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SMPTE STANDARD

for Television — Material Exchange Format (MXF) — Mapping Type D-10 Essence Data to the MXF Generic Container



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1 Scope

This standard defines the mapping of compressed picture data according to the type D-10 data stream and up to 8 channels of AES3 data into the material exchange format generic container (MXF-GC). This mapping is given the acronym: MXF-GC(D-10).

The MXF specification is written in several parts. This is one of a set of documents that define the contents of the MXF file body.

The MXF file format specification includes operation pattern specifications that may define restrictions to be placed on the way in which this essence container type can be implemented. The reader is advised to carefully study the appropriate operational pattern document for compliance to the defined implementation.

2 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 editions of the standards indicated below.

SMPTE 331M-2004, Television — Element and Metadata Definitions for SDTI-CP

SMPTE 356M-2001, Television — Type D-10 Stream Specifications: MPEG-2 4:2:2P@ML for 525/60 and 625/50

SMPTE 377M-2004, Television — Material Exchange Format (MXF) File Format Specification

SMPTE 379M-2004, Television — MXF Generic Container

SMPTE 385M-2004, Television — Mapping SDTI-CP Essence and Metadata into the MXF Generic Container

SMPTE RP 204-2000, SDTI-CP MPEG Decoder Templates

3 Glossary of acronyms, terms and data types

The general glossary of acronyms, terms and data types used in the MXF specification is given in SMPTE 377M. Supplementary glossaries of acronyms and terms are defined in SMPTE 379M and SMPTE 385M. They are not repeated here to avoid any divergence of meaning.

4 Introduction

The MXF generic container (MXF-GC) is a streamable essence container that encapsulates a sequence of one or more content packages (CP). SMPTE 379M defines the MXF generic container as the native essence container in MXF files. SMPTE 385M defines a system item that is compatible with SMPTE 326M (SDTI-CP) and also defines how SDTI-CP essence and metadata can be used in the MXF generic container.

This standard specifies the mapping of the type D-10 stream data and 8-channel AES3 data into the MXF generic container. This same data is directly compatible with SDTI-CP constrained by the template defined in SMPTE RP 204.

5 Type D-10 mapping

The MPEG-2 baseline decoder template specified by SMPTE RP204 provides for codecs operating with MPEG-2 4:2:2P@ML encoded pictures accompanied by an 8-channel AES3 data capability and a general data element. It specifies a codec capable of basic timing and transfer modes for SDTI operation. The specification is a baseline allowing receiver/decoders to be designed with higher capabilities if and when desired. Details of the element and metadata definitions plus the MPEG-2 baseline SDTI decoder template are given in SMPTE 331M and SMPTE RP 204.

This specification shall use frame-based mapping as defined by SMPTE 379M. The order of items in this mapping shall be system, picture, sound and data (if present).

NOTE – Auxiliary items and elements in SMPTE 326M are synonymous with data items and elements in the MXF generic container.

5.1 System item mapping

The mapping of system item data shall comply with that defined in SMPTE 385M. The system metadata pack and the package metadata set are required. The presence of the picture item, sound item, data item and control element depends on the setting of the system metadata bitmap as defined in SMPTE 385M.

The universal label (UL) used in the MXF GC(D-10) system item and in the MXF header metadata shall have the following value:

Table 1 – Specification of the MXF-GC(D-10) essence container UL

Byte No.	Description	Value (hex)	Meaning
1~13	See SMPTE 379M	--	Defined in Table 3 of SMPTE 379M
14	Type D-10 Mapping	01h	Mapping compliant to SMPTE 356M and SMPTE RP204
15	MPEG Constraints: SMPTE 356M	01h 02h 03h 04h 05h 06h	50 Mbps, 625/50 50 Mbps, 525/60 40 Mbps, 625/50 40 Mbps, 525/60 30 Mbps, 625/50 30 Mbps, 525/60
16	Type: Template Extension	01h or 02h	01h = template defined in this document 02h = extended template

This label value as described above shall be used as the essence container UL in the preface set and the appropriate file descriptor set of the header metadata and in the partition pack.

5.2 Picture item mapping

There shall be one essence element in the MXF-GC picture item which shall be a MPEG-2 4:2:2P@ML video elementary stream constrained according to SMPTE 356M.

5.2.1 Essence element key

The essence element key value shall be defined as follows:

Table 2 – Key value for the type D-10 picture element

Byte No.	Description	Value (hex)	Meaning
1~12	See SMPTE 379M	--	Defined in Table 2 of SMPTE 379M
13	Item Type Identifier	05h	SDTI-CP compatible picture item
14	Essence Element Count	01h	One essence element present
15	Essence Element Type	01h	MPEG2 422P@ML element as defined in SMPTE 331M
16	Essence Element Number	nnh	As defined by SMPTE 379M section 7.1.

5.2.2 Essence element length

The length field of the KLV coded element shall be 4 bytes BER long-form encoded (i.e., 83h.xx.yy.zz). The value of the length field shall correctly define the length of the element value.

5.2.3 Essence element value

The MPEG-2 4:2:2P@ML video elementary stream is as per the definition in SMPTE 331M. The encoded bitstream is constrained according to the type D-10 MPEG-2 data stream specification (SMPTE 356M).