

## CD SMPTE Standard



# Interoperable Master Format — Application #2E Amendment 1

Page 1 of 4 pages

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## Table of Contents

<b>1</b>	<b>Scope</b>	<b>2</b>
<b>2</b>	<b>Conformance Notation</b>	<b>2</b>
<b>3</b>	<b>Amendments</b>	<b>2</b>
3.1	Section 3 Normative References	3
3.2	Section 5 Image Essence	3
3.3	Section 6 Image Track Files	3
3.4	Annex A Bibliography	4

## Foreword

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## 1 Scope

This amendment adds the Hybrid Log-Gamma (HLG) high dynamic range format specified in ITU-R BT 2100 to SMPTE ST 2067-21:2016 IMF – Application 2E

## 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 Amendments

Amendments are detailed and listed by existing SMPTE ST 2067-21:2016 section references and new section references where required.

### 3.1 Section 3 Normative References

**Add the following normative reference:**

Recommendation ITU-R BT.2100-2, Image parameter values for high dynamic range television for use in production and international programme exchange

### 3.2 Section 5 Image Essence

**Add COLOR.8 to 10/12 bit columns in Table 3 Image Characteristics:**

**Table 3. Image Characteristics.**

Image Frame Width	1..3840				1..4096		
Image Frame Height	1..2160				1..3112		
Colorimetry	COLOR.3	COLOR.4	COLOR.5 COLOR.8	COLOR.7	COLOR.3	COLOR.5 COLOR.8	COLOR.6 COLOR.7
Pixel Bit Depth	8 10		10 12	10 12 16	8 10	10 12	10 12 16

**Add COLOR.8 definition to Table 4 Colorimetry Systems:**

**Table 4 Colorimetry Systems.**

COLOR.8	<p>R'G'B' components are mapped using the color primaries and white point specified in Recommendation ITU-R BT.2020 and the Hybrid Log-Gamma (HLG) reference non-linear transfer function specified in ITU-R BT.2100.</p> <p>R'G'B' components are mapped to Y'C<sub>B</sub>C<sub>R</sub> components using the (non-constant luminance) derivation of Y' and color difference signals specified in Table 4 of Recommendation ITU-R BT.2020.</p>
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### 3.3 Section 6 Image Track Files

**Add the following to Section 6.1.1 Transfer Characteristic:**

- 06.0E.2B.34.04.01.01.0D.04.01.01.01.01.0B.00.00 ["Hybrid Log-Gamma OETF Transfer Characteristic" in RP 224] if the COLOR.8 system is used.

**Add COLOR.8 to Section 6.1.2 Coding Equations second bullet:**

- 06.0E.2B.34.04.01.01.0D.04.01.01.01.02.06.00.00 ["Identifies ITU-R BT.2020 coding equations for non-constant luminance" in RP 224] (see Annex F) if COLOR.5, COLOR.7 or COLOR.8 system is used.

**Add COLOR.8 to Section 6.1.3 Color Primaries second bullet:**

- 06.0E.2B.34.04.01.01.0D.04.01.01.01.03.04.00.00 ["ITU-R.BT2020 Color Primaries" in RP 224] if the COLOR.5, COLOR.7 or COLOR.8 systems are used.

**Add COLOR.8 to Section 6.1.5 Master Display Color Volume Metadata as shown:**

If COLOR.3, COLOR.5, COLOR.6, COLOR.7 or COLOR.8 system is used then

- either all or none of the items specified in Annex C shall be present;
- the items specified in Annex C should characterize the mastering display; and
- if the items specified in Annex C are absent, no ST 2086 metadata values are assumed.

If neither COLOR.5, COLOR.6, nor COLOR.7 nor COLOR.8 system is used, then no item specified in Annex C shall be present.

Note: Annex C.6 contains selected examples values for Mastering Display Color Volume Metadata. Other values, not specified in these examples, are also permitted.

Note: Although COLOR.8 does not require Master Display Color Volume Metadata, the option to include it is intended to facilitate downstream conversion to formats that do require this data. General information on conversion between high dynamic range systems defined by ITU-R BT.2100-2 can be found in ITU-R BT.2390-6.

**Add COLOR.8 to Section 6.3 CDCI Picture Essence Descriptor:**

If COLOR.4, COLOR.5, COLOR. 7 or COLOR.8 is used, the values of the Black Ref Level, White Ref level and Color Range items shall be set according to Table 7.

**Table 7. Black Ref Level, White Ref level and Color Range values for COLOR.4, COLOR.5, COLOR.7 and COLOR.8.**

Colorimetry	COLOR.4		COLOR.5 COLOR.7 COLOR.8		COLOR.5 COLOR.7
Pixel Bit Depth	8	10	10	12	16
Black Ref Level	16	64	64	256	4096
White Ref level	235	940	940	3760	60160
Color Range	254	1013	897	3585	57345

NOTE 1: The White Ref level item applies only to the Y' component, and the Color Range item to the C'B and C'R components.

NOTE 2: In the case of COLOR.7 or COLOR.8, "White Ref" is occasionally referred to as "Nominal Peak".

### 3.4 Annex A Bibliography

**Add the following reference:**

Report ITU-R BT.2390-6, High dynamic range television for production and international programme exchange