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SMPTE STANDARD

Broadcast Exchange Format (BXF) — Requirements and Informative Notes



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MOTION PICTURE AND TELEVISION ENGINEERS
3 Barker Avenue, White Plains, NY 10607
(914) 761-1100

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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 ST 2021-1 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.

SMPTE 2021 (BXF) is 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.

Background

To understand the scope of BXF, a little background is helpful. The genesis of BXF can be traced to the need for a consistent yet flexible means for exchanging schedule, as run, and content metadata between Traffic and Automation systems. Literally hundreds of proprietary, fixed interfaces and protocols have been created over the past 20 years or so between these two types of systems. Vendors who create and develop these systems were invited to share ideas in search of a better way to facilitate the exchange of data between systems. The group quickly embraced Content Distribution and Program Management vendors as well, as they too were seeking a form of standardization and improvement in their interfacing efforts.

BXF supports the exchange of single or multiple records at one time, over a variety of transport mechanisms.

While endeavoring to be a comprehensive protocol, it is acknowledged that it is possible that additional data elements, or data elements that apply to a few specific systems, may need to be exchanged. For this reason, Private Information structures have been placed at various points in the schema to allow vendors the flexibility to add data elements.

It is expected that BXF could be extended in the future, as warranted, and it has been designed with this in mind.

BXF is intended to complement, not replace, the following:

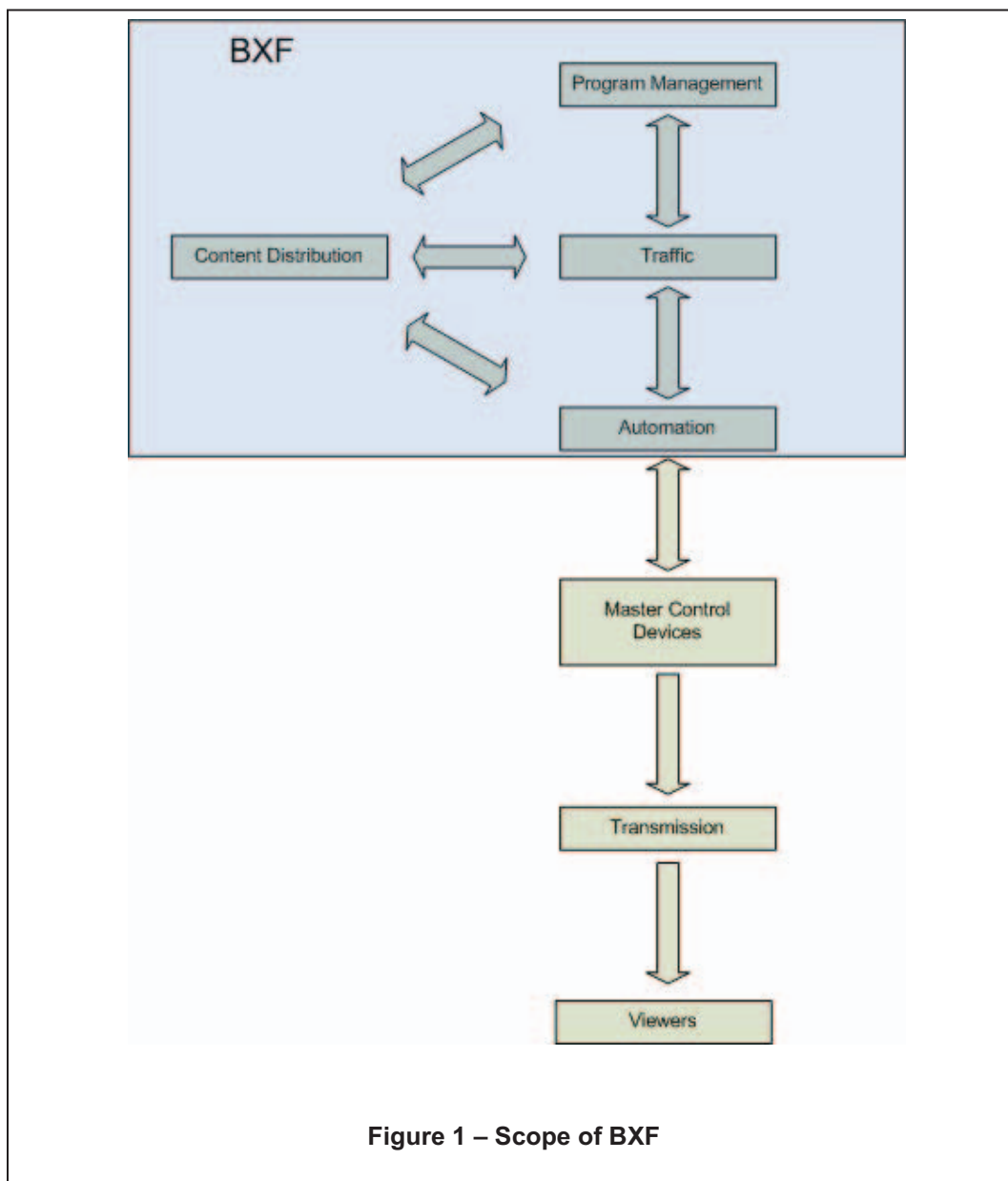
- Advanced Authoring Format
- Material eXchange Format
- MDP – Media Dispatch Protocol

It is acknowledged that some may see an area of overlap in BXF's ability to request the movement of content with other standards, such as MDP. However, MDP itself does not include support for these specific requests. Instead,

BXF incorporates aspects of several pre-existing standards into its schema, such as:

- Programming Metadata Communication Protocol (ATSC)
- International Standard Audiovisual Number (ISO)
- Ad-ID (AAAA/ANA)

The following figure illustrates the scope of BXF within a broadcast facility. Those areas outside of the BXF box are considered outside the intended scope of the BXF protocol and this document.



Broadcast Exchange Format (BXF)

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 document serves as the master document for the 2021 suite (thus its Part 1 designation). It includes general BXF details as well as informative notes. SMPTE OV 2021-0 provides a Roadmap for the 2021 Document Suite

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.

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 Document Elements

This document 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/2021/2015/BXF>. (Accessible only by appropriately-designed software applications, for schema validation. Not intended to be human-accessible.)

- a) Prose document st2021-1-2015.pdf (this file) [Normative]
- b) XML schema st2021-2021-1a-2015.xml [Normative]
- c) HTML schema guide st2021-1b-2015.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.

- XML Schema Part 1: Structures Second Edition, W3C Recommendation 28 October 2004, <http://www.w3.org/TR/2004/REC-xmlschema-1-20041028/>
- XML Schema Part 2: Datatypes Second Edition, W3C Recommendation 28 October 2004, <http://www.w3.org/TR/2004/REC-xmlschema-2-20041028/> Extensible Markup Language (XML) 1.0 (Second Edition)
- W3C Recommendation, 6 October 2000, <http://www.w3.org/TR/2000/REC-xml-20001006>
- XML Schema, W3C Recommendation, 2 May 2001, <http://www.w3.org/TR/2001/REC-xmlschema-0-20010502>
- A/76B “Programming Metadata Communication Protocol, Revision B”, Advanced Television Systems Committee, Washington, DC, January, 2008
- “XML Path Language”, W3C Recommendation 16 November 1999, <http://www.w3.org/TR/1999/REC-xpath-19991116>
- ISO 15706-2:2007, Information and Documentation — International Standard Audiovisual Number (ISAN) — Part 2: Version Identifier
- SMPTE ST 258:2004, Transfer of Edit Decision Lists, Society of Motion Picture and Television Engineers, April 21, 2004.
- A Universally Unique IDentifier (UUID) URN Namespace P. Leach, M. Mealling, R. Salz, 2005 IETF RFC4122 <http://www.ietf.org/rfc/rfc4122.txt>

- IETF RFC3986 - Uniform Resource Identifiers (URI): Generic Syntax T. Berners-Lee, et al. The Internet Society, 2005. <http://www.ietf.org/rfc/rfc3986.txt>
- IETF RFC3066 - Tags for the Identification of Languages, H. Alvestrand, The Internet Society, 2001 <http://www.ietf.org/rfc/rfc3066.txt>
- MPEG-2 ISO/IEC 13818-2:2000, Information technology — Generic Coding of Moving Pictures and Associated Audio Information: Video
- A/65C, "Program and System Information Protocol for Terrestrial Broadcast and Cable, Revision C, with Amendment No. 1", Advanced Television Systems Committee, Washington, DC, 9 May 2006
- CEA-708-D, Digital Television (DTV) Closed Captioning, Consumer Electronics Association

5 Definitions

The following definitions apply within the BXF protocol standard.

Word	Element/Attribute Name	Definition
Advertiser Name	AdvertiserName	Time in a broadcast schedule may be sold to a third party for the purpose of advertising products, goods, or services. These are commonly referred to as commercials, and the third party that purchased the time for the commercial is an Advertiser.
Agency	Agency	The entity that manages placement of commercials, and in some cases the production of commercials
Alternate Audio Content	AlternateAudioContent	If audio that is not directly associated with the primary video content is scheduled to run with the primary video, a separate piece of content for just this audio must be indicated. This includes audio that may be provided for the purpose of accessibility issues.
As Run (Schedule)	AsRun CompleteAsRun BasicAsRun	A term typically applying to broadcast playout schedules referring to the exact events that aired during a specific period of time, usually a broadcast day and also includes errors concerning scheduled content that did not air or was aired improperly.
Asset Server	AssetServer	Asset server is a term that describes a server where commercial and program content is stored.
Authorization List	AuthorizationList	For cable operations a list of cable headend locations that are authorized to present specific commercial content.
Avail Number	AvailNumber	A count of the number of format positions that are allowed to contain commercial content.
Billing Reference Code	BillingReferenceCode	A unique reference code for each billable event that typically links back to the system that created the event, and is used in the reconciliation of the as run against the schedule.
Channel	Channel	A definition used to describe the means by which a schedule is broadcast.

Configuration	Configuration	There are several schema elements that are not specifically enumerated in the schema and must be configured between the two systems before the elements can be used.
Constraints	Constraints	A set of rules that restricts the placement of commercial content on a schedule.
Content	Content	Content may contain multiple essence types, (e.g. audio, video, etc.)
Content Metadata	ContentMetaData	Information concerning a specific piece of content
Content Play Number	ContentPlayNumber	Each time a program is scheduled and aired by an entity it is given a play number that allows the entity to track how many times it has been aired.
Content Transfer	ContentTransfer	The movement or copying of content from one location to another.
Content Type	ContentType	Another way to categorize content into specific groupings (e.g. network, local, news, entertainment).
Day Pattern	dayPattern	When creating a schedule description, it is possible to define only part of a schedule that covers specific days and periods of time. The day pattern is used to describe this using Monday as the arbitrary first day of the week and having seven elements where each one represents one day of the week. For example, the number string 1111100 would represent M-F, 0000010 represents Sat, and 0000001 is Sun.
Dub Request (May sometimes be called "Copy")	transferType:Duplication	A set of instructions that cause the specified content to be copied from its original location to a new destination.
Duration	Duration	Duration of content

E-I Code	E-ICode	Certain programs may be designated by the entity to conform to a governmental standard of being education and/or informational in nature for a specific age group, usually children and teens (FCC 06-143).
Elements	Elements	A stream of content can be divided into its individual elements (i.e. Commercials, program segments, graphics, etc).
Embargo Date	EmbargoDate	The first date content may be used
Embedded Non-program Content	EmbeddedNonProgramContent	This is another name for commercial content supplied by the distributor of the content and is considered part of a program segment rather than being broken out into its own event. When this happens, the commercial content is referred to as being embedded.
End Mode	EndMode	Each event can end using one of several possible options: Duration - when the value set for the event's duration is reached. Manual - when the operator ends the event via manual intervention. External - continue to run until an external event has taken place that triggers the end of the event.
EOM		End of Material is a point beyond which the content should not be played.
Episode	EpisodeName EpisodeCode	A single program of a series.

Event	EventData	An event is a period of time during which one or more types of content is displayed on the channel. Examples include: Single event: playback of a program segment that is uninterrupted. Single event: playback of a non-program type content (commercials). Single event with no duration: turning on the tower lights at dusk. Single event with no duration: the generation of a commercial cue tone. Multiple events: playback of a promotional message at the end of a movie while the credits are rolling.
Expendable	Expendable	A flag that is set on an event by the traffic management system to indicate that the event may be preempted.
Expiration Date	ExpirationDate	The last date and time when the content can be used on a schedule as determined by its contract or some other restriction.
Federal Source	FederalSource	A value that is set for each event as required by the local or federal government in order to categorize the event in some way.
First Air Date	FirstAirDate	The first date that the content is aired on a schedule.
Format Element Type	FormatElementType	Formats consist of either segments or breaks. Segments are placeholders for program content and breaks are placeholders for commercial content. Comments can also be added to formats but can not hold any type of content.
Format	Format	The definition of the empty structure of a program as used by the traffic system to construct a schedule grid.
Frame		A frame contains all of the lines of spatial information of a video signal required to make up one complete picture.
Frame Rate	frameRate	The number of frames per second

Genre	Genre	Programs may be grouped into separate categories for the convenience of organizing them. Genre usually represents the type of content based on the storyline or style of the content. (E.g. police drama, western, game show, children's show, etc.)
Heartbeat Message	messageType:Heartbeat	An XML message conforming to the BXF Schema definitions that is used by one system to query if another system is operational.
Hiatus Date Range	HiatusDateRange	A date range period after the embargo date, but before the expiration date during which the content can not be aired.
IgnoreAvail	IgnoreAvail	A flag to indicate that commercial content may not be aired in some locations while still being authorized to air in others based on external agreements.
JIP Flag	JipFlag	Set when a program is joined in progress rather than starting at its beginning.
Last Play Flag	LastPlayFlag	Set when a program is being aired for the last time.
Macro	MacroEvent	In order to facilitate the processing of a complex sequence of instructions to an automation system, a single macro name is substituted which may also have a set of parameters that define how the macro is to be processed by the device. The execution of the macro by the automation system triggers a predefined series of discreet events rather than requiring that each event be specifically called.
Media	Media	The physical means on which a piece of content is stored (i.e. Tape, dvd, and server).
Non-primary Elements	NonPrimaryElements	The individual components of a format that make up a non-primary event.
Non-primary Event	NonPrimaryEvent	An event that depends on a primary event and is scheduled relative to that event.
Non-program Content	NonProgramContent	Short form content that is interspersed between the program content.

Parental Rating	ParentalRating	A rating applied to most program content that allows parental control.
Physical Asset	PhysicalAsset	The storage of content on a physical medium such as tapes, CDs, DVDs, etc.
Playout Schedule		A list of events to be played in sequential order based on the instructions included as part of the schedule.
Preemption Warning	PreemptionWarning	A flag set by the traffic system to warn the operator of the automation system not to preempt the airing of the flagged content.
Premiere Flag	PremiereFlag	Set when a program is first aired by the entity.
Primary Duration	PrimaryDuration	The length of time assigned as the duration of a format element.
Primary Element ID	PrimaryElementId	A value assigned to each element of a format that can then be used to link it to a specific event.
Primary Event	PrimaryEvent	An event that does not depend upon any other event to happen.
Primary Offset	PrimaryOffset	Each format element is given an offset value in time to indicate when it starts relative to the start of the program.
Product Code	ProductCode	The category of the product.
Product Name	ProductName	The name of the product being advertised.
Program Contract	ProgramContract	Many programs are purchased or licensed from a third party and the program contract specifies the limitations on how that program may be aired by the entity.
Program Management		The process of managing a broadcast entity's library of content and coordinating the delivery of other media content from third party sources.
Program Content	ProgramContent	Content that is typically longer in duration and excludes non-program types.
Protection	Protection	In order to protect against a possible equipment failure, a protection source may be requested so that one or more identical copies of the primary content be running at the same time.