



ATSC

ADVANCED TELEVISION
SYSTEMS COMMITTEE

ATSC Proposed Standard: A/341 Amendment – SL-HDR1

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Advanced Television Systems Committee
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The Advanced Television Systems Committee, Inc., is an international, non-profit organization developing voluntary standards for digital television. The ATSC member organizations represent the broadcast, broadcast equipment, motion picture, consumer electronics, computer, cable, satellite, and semiconductor industries.

Specifically, ATSC is working to coordinate television standards among different communications media focusing on digital television, interactive systems, and broadband multimedia communications. ATSC is also developing digital television implementation strategies and presenting educational seminars on the ATSC standards.

ATSC was formed in 1982 by the member organizations of the Joint Committee on InterSociety Coordination (JCIC): the Electronic Industries Association (EIA), the Institute of Electrical and Electronic Engineers (IEEE), the National Association of Broadcasters (NAB), the National Cable Telecommunications Association (NCTA), and the Society of Motion Picture and Television Engineers (SMPTE). Currently, there are approximately 150 members representing the broadcast, broadcast equipment, motion picture, consumer electronics, computer, cable, satellite, and semiconductor industries.

ATSC Digital TV Standards include digital high definition television (HDTV), standard definition television (SDTV), data broadcasting, multichannel surround-sound audio, and satellite direct-to-home broadcasting.

Note: The user's attention is called to the possibility that compliance with this standard may require use of an invention covered by patent rights. By publication of this standard, no position is taken with respect to the validity of this claim or of any patent rights in connection therewith. One or more patent holders have, however, filed a statement regarding the terms on which such patent holder(s) may be willing to grant a license under these rights to individuals or entities desiring to obtain such a license. Details may be obtained from the ATSC Secretary and the patent holder.

Revision History

Version	Date
Candidate Standard approved	21 August 2017
Revision 1 approved	28 November 2017
Amendment approved	[date]

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1. OVERVIEW

This document specifies constraints and usage of ETSI TS 103 433-1 (SL-HDR1) SEI messages for enabling delivery of SDR-to-HDR dynamic SEI messages along with an SDR stream in ATSC 3.0 video services. If approved by the ATSC, A/341:2017, “Video–HEVC,” would be amended according to the edits described herein.

2. CHANGES TO A/341

In this document, “[ref]” indicates that a cross reference to a cited reference document that is listed in A/341 would be inserted. Actual cross references indicate that the reference is to a document that would be added to the A/341 references section as described below.

Change instructions are given below in italics. Unless otherwise noted, inserted text, tables, and drawings are shown in blue; deletions are shown in ~~red-strikeout~~.

2.1 Add the following Normative Reference to A/341

[1] ETSI: “High-Performance Single Layer High Dynamic Range (HDR) System for use in Consumer Electronics devices; Part 1: Directly Standard Dynamic Range (SDR) Compatible HDR System (SL-HDR1)”, Doc. ETSI TS 103 433-1 V1.2.1 (2017-08), European Telecommunications Standards Institute, Sophia Antipolis Cedex – FRANCE.

2.2 Add the following acronym to A/341 Section 3.3 “Acronyms and Abbreviations

SL-HDR1 – Single Layer High Dynamic Range part 1

2.3 Add the following text to Section 6.3.2.1 “SDR Transfer Characteristics”

Video with SDR transfer characteristics may contain SL-HDR1 Metadata as documented in Section 6.3.2.1.x.

2.4 Add two new subsections under Section 6.3.2.1 titled “SDR Transfer Characteristics”

(The following inserted text is not shown in markup to preserve readability.)

Section 6.3.2.1.x SL-HDR1 Metadata

SL-HDR1 Metadata are an aggregation of parameters, syntactically and semantically specified in [1], Section 6, which may be used in the decoding process to reconstruct HDR video from an SDR encoded video stream.

An HEVC or SHVC video stream may contain SL-HDR1 Metadata in order to provide both an SDR picture and an HDR picture from the same video stream. When SL-HDR1 Metadata are present, they allow reconstructing the HDR video from the received SDR video stream. The reconstructed HDR video can be represented as linear light or using any of the available HDR transfer functions listed in these specifications.

Usage of SL-HDR1 Metadata is as follows. At the emission encoder, HDR video is decomposed into SDR video (“derived SDR”) and associated SL-HDR1 Metadata. The SDR video and accompanying SL-HDR1 Metadata are encoded in an HEVC stream.

If present in an HEVC or SHVC bitstream, SL-HDR1 Metadata are encapsulated into an HEVC SEI message, **SL-HDR Information SEI message**, specified in [1], Section A.2.2. Mapping SL-HDR Information SEI message syntax elements to SL-HDR1 Metadata is documented in [1], Section A.2.3.

The following references document the non-normative SL-HDR1 decomposition process:

- Annex C of [1] provides HDR-to-SDR decomposition principles that may be used to generate the derived SDR video prior to encoding.
- Section D.3 of [1] provides the forward gamut mapping process that may be used to map the color gamut of the original HDR video (e.g. Rec. BT.2020) onto the target color gamut of the derived SDR video (e.g. Rec. BT.709). The forward gamut mapping process is not used when the HDR video gamut and the derived SDR video gamut are the same.

The following references document the normative SL-HDR1 reconstruction process for devices that support SL-HDR1:

- The SDR-to-HDR reconstruction process is specified in Section 7 of [1].
- When Gamut Mapping is employed at the encoder and signaled in the SL-HDR Information SEI message, the inverse gamut mapping process to map the color gamut of the derived SDR video (e.g. Rec. BT.709) back to the color gamut of the original HDR video (e.g. Rec. BT.2020) is specified in Section D.4 of [1].

If an SL-HDR Information SEI message is present, the following restrictions shall apply:

- It shall be transmitted at least with every IRAP.
- `nal_unit_type` shall be set to `PREFIX_SEI_NUT`.

Note: This indicates that the SL-HDR Information SEI message is a prefix SEI NAL unit.

- `sl_hdr_payload_mode` shall be set to 0.

Note: This constrains the payload carriage mode to the parameter-based mode.

- `src_mdcv_info_present_flag` value shall be set to 1.

Note: This indicates that mastering display color volume primaries, white point and minimum and maximum luminance are present within the SL-HDR Information SEI message.

- `gamut_mapping_mode` value shall be set to 1, 2 or 3.

Note: This constrains the gamut mapping mode to explicit parameters, preset #1 (Rec. BT.709 to P3D65), and preset #2 (Rec. BT.709 to Rec. BT.2020), respectively.

Section 6.3.2.1.y SL-HDR1 Usage With SHVC

SL-HDR Information SEI messages may be used in combination with an SHVC two-layer spatial scalable stream as defined in Section 6.3.1 [ref to section within A/341]. When this combination is employed, SL-HDR Information SEI messages may be present in the base layer, or present in the enhancement layer. If SL-HDR Information SEI messages are simultaneously present in both

video layers, the SEI message in the enhancement layer is to be ignored; the base layer SEI message takes precedence.

When the SL-HDR Information SEI message is present in the base layer, the base and enhancement layers may both be decoded and reconstructed to HDR video by the SL-HDR1 reconstruction process as described above. When the SL-HDR Information SEI message is present in the enhancement layer, only the enhancement layer may be decoded and reconstructed to HDR video. The latter enables transmission of a video stream where the base layer is always decoded as SDR video while the spatial enhancement layer may be decoded as HDR video.

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