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Media Type Registration for the  
Society of Motion Picture and Television Engineers (SMPTE)  
Material Exchange Format (MXF)

Status of This Memo

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Abstract

This document serves to register a media type for the Society of Motion Picture and Television Engineers (SMPTE) Material Exchange Format (MXF). MXF, defined by SMPTE 377M, is a standard wrapper format developed for the interchange of audiovisual material, including both audiovisual essence and rich metadata.

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## 1. Introduction

The present document registers a media type for SMPTE Material Exchange Format (MXF). MXF, defined by SMPTE 377M [SMPTE377M], is a standard wrapper format developed for the interchange of audiovisual material, including both audiovisual essence and rich metadata.

Essence is the raw video, audio, and data streams contained and described by MXF. Metadata carried by MXF includes structural metadata and descriptive metadata. Structural metadata relates to the structure and capabilities of the MXF file and is generally required for proper decoding. Some examples of structural metadata are descriptions of essence types, information to help synchronize playout of audio and video, and content length. Descriptive metadata gives information about the program content in the file and is not essential for decoding. Some examples of descriptive metadata are program title, actors, and scene descriptions. The essence in MXF files may itself carry data, such as vertical blanking interval data used for carriage of Closed Captioning and other purposes.

MXF is an important tool in providing interoperation between different video systems as well as digital cinema systems. MXF also aids in the development of video production and distribution workflows that are more efficient, multi-vendor, file based, and IT oriented.

SMPTE currently has standards for the mapping of the following essence types to the MXF generic container: MPEG (including MPEG-1 and MPEG-2 video streams, as well as MPEG audio), DV-DIF (Digital Video Digital Interface Format for the DV family of related video encodings), Uncompressed Pictures, SDTI-CP (Serial Digital Transport Interface Content Package for delivering packetized audiovisual content over the SDI interface), D-10 (a specialized video stream incorporating MPEG-2 4:2:2P@ML), D-11 (a high-definition video compression standard), AES3 audio, Broadcast Wave audio, and A-Law audio. The flexibility of the MXF generic container allows for the possibility of mappings of additional essence types in the future.

The media type defined here is needed to correctly identify MXF files when they are served over HTTP or other network connections, included in multi-part documents, indexed by operating systems and digital asset management systems, or used in other places where media types are used.

## 2. Security Considerations

Security requirements for the application/mxf media type are discussed in the IANA media type registration (Section 3.1).

## 3. IANA Considerations

The IANA has registered the media type application/mxf as specified in Section 3.1. The registration uses the template present in [RFC4288].

### 3.1. Media Type for SMPTE Material Exchange Format (MXF)

To: ietf-types@iana.org

Subject: Registration of media type application/mxf

Type name: application

Subtype name: mxf

Required parameters: none

Optional parameters: ULs

The optional parameter ULs is a single Uniform Resource Name (URN), or a comma-separated list of multiple URNs of SMPTE Universal Labels (which are defined by SMPTE 400M [SMPTE400M]).

This optional parameter provides hints to the decoder regarding the structure of the MXF file, which could include Operational Pattern, essence types, descriptive metadata schemes, and other elements that are identified by their SMPTE Universal Label.

SMPTE Universal Labels are Object Identifiers (OIDs), as specified by [ASN1]. Thus, a URN of a SMPTE Universal Label can use the OID URN namespace specified in [RFC3061], or any other future URN namespace that is appropriate for SMPTE Universal Labels.

Note that, per [RFC2045], some characters (including the comma used to separate multiple values) require that the entire parameter value be enclosed in quotes.

Below is an example of use of the optional parameter. The two SMPTE Universal Labels indicate that the MXF file uses the OP1a Operational Pattern and contains IEC DV video at 25 Mbps, 525 lines, 59.94 fps interlaced essence.

Content-Type: application/mxf;  
ULs="urn:oid:1.3.52.4.1.1.1.13.1.2.1.1.1,  
urn:oid:1.3.52.4.1.1.1.4.1.2.2.2.1.1"

Encoding considerations: binary

Security considerations: Application/mxf objects are not signed but may be partially encrypted internally. External security mechanisms must be employed to ensure content confidentiality. MXF, through metadata extensions, may allow executable code to be transferred in the file. It is suggested that no unauthenticated executables decoded from an MXF file be executed. Some compressed essence types carried in MXF may carry a risk that certain pathological bitstreams could lead to potential denial-of-service attacks against these essence decoders.

Interoperability considerations: MXF provides a standard wrapping for a number of audio and video essence types according to a number of different Operational Patterns (OP). Thus, interoperability depends upon whether the MXF file decoder has the capability to match the features of the MXF file encoder. An Application Specification (AS) can ensure that MXF encoders and decoders can interoperate effectively.

Published specification: RFC 4539, SMPTE 377M [SMPTE377M]

Applications that use this media type: MXF is a wrapper for many types of audio and video essence types in use by many applications in the broadcast and digital cinema industries. These include non-linear editing systems, video servers, video camera systems, digital asset management systems, and digital video distribution systems.

Additional information:

Magic number(s): none

File extension(s): .mxf

Macintosh File Type Code(s): "mxf "

Person & email address to contact for further information:

Thomas Edwards

email: tedwards@pbs.org

Intended usage: COMMON

Restrictions on usage: none

Author/Change controller:

Thomas Edwards  
email: tedwards@pbs.org

## 4. References

### 4.1. Normative References

- [SMPTE377M] Society of Motion Picture and Television Engineers, "Material Exchange Format (MXF) File Format Specification", SMPTE 377M-2004, <<http://www.smpte.org>>.
- [SMPTE400M] Society of Motion Picture and Television Engineers, "SMPTE Labels Structure", SMPTE 400M-2004, <<http://www.smpte.org>>.

### 4.2. Informative References

- [ASN1] International Telephone and Telegraph Consultative Committee, "Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1)", CCITT Recommendation X.209, January 1988.
- [RFC2045] Freed, N. and N. Borenstein, "Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies", RFC 2045, November 1996.
- [RFC3061] Mealling, M., "A URN Namespace of Object Identifiers", RFC 3061, February 2001.
- [RFC4288] Freed, N. and J. Klensin, "Media Type Specifications and Registration Procedures", BCP 13, RFC 4288, December 2005.

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