
SMPTE EG 2021-4:2015

Revision of
SMPTE EG 2021-4:2013

SMPTE ENGINEERING GUIDELINE

Broadcast Exchange Format (BXF) — Schema Documentation



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Approved
October 9, 2015

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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 its Standards Operations Manual.

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 OV 2021-0, the Document Roadmap to this suite of documents.

As of BXF 3.0, many schema changes have taken place. Those changes are described under the appropriate schema sections in this document.

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.

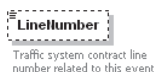
3 Schema Documentation

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:

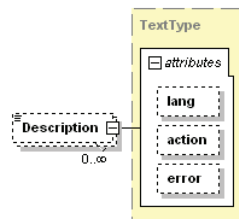
Single element – mandatory: Indicated by a rectangle with a solid border. The element name is inside the shape.



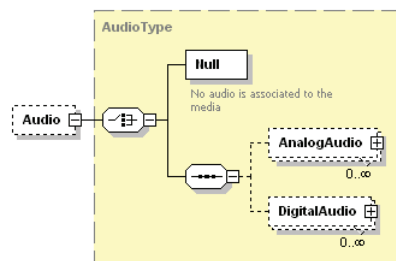
Single element – optional: Indicated by a rectangle with a dashed border. The element name is inside the shape.



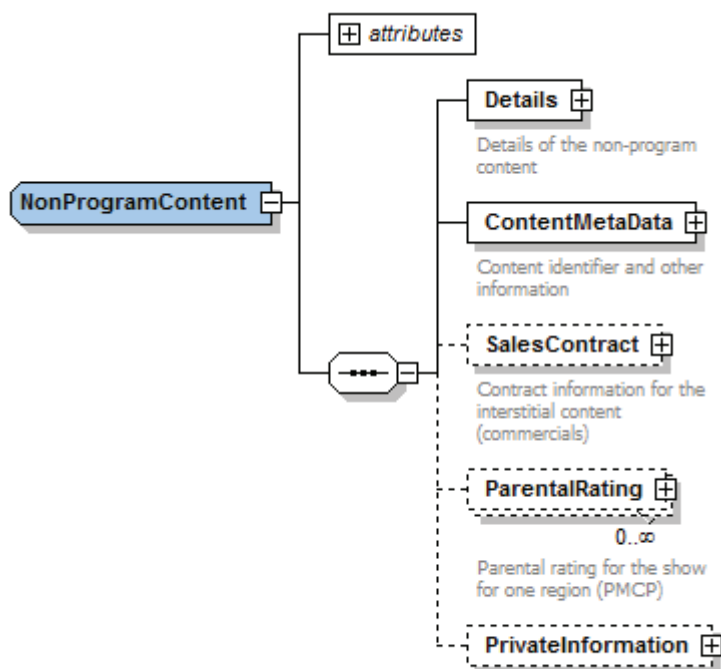
Multiple elements: Indicated by a rectangle with a solid border with a number range representing the minimum and maximum number of occurrences possible. In the example, 0 to infinity (0..∞) is shown.



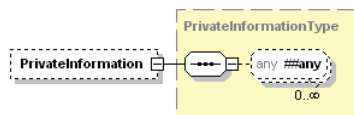
Elements containing child elements: Indicated by a [+] or [-] on the element, representing an element containing additional attributes or elements. The [+] indicates that additional elements are available for display. The [-] indicates that the child elements are displayed.



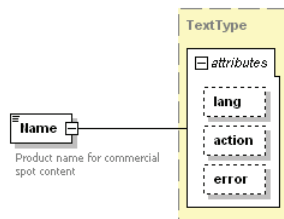
Complex type: Indicated by a partial hexagon and a child element symbol.



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

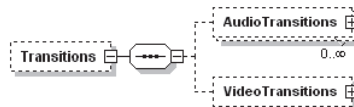


Attributes: Indicated by the word 'attributes'

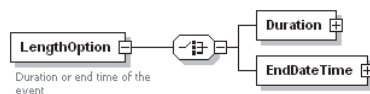


The relationships between components are represented by symbols for sequence and choice.

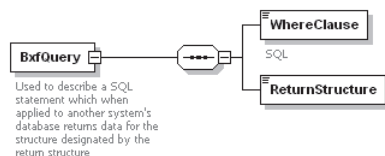
Sequence: The sequence compositor shows that all elements occur in sequence.



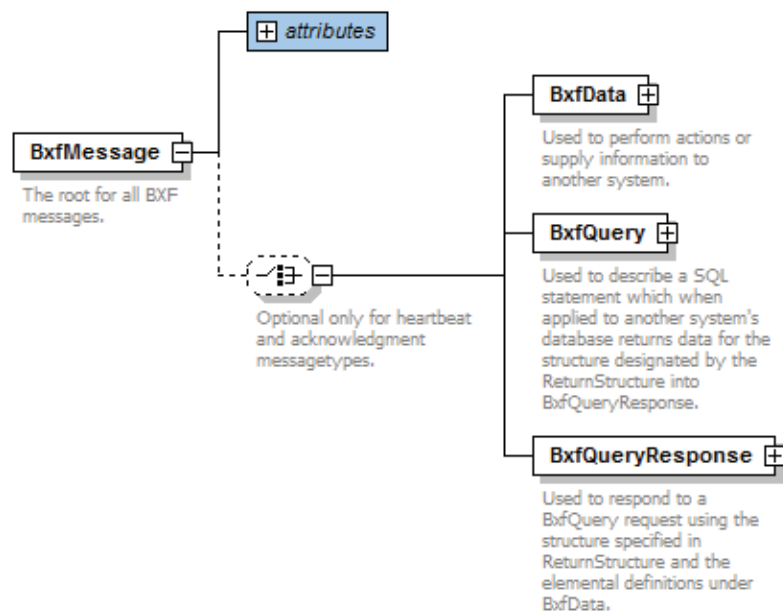
Choice: The choice compositor shows the 'or' relationship between associated components (only one choice may be made).



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

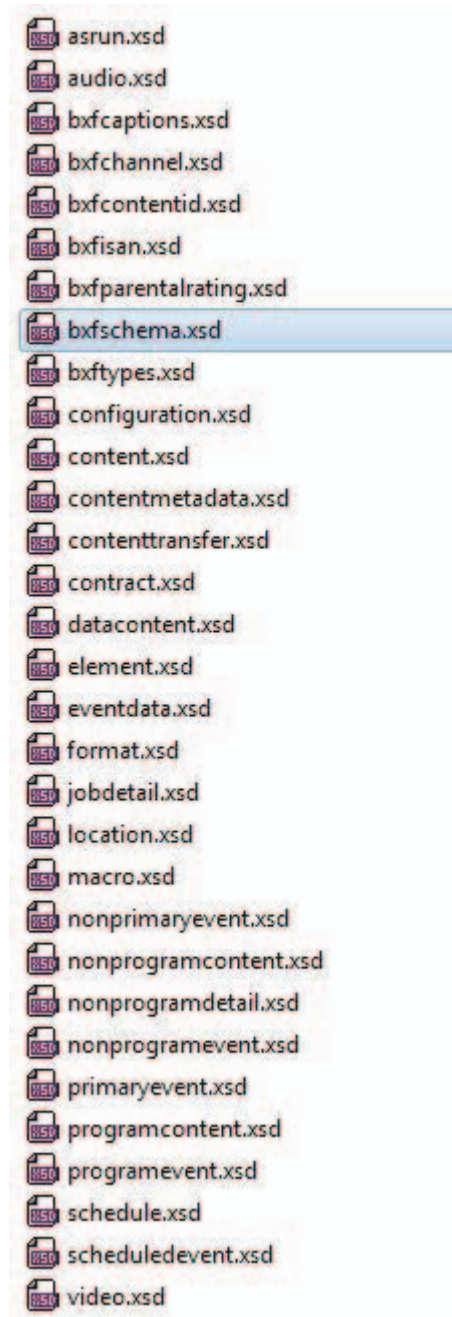


Dashed lines: Dashed lines between elements represent optional connections within the schema diagrams.



3.1 Schema File List

The Schema is actually composed of 31 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.



3.2 Header Change in BXF 4.0

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

```
<!-- Copyright 2015 Society of Motion Picture and Television Engineers. All rights reserved. -->

<xs:schema xmlns="http://smpte-ra.org/schemas/2021/2015/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/2021/2015/BXF" elementFormDefault="qualified" attributeFormDefault="unqualified"
  version="4.000">
```

Most of the XSDs had only their header changed, and are listed below.

- Asrun.XSD
- Audio.XSD
- BXFCaptions.XSD
- BXFChannels.XSD
- BXFContentID.XSD
- BXFISAN.XSD
- BXFParentalRating.XSD
- BXFSchema.XSD
- Configuration.XSD
- Content.XSD
- ContentTransfer.XSD
- Contract.XSD
- DataContent.XSD
- Element.XSD
- Location.XSD
- Macro.XSD
- NonPrimaryEvent.XSD
- NonProgramContent.XSD
- NonProgramDetail.XSD
- NonProgramEvent.XSD
- PrimaryEvent.XSD
- Video.XSD

3.2.1 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.

3.2.2 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.

3.2.3 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).

3.2.4 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.

3.2.5 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: bxftypes.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.

3.2.6 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 for more information on the use of ISAN with content identification.

3.2.7 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 bxfatypes.xsd	
complexType	BxfParentalRating	ann:

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

3.2.8 BxfSchema.XSD

Contains:

import	loc http://www.w3.org/2001/xml.xsd	ns http://www.w3.org/XML/1998/namespace
include	loc bxfatypes.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 BFX messages.

The root for all BFX messages.

3.2.9 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	BxfAddress	Address details
complexType	BxfCompany	Defines all the attributes required for a company
complexType	BxfContact	Defines a contact that is being referenced including phone, email and address details
complexType	BxfCoverage	Defines a physical location that represents the coverage for a broadcast station or the area of distribution for a distributor of media content
complexType	BxfDateRange	Defines a date range for use in scheduling of content. Note that it is possible to create logical periods of time when potentially crossing the start of the broadcast day or crossing midnight depending on the system ingesting the definition
complexType	BxfDuration	Duration can be expressed using either SMPTE time code or as duration
complexType	BxfExtensions	Used to describe customized metadata using data pairs and optionally a validation data type (v:3)
complexType	BxfRepeatTime	Any sequence of well-formed private XML elements
complexType	BxfSimpleTime	Used for time duration or offset
complexType	BxfSimpleDateRange	Used for date-time entry in the schema
complexType	BxfStation	A broadcaster or distributor of media content either over the air or by other means
complexType	BxfText	Used for all free text entry elements in the schema
complexType	BxfUTCDateRange	Standard UTC Date-Range
complexType	EventFilter	Operator rules used to associate the event with reference to the person that created the rule
complexType	Action-ErrorGroup	Used to set an action or report an error and add attribute extensibility
complexType	GroupActionErrorExtensionGroup	Used to set an action or report an error and add attribute extensibility
complexType	BxfActionData	
complexType	BxfShortName	
complexType	BxfElementaryErrorExt	Type for an elementary error
complexType	BxfElementaryError	Type for an elementary error
complexType	BxfError	
complexType	BxfStatus	Status of a ready message
complexType	BxfBroadcastType	
complexType	BxfDay	Used to denote a universal file location
complexType	DayPattern	A binary representation of the days of the week with Monday in the left-most position (eg - "111100" = M-F)
complexType	DestinationType	Type of the destination system (see ATSC code point registry - www.atsc.org/standards/Codes_Point_Registry.pdf)
complexType	ECCode	ATSC Channels and information Codes
complexType	EventModeType	
complexType	Message	Allowed types of messages in this schema
complexType	OperationModeType	
complexType	OriginType	Type of the origin system (see ATSC code point registry - www.atsc.org/standards/Codes_Point_Registry.pdf)
complexType	QueryStrongIdentifier	Restricts Query ReturnStructure based on a pattern that would restrict the return structure to follow the "camel back" style used in the Schema
complexType	QueryStrong	Restricts the Query where clause based on a pattern. Note that regular expressions are not supported
complexType	ScheduleEvent	
complexType	ScheduleType	A type of schedule
complexType	ScheduleTimeCode	Reference SMPTE 259M, section 8
complexType	StartModeType	
complexType	UUID	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.

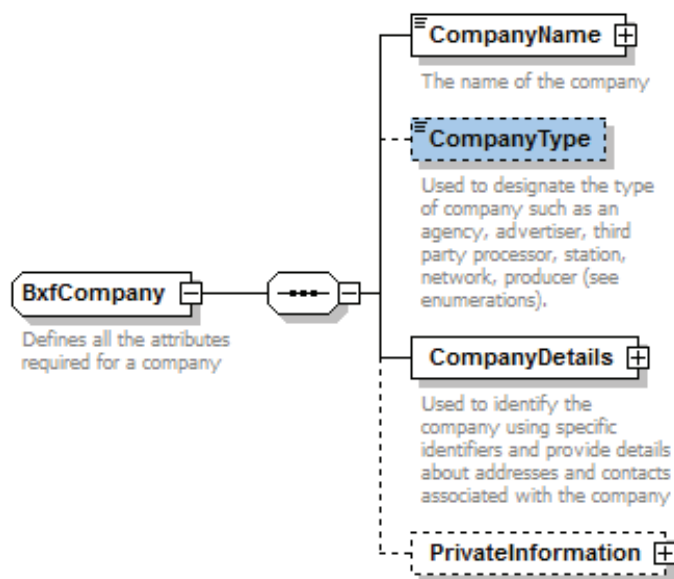
3.2.9.1 BXF 4.0 Changes

Description of change:

Under BxfCompany, “Producer” added as a new enumeration and the list resorted alphabetically for CompanyType along with adjustments to the annotation for the element. For PhoneType, under BxfContact, a new enumeration of “Fax” has been added.

Text representation:

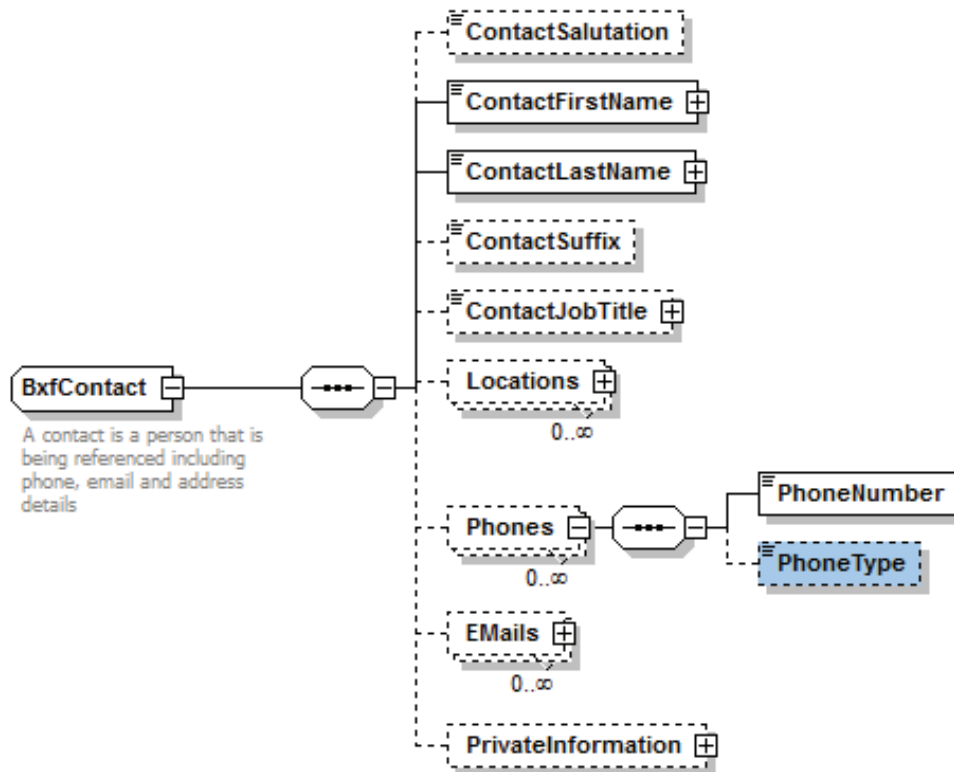
```
<xs:element name="CompanyType" minOccurs="0">
  <xs:annotation>
    <xs:documentation>Used to designate the type of company such as an agency, advertiser, third party
processor, station, network, producer (see enumerations).</xs:documentation>
  </xs:annotation>
  <xs:simpleType>
    <xs:restriction base="xs:string">
      <xs:enumeration value="Advertiser"/>
      <xs:enumeration value="Agency"/>
      <xs:enumeration value="Cable Network"/>
      <xs:enumeration value="Interconnect Content Distributor"/>
      <xs:enumeration value="Local Cable System"/>
      <xs:enumeration value="Producer"/>
      <xs:enumeration value="Program Distributor"/>
      <xs:enumeration value="Radio Network"/>
      <xs:enumeration value="Radio Station"/>
      <xs:enumeration value="MSO"/>
      <xs:enumeration value="MVPD"/>
      <xs:enumeration value="Satellite Service"/>
      <xs:enumeration value="TV Network"/>
      <xs:enumeration value="TV Station"/>
      <xs:enumeration value="Other"/>
    </xs:restriction>
  </xs:simpleType>
</xs:element>
```



```

<xs:element name="PhoneType" minOccurs="0">
  <xs:simpleType>
    <xs:restriction base="xs:string">
      <xs:enumeration value="Business"/>
      <xs:enumeration value="Home"/>
      <xs:enumeration value="Mobile"/>
      <xs:enumeration value="Alternate"/>
      <xs:enumeration value="Fax"/>
      <xs:enumeration value="Other"/>
    </xs:restriction>
  </xs:simpleType>
</xs:element>

```



3.2.10 Configuration.XSD

Contains:

include	loc:bxfypes.xsd
complexType	Configuration
	ann:

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

3.2.11 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.

3.2.12 ContentMetadata.XSD

Contains:

	File Name	Description
include	audio.xsd	
include	bxfoptions.xsd	
include	bxfocontentid.xsd	
include	datscontent.xsd	
include	location.xsd	
include	video.xsd	
include	macro.xsd	
include	bxftypes.xsd	
complexType	AlternateAudioContent	amr Used to provide alternate audio only media information
complexType	BaseMedia	amr Enumerates the way content is stored or the method used to transmit
complexType	Billboard	amr Used to describe the different attributes of one or more Billboards
complexType	ContentMetadata	amr Used to describe all the metadata for a single instance of content. (Note that this element name should 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	amr Base Media combined with Media Location
complexType	MediaLocation	amr Used to designate the physical location of a media essence
complexType	UsagePolicy	amr

Content identification and other details.

3.2.12.1 BXF 4.0 Changes

Description of change:

Duration used under MediaLocation has been extended to include a new boolean flag attribute called “useEOM” which signals that an EOM value is available and should be used rather than calculating it by using the SOM and Duration values. A new element “EOM” is also included to allow the entry of the EOM directly. Also, the attributes for MediaLocation have been enhanced. “sourceType” has three new enumeration options: Preview, Proxy and Other; and a new attribute “qualifier” is to be used to differentiate between two similar sources. UsagePolicy has also added a new element, “EmbeddedRights” used to describe the rights held within a piece of content that differ from the rest of the content's rights. For example, music embedded in a program, or a special event shown as part of an anthology program.

Text representation:

```
<xs:element name="Duration">
  <xs:annotation>
    <xs:documentation>The length of the content specified.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="BxfDuration">
        <xs:attribute name="useEOM" type="xs:boolean">
          <xs:annotation>
            <xs:documentation>If set to yes, populate EOM with a prtoper value to be
used.</xs:documentation>
          </xs:annotation>
        </xs:attribute>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:element>
```