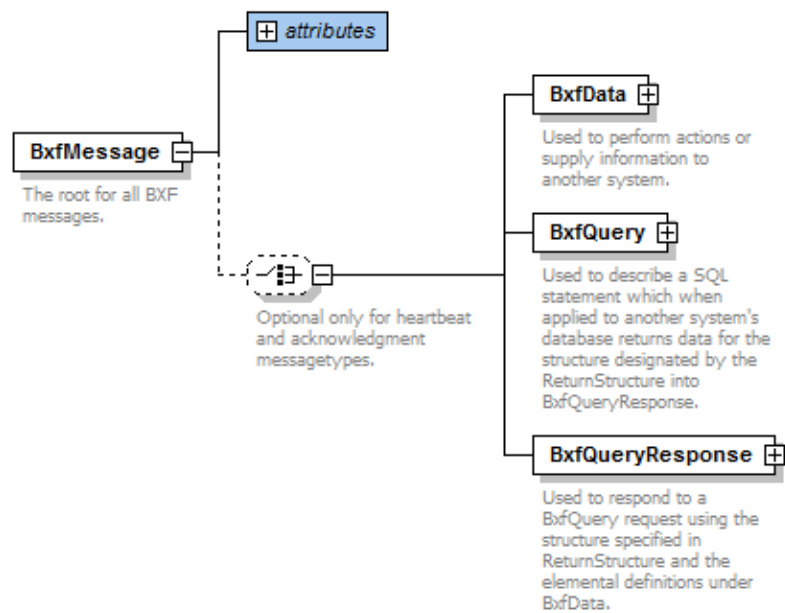
**Choice:** The choice compositor shows the 'or' relationship between associated components (only one choice may be made).



**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.



## 2.2 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.

asrun.xsd
audio.xsd
bxfcaptions.xsd
bxfchannel.xsd
bxfcontentid.xsd
bxfisan.xsd
bxfparentalrating.xsd
bxfschema.xsd
bxfatypes.xsd
configuration.xsd
content.xsd
contentmetadata.xsd
contenttransfer.xsd
contract.xsd
datacontent.xsd
element.xsd
eventdata.xsd
format.xsd
location.xsd
macro.xsd
nonprimaryevent.xsd
nonprogramcontent.xsd
nonprogramdetail.xsd
nonprogramevent.xsd
primaryevent.xsd
programcontent.xsd
programevent.xsd
schedule.xsd
scheduledevent.xsd
video.xsd



## 2.2.1 AsRun.XSD

Contains:

include	loc:bxftypes.xsd	
include	loc:scheduleevent.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.

## 2.2.2 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 AudioType
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.

## 2.2.3 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).

## 2.2.4 BxfChannel.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	Channel	ann:

Extends ATSC's PMCP 3.1 definition of a channel.

## 2.2.5 BxfContentId.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: bxfisn.xsd	
complexType	BxfAlternateId	ann:
complexType	BxfHouseNumber	ann:
complexType	BxfContentId	ann: Groups several content IDs that may be used simultaneously to label and reference a show

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.

## 2.2.6 BxfISAN.XSD

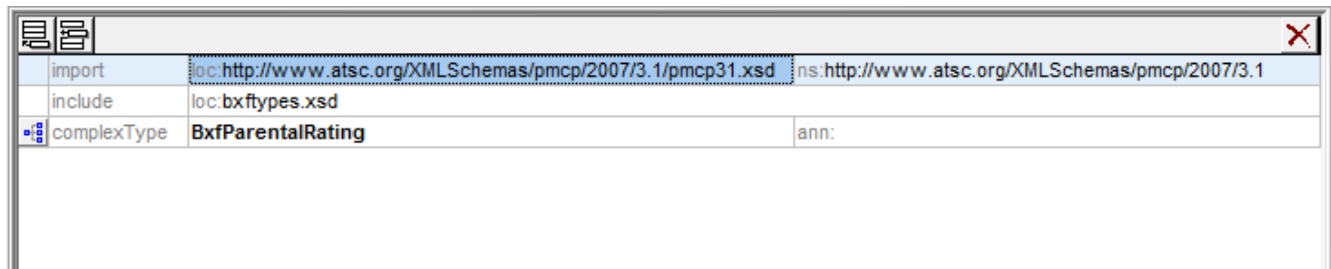
Contains:

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	BxfIsan	ann:

Used to define entry of an ISAN value into ContentID. Go to [www.isan.org](http://www.isan.org) for more information on the use of ISAN with content identification.

### 2.2.7 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.

### 2.2.8 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: bxsfchannel.xsd	
include	loc: schedule.xsd	
include	loc: contenttransfer.xsd	
include	loc: configuration.xsd	
element	BxfMessage	ann: The root for all BFX messages.

The root for all BFX messages.

## 2.2.9 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 - <a href="http://www.atsc.org/standards/Code_Point_Registry.pdf">www.atsc.org/standards/Code_Point_Registry.pdf</a> )
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 - <a href="http://www.atsc.org/standards/Code_Point_Registry.pdf">www.atsc.org/standards/Code_Point_Registry.pdf</a> )
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.

## 2.2.10 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.

## 2.2.11 Content.XSD

Contains:

include	loc:bxftypes.xsd	
include	loc:programcontent.xsd	
include	loc:nonprogramcontent.xsd	
complexType	<b>Content</b>	ann:

Used to describe the content at a specific location.

## 2.2.12 ContentMetadata.XSD

Contains:

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

Content identification and other details.

### 2.2.13 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.

### 2.2.14 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).

### 2.2.15 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.

## 2.2.16 Element.XSD

Contains:

include	loc:scheduleevent.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.

## 2.2.17 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. In Version 2, support for multiple titles and descriptions in a single message has been added in order to allow multi-language support.

## 2.2.18 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.

### 2.2.19 Location.XSD

Contains:

include	loc:bxftypes.xsd	
complexType	Location	ann:Identification of where the media is stored. Used by systems to notify locations of essence instance

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

### 2.2.20 Macro.XSD

Contains:

include	loc:bxftypes.xsd	
complexType	Macro	ann:

Used to describe a MacroEvent under EventData.

### 2.2.21 NonPrimaryEvent.XSD

Contains:

include	loc:macro.xsd	
include	loc:nonprogramevent.xsd	
include	loc:programevent.xsd	
complexType	NonPrimaryEvent	ann:

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. Note that in Version 2, BXF supports the inclusion of program events referenced by the secondary event.



## 2.2.22 NonProgramContent.XSD

Contains:

include	loc:bxfparentalrating.xsd	
include	loc:contentmetadata.xsd	
include	loc:contract.xsd	
include	loc:nonprogramdetail.xsd	
complexType	NonProgramContent	ann:

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

## 2.2.23 NonProgramDetail.XSD

Contains:

include	loc:bxftypes.xsd	
complexType	NonProgramDetail	ann:

Details of the non-program content.

## 2.2.24 NonProgramEvent.XSD

Contains:

include	loc:contract.xsd	
include	loc:nonprogramdetail.xsd	
complexType	Constraint	ann:
complexType	NonProgramEvent	ann:

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

### 2.2.25 PrimaryEvent.XSD

Contains:

include	loc:bxftypes.xsd	
include	loc:nonprogramevent.xsd	
include	loc:programevent.xsd	
complexType	PrimaryEvent	ann:

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

### 2.2.26 ProgramContent.XSD

Contains:

include	loc:bxfparentalrating.xsd	
include	loc:bxftypes.xsd	
include	loc:contentmetadata.xsd	
include	loc:contract.xsd	
include	loc:element.xsd	
include	loc:scheduledevent.xsd	
complexType	ProgramContent	ann:

Used to describe the full length content of a show.

### 2.2.27 ProgramEvent.XSD

Contains:

include	loc:bxftypes.xsd	
include	loc:contract.xsd	
include	loc:nonprogramevent.xsd	
complexType	ProgramEvent	ann:

Describes an event that contains ProgramContent.

## 2.2.28 Schedule.XSD

Contains:

include	loc:asrun.xsd	
include	loc:bxchannel.xsd	
include	loc:bxftypes.xsd	
include	loc:scheduleevent.xsd	
complexType	Schedule	ann:A schedule

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 play out next.

## 2.2.29 ScheduledEvent.XSD

Contains:

include	loc:bxparentalrating.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.

## 2.2.30 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 methods 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.