SMPTE Public Committee Draft

Interoperable Master Format – Application Constraint DPP (JPEG2000)

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Foreword

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Introduction

Building on the pioneering work of SMPTE who created a Mastering Format (IMF) for Feature Films, the Digital Production Partnership (DPP) and the North American Broadcasters Association (NABA) have collaborated to develop a SMPTE Registered Disclosure Document for an IMF Application Constraint based on the requirements common to many in the broadcast and online sector. This SMPTE Registered Disclosure Document is based on the image formats referred to in ITU-R BT.2100 and references SMPTE ST 2067 Interoperable Master Format suite of standards as well as SMPTE RDD 59-1:2021

Advice to readers

Users (including Production and Post Production)

Users are advised to refer to any contractual or delivery documentation supplied by the commissioners or distributors or co-producers, before selecting options such as frame rate, image size, colorimetry etc.

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1 Scope

This SMPTE Registered Disclosure Document specifies an Application Constraint of SMPTE ST 2067-21 - the Interoperable Master Format Application #2E. The purpose of an application constraint is to provide a reduced set of technical parameters based around a defined use-case, which can be implemented in a common way by multiple implementers. Editorial constraints that are relevant to a specific content provider will be specified separately.

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

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3 References & Definitions

3.1 Normative References

The following documents contain provisions, which, through reference in this text, constitute provisions of this SMPTE Registered Disclosure Document. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this SMPTE Registered Disclosure Document are encouraged to investigate the possibility of applying the most recent edition of the documents indicated below.

SMPTE ST 2067-2:2020, Interoperable Master Format – Core Constraints

SMPTE ST 2067-8:2013, Interoperable Master Format – Common Audio Labels

SMPTE ST 2067-21:2020, Interoperable Master Format – Application #2E

Amendment 1:2020 to SMPTE ST 2067-21:2020

ITU-R BT.2100, Image parameter values for high dynamic range television for use in production and international programme exchange

SMPTE ST 428-12:2013, D-Cinema Distribution Master Common Audio Channels and Soundfield Groups

SMPTE ST 377-41:20xx, MXF Multichannel Audio Controlled Vocabulary

3.2 Informative References

SMPTE RDD 59-1 IMF Application DPP (ProRes)

AMWA AS-11 Media Contribution File Format Specifications: amwa.tv/as-11

Report ITU-R BT.2390, High Dynamic Range for production and international programme exchange

SMPTE ST 2067-200:2018 Dynamic Metadata for Color Volume Transform (DMCVT) Plug-in

SMPTE ST 2067-9:2018 Interoperable Master Format – Sidecar Composition Map

Recommendation DPP003 Carriage of AMWA AS-11 Related Metadata in IMF: thedpp.com/downloads#dpp003

Guidance DPP005 IMF Operational Guidance: thedpp.com/downloads#dpp005

Guidance DPP004 IMF QC Workflows: thedpp.com/downloads#dpp004

35PM-ER-AMWA-AS11-OPL-Report

3.3 Terms and Definitions

HD HDR: acronym for High Definition High Dynamic Range

HD SDR: acronym for High Definition Standard Dynamic Range

UHD: acronym for Ultra High Definition

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4 Overall

The normative provisions of SMPTE ST 2067-21:2020 shall apply in addition to those specified herein unless specified otherwise.

5 Image Essence

5.1 Constraints

Image frames shall conform to the combinations of characteristics allowed in Table 1. These characteristics constrain the general provisions of Table 3 of SMPTE ST 2067-21:2020.

Table 1. Image Parameters

Originating Source	**HD SDR**	**HD HDR**		**UHD**	
Image Frame Width	1920	1920		3840	
Image Frame Height	1080	1080		2160	
Frame Structure	Progressive or Interlace	Progressive			
Stereoscopy	Monoscopic Stereoscopic	Monoscopic Stereoscopic			
Frame Rate	24 24000/1001 25 30 30000/1001 50 60 60000/1001				
Sampling	4:2:2	4:2:2	4:4:4	4:2:2	4:4:4
Quantisation	QE.1	QE.1	QE.1 QE.2	QE.1	QE.1 QE.2
Color Components	$Y'C_B'C_R'$	$Y'C_B'C_R'$	R'G'B'	$Y'C_B'C_R'$	R'G'B'
Colorimetry	COLOR.3	COLOR.3 COLOR.5 COLOR.7	COLOR.5 COLOR.7	COLOR.3 COLOR.5 COLOR.7	COLOR.5 COLOR.7

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		COLOR.8	COLOR.8	COLOR.8	COLOR.8
Pixel Bit Depth	8 or 10	10	12	10	12

6 Image Track Files

6.1 Essence

Essence shall conform to section 5.

6.2 Profiles

Implementations shall support the combinations of JPEG 2000 IMF profiles (as specified in ISO/IEC 15444-1:2016) and image frame dimensions listed in Table 2.

Table 2 - Image Profiles

Profile	HD		UHD	
Image Frame Width	1920		3840	
Image Frame Height	1080		2160	
JPEG2000 Profile	2K IMF single/multi-tile Reversable	2K IMF single tile Lossy	4K IMF single/multi-tile Reversable	4K IMF single tile Lossy
JPEG2000 Operating Levels	Main Level 5 Main Level 6		Main Level 6 Main Level 7 Main Level 8 Main Level 9	
JPEG2000 Operating Sub Levels	Sub Level 0 only	All allowed for a given Main Level except Sublevel 0	Sub Level 0 only	All allowed for a given Main Level except Sublevel 0

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7 Application Identification

The ApplicationIdentification element, as specified in SMPTE ST 2067-2, shall include value 1) listed in Table 3 and should include value 2).

Composition Play List (CPL) Readers/Parsers shall accept either or both values from Table 3.

CPL Writers shall write both values from Table 3.

Table 3. Application Identification

1)	`http://www.smpte-ra.org/schemas/2067-21/2020`
2)	`http://schema.thedpp.com/imf/RDD59-2/2021`

8 Audio

The provisions of SMPTE ST 2067-2:2020 shall apply.

9 Metadata (Informative)

Additional static metadata can be carried in the CPL extension properties as per Recommendation DPP003 or in a sidecar XML file. In either case business requirements (such as required elements) should be defined in a Delivery Requirements Document.

10 Output Profile List (OPL) (Informative)

The processing or transformation of compliant packages can be specified by OPLs. Within a given IMF Package (IMP) each CPL that conforms to this specification could be referenced by at least one OPL in the same IMP. A usable OPL structure has been defined in 35PM-ER-AMWA-AS11-OPL-Report.

11 Audio Description (AD) / Described Video Service (DVS)

Audio Description/Described Video Service/Descriptive Video can be supplied as narration-only or mixed with program.

If supplied as narration-only:

- Each supplied narration-only shall be a single monaural audio channel containing Visually Impaired-Narrative (VIN) as described in SMPTE ST 428-12:2013. Each narration-only audio channel shall be wrapped in an IMF Audio Track File containing exactly one audio channel per track file.

The MCA Label values are as follows. MCA Audio Content Kind and MCA Audio Element Kind values match those in Tables 2 and 3 of SMPTE ST 377-41:20xx respectively. Text in **bold** represents specific absolute values which shall be set, whereas text in *italics* indicates a description of the data that should be inserted.

Table 4 - MCA details for the “narration-only” case

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MCALabelSubDescriptor	AudioChannelLabel SubDescriptor	SoundfieldGroupLabelSubDescriptor
MCA Tag Name	**Visually Impaired-Narrative**	**Visual Accessibility**
MCA Tag Symbol	**chVIN**	**sgVA**
RFC 5646 Spoken Language		*Spoken language tag per RFC5646*
MCA Audio Content Kind		**VI**
MCA Audio Element Kind		**SING**
MCA Title		*Content provider's title for the overall program*
MCA Title Version		*The version ("cut") of the MCA Title*

If supplied mixed with program:

- Each supplied mixed Audio Description/Described Video Service/Descriptive Video shall be one Soundfield Group as described in SMPTE ST 2067-8:2013, wrapped in an IMF Audio Track File containing all channels in the Soundfield Group.

EXAMPLE The MCA Label values for each Audio Channel and Soundfield Group shall be as follows (using a 5.1 Soundfield Group and respective channels as an example). MCA Audio Content Kind and MCA Audio Element Kind values match those in Tables 2 and 3 of SMPTE ST 377-41:20xx respectively.

(Text in **bold** represents specific absolute values which shall be set, whereas text in *italics* indicates a description of the data to be inserted.)

Table 5 - Example MCA details for the "narration mixed with program" case

MCALabelSubDescriptor	AudioChannelLabel SubDescriptor	SoundfieldGroupLabelSubDescriptor
MCA Tag Name	*The Appropriate selection from:* **Left, Right, Center, Left Surround, Right Surround, LFE**	**5.1**
MCA Tag Symbol	*The appropriate selection from:* **chL, chR, chC, chLs, chRs, chLFE**	**sg51**
RFC5646 Spoken Language		*Spoken language tag per RFC5646*
MCA Audio Content Kind		**DV**
MCA Audio Element Kind		**FCMP**
MCA Title		*Content provider's title for the overall program*
MCA Title Version		*The version ("cut") of the MCA Title*

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