SMPTE RDD 48:2018
Amendment 1:2022

SMPTE REGISTERED DISCLOSURE DOCUMENT

MXF Archive and Preservation Format Application Specification – Amendment 1

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1 Scope

This Amendment to RDD 48:2018 adds mapping of RFC 9043 FFV1 Video Coding Format Versions 0, 1, and 3 to RDD 48 and the MXF Generic Container.

2 Conformance Notation

Normative text is text 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 this document is, by default, normative, except: the Introduction, any section explicitly labeled as "Informative" or individual paragraphs that start with "Note:"

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 this 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.

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; then formal languages; then figures; and then any other language forms.

3 Mapping FFV1 into RDD 48

In section 3 Reference Documents

Add

IETF RFC 9043 FFV1 Video Coding Format Version 0, 1, and 3

In section 6.2.10.4.2 Retain Source Encoding Essences and MXF GC Mapping

Add to bulleted enumerations

- RDD 48 (this document) Appendix K - FFV1

In section 6.2.10.4.5 Shim Parameter Table for Picture Essence – Retain Source Encoding as Acquired

Add to enumerations in table

Picture family for retain born digital as acquired	Picture signal schemes (compression or sampling or other)	picture_family	Gentle	FFV1 (RDD 48 Appendix K)
Permitted pixel layout	*PixelLayout* types that may be present in the file	pixel_layout	Moderate	RDD 48 Appendix K
Permitted containers	Essence container types that may be present in the file.	permitted_essence_container	Moderate	RDD 48 Appendix K

Add Annex K. FFV1 - Mapping of IETF RFC 9043 FFV1 Video Coding Format Versions 0, 1, and 3 to the MXF Generic Container

(see next page)

Annex K. FFV1 - Mapping of IETF RFC 9043 FFV1 Video Coding Format Versions 0, 1, and 3 to the MXF Generic Container

K.1 Introduction (informative)

The FFV1 bitstream is defined by IETF RFC 9043 FFV1 Video Coding Format Versions 0, 1, and 3. FFV1 is a lossless, intra-frame video encoding format designed to efficiently compress video data to approximately 70% of the bitrate of uncompressed video. It can support a variety of color spaces including YCbCr and RGB along with frame level fixity and self-describing metadata.

K.2 Mapping FFV1 Streams to the MXF Generic Container

The mapping of the FFV1 stream shall use the MXF Generic Container in the Frame-based wrapping, Clip-based wrapping or the Custom wrapping as defined in SMPTE ST 379-1 and SMPTE ST 379-2.

K.3 Key-Length-Value Coding

K.3.1 Picture Element Key

FFV1 streams shall be wrapped using the FFV1 Picture Element Key as defined in this section.

The values of the first 12 bytes of the Essence Element Key are defined in SMPTE ST 379-1 and SMPTE ST 379-2. The values of the last four bytes of the Picture Element Key are given in Table K.1.

Table K.1 – Key Value for the FFV1 Picture Element (Informative)

Byte No.	Description	Value (hex)	Meaning
1-12	Specified by the MXF Generic Container Specification, SMPTE ST 379-1 and SMPTE ST 379-2		
13	Item Type Identifier	15_h	Generic Container Picture Item (as defined in SMPTE ST 379-1 and SMPTE ST 379-2)
14	Essence Element Count	kk_h	Count of Picture Elements in this Picture Item
15	Essence Element Type	$1d_h$ $1e_h$	Frame Wrapped FFV1 Picture Element Clip Wrapped FFV1 Picture Element
16	Essence Element Number	nn_h	The Number (used as an Index) of this Picture Element in this Picture Item

K.3.2 *Picture Element Length*

The length field of the KLV coded Element shall be 4 bytes BER long-form encoded (i.e. 83h.xx.yy.zz) for Frame wrapping. The length field of the KLV coded Element shall be 8 bytes BER long-form encoded (i.e., 87h.aa.bb.cc.dd.ee.ff.gg) for Clip wrapping. For all Edit Units of the essence container and shall be either 4 bytes or 8 bytes as appropriate.

K.3.3 *Picture Element Value*

The Picture Element Values shall be the FFV1 access unit. The bit streams carried in the Value field shall contain complete access units including their relevant parameter sets.

Note: Stream format is defined in the Byte 14 of the Essence Container Label described in Section K.3.1

K.4 SMPTE Label Values

K.4.1 *Essence Container Label*

This Essence Container Label is the UL value carried in the Essence Containers Properties of the Partition Packs, Preface Set and File Descriptor.

Table K.2–Essence Container Label Values for FFV1 Picture Element

Item Name	Symbol	Kind	Item UL
MXFGCFFV1PicturesFrame	MXFGCFFV1PicturesFrame	LEAF	urn:smpte:ul: 060e2b34.0401010d.0d010301.02230100
MXFGCFFV1PicturesClip	MXFGCFFV1PicturesClip	LEAF	urn:smpte:ul: 060e2b34.0401010d.0d010301.02230200

K.4.2 *Picture Essence Coding Label*

The Picture Essence Coding Label is used in the Generic Picture Essence Descriptor

Table K.3– Picture Essence Coding Label Values for FFV1 Picture Element

Item Name	Symbol	Kind	Item UL
FFV1PictureCodingV0	FFV1PictureCodingV0	LEAF	urn:smpte:ul: 060e2b34.0401010d.04010202.03090100
FFV1PictureCodingV1	FFV1PictureCodingV1	LEAF	urn:smpte:ul: 060e2b34.0401010d.04010202.03090200
FFV1PictureCodingV3	FFV1PictureCodingV3	LEAF	urn:smpte:ul: 060e2b34.0401010d.04010202.03090400

K.5 SubDescriptor for FFV1 Mapping

For the FFV1 wrapping, the FFV1 SubDescriptor, which is strongly referenced from the CDCI Descriptor or the RGBA Descriptor, should be used. The FFV1 Picture SubDescriptor consists of the FFV1 specific properties as shown in this section. If the properties in Table 5 are present, their values shall apply to the entire Essence described.

Table K.4– FFV1 Picture SubDescriptor UL

Item Name	Symbol	Kind	Item UL
FFV1PictureSubDescriptor	FFV1PictureSubDescriptor	LEAF	urn:smpte:ul: 060e2b34.027f0101.0d010101.01018103

Table K.5– ULs for FFV1 Picture SubDescriptor

Item Name	Symbol	Kind	Item UL
FFV1InitializationMetadata	FFV1InitializationMetadata	LEAF	urn:smpte:ul: 060e2b34.0101010e.0401060c.01000000
FFV1IdenticalGOP	FFV1IdenticalGOP	LEAF	urn:smpte:ul: 060e2b34.0101010e.0401060c.02000000
FFV1MaxGOP	FFV1MaxGOP	LEAF	urn:smpte:ul: 060e2b34.0101010e.0401060c.03000000
FFV1MaximumBitRate	FFV1MaximumBitRate	LEAF	urn:smpte:ul: 060e2b34.0101010e.0401060c.04000000
FFV1Version	FFV1Version	LEAF	urn:smpte:ul: 060e2b34.0101010e.0401060c.05000000
FFV1MicroVersion	FFV1MicroVersion	LEAF	urn:smpte:ul: 060e2b34.0101010e.0401060c.06000000

Table K.6– Element of FFV1 Picture SubDescriptor Set

Symbol	Type	Len	Req ?	Meaning	Default
FFV1PictureSubDescriptor	Set UL	16	Req	Defines the FFV1 Picture SubDescriptor Set	
Length	BER Length	4	Req	Set length	
All items from the abstract SubDescriptor as specified in SMPTE ST 377-1 annex B.3					
FFV1InitializationMetadata	UInt8Array	N	D/Req	FFV1 Initialization Metadata, required for Version 3 streams. Forbidden for version 0 and 1 streams	
FFV1IdenticalGOP	Boolean	1	Opt	TRUE if every GOP in the sequence is constructed the same	TRUE
FFV1MaxGOP	UInt16	2	Opt	Specifies the maximum occurring spacing between key frames. A value of 0 or the absence of this property implies no limit to the maximum GOP	1
FFV1MaximumBitRate	UInt32	4	Opt	Maximum bit rate of FFV1 video elementary stream in bits per second	
FFV1Version	UInt16	2	Opt	Specifies the FFV1 video version. Coded as per RFC 9043	3
FFV1MicroVersion	UInt16	2	Opt	Specifies the FFV1 video microversion. Coded as per RFC 9043	

Note: FFV1InitializationMetadata is a UInt8Array with implicit Count and Size, hence length is N bytes, not 8+N bytes