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STANDARDS

Digital Video Subcommittee

AMERICAN NATIONAL STANDARD

ANSI/SCTE 215-1-1 2020b

HEVC Video Constraints for Cable Television
Part 1-1 HDR

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1. Introduction

1.1. Executive Summary

This document in combination with SCTE 215-1 specifies the creation of an HDR10 HEVC coded video elementary stream and is intended for cable video services applications such as broadcast, time-shifting (e.g., PVR/DVR service), Video-on-Demand services, and splicing (e.g., Ad-insertion) that could employ the specifications in this document. However, constraints specific to those applications are outside of the scope of this document.

Dynamic metadata applications can be used to adapt HDR imagery to a multiplicity of displays that have different characteristics than the underlying content.

The means to carry SCTE dynamic metadata Application #1 (DM App #1) and Application #4 (DM App #4) in an HEVC bitstream is described in Section 7 and in Appendices A and B. SCTE DM Apps describe parametric data sets to be used to adapt the imagery for viewers' displays and environment.

Section 9 describes the CMAF bindings to carry SCTE DM Apps #1 and #4 in a CMAF container.

1.2. Scope

This document defines the additional coding constraints on SCTE 215-1 HDR video streams using an HDR10 format.

2. Normative References

The following documents contain provisions, which, through reference in this text, constitute provisions of this document. At the time of Subcommittee approval, the editions indicated were valid. All documents are subject to revision; and while parties to any agreement based on this document are encouraged to investigate the possibility of applying the most recent editions of the documents listed below, they are reminded that newer editions of those documents might not be compatible with the referenced version.

2.1. SCTE References

- [1] ANSI/SCTE 215-1, HEVC Video Constraints for Cable Television Part 1- Coding.
- [2] ANSI/SCTE 128-1, AVC Video Constraints for Cable Television Part 1- Coding.

2.2. Standards from Other Organizations

- [3] ITU-R BT.2100-2:2018 Image parameter values for high dynamic range television for use in production and international programme exchange.
- [4] SMPTE ST 2094-1:2016, "Dynamic Metadata for Color Volume Transformation – Core Components".
- [5] SMPTE ST 2094-10:2016, "Dynamic Metadata for Color Volume Transformation – Application #1".
- [6] SMPTE ST 2086:2018, "Mastering Display Color Volume Metadata Supporting High Luminance and Wide Color Gamut".
- [7] ISO/IEC 23000-19:2020, "Information technology -- Multimedia application format (MPEG-A) - Part 19: Common media application format (CMAF) for segmented media".
- [8] IETF RFC 6381, The 'Codecs' and 'Profiles' Parameters for "Bucket" Media Types, 15 August 2011.

- [9] ISO/IEC 23008-8:2018, “Information technology — High efficiency coding and media delivery in heterogeneous environments — Part 8: Conformance specification for HEVC”
- [10] CTA-5001-B (2019), Web Application Video Ecosystem – Content Specification
- [11] CTA-861-H "A DTV Profile for Uncompressed High Speed Digital Interfaces"

2.3. Published Materials

- No normative references are applicable.

3. Informative References

The following documents might provide valuable information to the reader but are not required when complying with this document.

3.1. SCTE References

- [12] ANSI/SCTE 215-2, HEVC Video Constraints for Cable Television Part 2- Transport.

3.2. Standards from Other Organizations

- [13] SMPTE ST 2036-1, Ultra High Definition Television- Image Parameter Values for Program Production.
- [14] ITU: Report ITU-R BT.2390, “High dynamic range television for production and international programme exchange,” International Telecommunications Union, Geneva.

3.3. Published Materials

- No informative references are applicable.

4. Compliance Notation

<i>shall</i>	This word or the adjective “ required ” means that the item is an absolute requirement of this document.
<i>shall not</i>	This phrase means that the item is an absolute prohibition of this document.
<i>forbidden</i>	This word means the value specified shall never be used.
<i>should</i>	This word or the adjective “ recommended ” means that there may exist valid reasons in particular circumstances to ignore this item, but the full implications should be understood and the case carefully weighted before choosing a different course.
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This document contains symbolic references to syntactic elements used in the video and transport coding subsystems. These references are typographically distinguished by the use of a different font (e.g., reserved), *may* contain the underscore character (e.g., constraint_set0_flag) and *may* consist of character strings that are not English words (e.g., pic_width_in_mbs_minus1).

5. Abbreviations and Definitions

5.1. Abbreviations

CLLI	Content Light Level information
CLL	Content Light Level
DM	dynamic metadata
DVB	Digital Video Broadcasting
DVS	Digital Video Subcommittee
ETSI	European Telecommunications Standards Institute
FALL	Frame Average Light Level
HDR	High Dynamic Range
HDTV	High Definition Television
MDCV	Mastering Display Color Volume
MPEG	Moving Picture Experts Group
PALL	Picture Average Light Level
SEI	Supplemental Enhancement Information
VUI	Video Usability Information
WCG	Wide Color Gamut

5.2. Definitions

DM App	Dynamic metadata associated with a specific application used on the HDR video content stream. This type of information is encapsulated within an SEI message used by the application in a post decode process.
HDR DM	Additional information about an HDR video content stream. Use is optional and intended to enhance video presentation quality. It is dynamic in that it may change at each access unit or group of access units. It may be transmitted either along with the content stream or by other delivery means.
HDR10	High Dynamic Range with a PQ EOTF, BT.2100 WCG container, 10 bit pixel values which may include MaxCLL, MaxFALL, and Mastering Display Color Volume information
HEVC	ITU-T Rec. H. 265 ISO/IEC 23008-2:2014 High Efficiency Video Coding [1]

Numerical formats are defined in Table 1.

Table 1 - Numerical Format Definitions

Example Values	Description
12345	Example of a decimal value format
0x2A	Example of a hexadecimal value format
'10010100'	Example of a string of binary digits

6. Possible Video Inputs – HDR10

Video streams can also be in the form of high dynamic range (HDR) which consists of streams of dynamic range types identified in Table 2.

Table 2 - HDR Dynamic Range Types of Video

HDR Type	Transfer Function	Color Gamut	Bits Per Pixel	Additional Info
HDR10	PQ	BT.2100	10	Optional: MDCV SEI CLLI SEI
HDR10 with SCTE DM App #1	PQ	BT.2100	10	Mandatory: MDCV SEI SCTE DM App #1 SEI Optional: CLLI SEI
HDR10 with SCTE DM App #4	PQ	BT.2100	10	Mandatory: MDCV SEI SCTE DM App #4 SEI Optional: CLLI SEI

NOTE 1: Resolution of video can be considered orthogonal to the dynamic range properties of video. For example, HDR10 streams may be either HDTV or UHD TV1 resolution.

NOTE 2: Syntax and semantics for SCTE DM App #1 can be found in Appendix A.

NOTE 3: Syntax and semantics for SCTE DM App #4 can be found in Appendix B.

NOTE 4: A single HDR10-based program may have neither, either or both Dynamic Metadata types present.