



High Dynamic Range Working Group meeting

Online meeting

October 19 2020

The meeting was opened at 04:00 UTC by William Li, ICC chair. After a sound check and self-introductions he handed over to Luke Wallis, chair of HDR WG. The agenda was agreed as follows:

1. Welcome and self-introductions.
2. Minutes from June meeting posted on the WG.
3. HDR WG charter.
4. HDR tags – open discussion.
5. Future work of HDR WG.
6. AOB.

3. HDR WG charter

The charter for the WG [see attached] had been approved by the Steering Committee and posted on the HDR WG page on color.org

4. HDR tags

Mr Wallis introduced a discussion on adding tags to v4 and v5 to address HDR content [see attached]. The v4 parametric curves were a good basis for HDR transfer functions, but need extending to HDR-specific functions. Tone mapping is also needed – the mapping to SDR in the HLG specification is not suitable, and something could be added to the ICC specification.

Lars Borg stated a preference for simply adding enumerated ID tags rather than model tags, as this is what happens in video workflow. Wallis confirmed that knowing the type of content is sufficient to construct the workflow, and in Apple the ICC profile can be extended to handle conversion based solely on the ID and connect to the appropriate specification to handle the conversion. He envisaged this being hierarchical, so that the preferred rendering can be defined at a high level.

Chris Lilley stated that the ID does not provide enough information to handle content mastered at different luminances. Wallis responded that the choice was whether to make the profile content-specific. The specification defines what the luminance is, but different developers handle the math differently. For example, in Rec. BT.1886 there are different gamma options and the developer makes a custom selection; this should be embraced by ICC. Borg suggested that one goal might be to match the appearance on an HDR TV. It was necessary to define the rendering goals, rely on conversions used in video and define interoperability requirements.

Portrait Displays calibrate displays for individual vendors, and Tom Lianza saw a need for a P3-based wide gamut specification for still images. Today even low end displays can exceed 1000 cd/m² and match PQ primaries – if properly mapped it is possible to handle interoperability with video.

The meeting discussed encoding and file formats for HDR. ISO TC42 has an NWI for ISO 22028-5 on colour encoding strategies for different file formats, which Canon are already implementing.

Borg noted that the vector+raster AVIF format has been adopted by Netflix, and is a top contender for still HDR content. Details are at <https://aomediacodec.github.io/av1-avif/> ‘AVIF for Next-Generation Image Coding’ <https://netflixtechblog.com/avif-for-next-generation-image-coding-b1d75675fe4> and ‘AVIF has landed’ (Jake Archibald, Chrome developer) <https://jakearchibald.com/2020/avif-has-landed/>

An issue on ICC profiles interacting with AVIF CICC enumerations in AVI bitstreams has been posted on Github at <https://github.com/AOMediaCodec/av1-avif/issues/84>

CTM is also used for HDR still images; this defines metadata but not conversion methods, and interoperability is a challenge.

It was agreed that it would be better for ICC to encode CICC enumerations and only the parameters for the transform rather than the complete transform. This would also allow the transform can be accelerated in hardware. For an ICC-based fall-back Borg had made a v4 profile which could be extended with a new parametricCurveType, but was probably good enough for 8-bit data.

HDR colour space enumerations could be standardised in ICC. Preferred tone mapping (e.g. scene- or display-referred) would be a level down, followed by specific tone mapping. The parametricCurveType would need to be revised to support advanced tone mapping operations, such as HDR-to-SDR conversion in BT.2446.

Complex transfer functions can be encoded in iccMAX, and there is an example HLG profile in RefIccMax.

An option would be to add metadata tags to specify CTM and HDR10 metadata. The metadata needs to be documented in order to support interoperability with SDR, and it is important that compositing and blending work.

It was agreed that Wallis and Borg will work towards defining a metadata container tag to support HDR conversion. This could be based on the VUI tag, with the ICC profile providing a fall-back HDR-to-SDR conversion. VUI is a 3-byte structure which has enumerations for the primaries, matrix coefficients and transfer function for both camera and display.

5. Future work of HDR WG

It was agreed that a problem definition was needed in order to clarify what the focus of HDR WG should be. Luke Wallis agreed to initiate this, with support from Lars Borg, Craig Revie and Chris Lilley (Chris Needham from the BBC will also be invited to participate). A telecon will be held in the first half of December to discuss this. Phil Green undertook to provide a template for a votable proposal.

There being no other business, the meeting closed at 06:00 UTC.

The following action items were agreed:

HDRWG-20-04 Propose a metadata container tag for ICC profiles to support HDR conversion, to be based on VUI (Wallis, Borg)

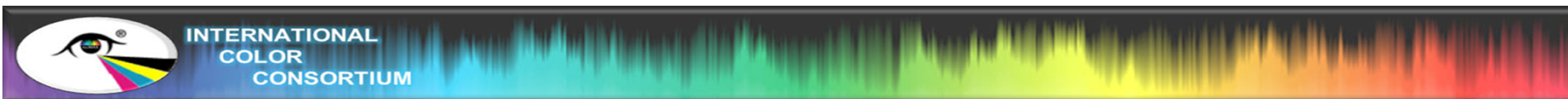
HDRWG-20-05 Propose an HDR problem definition for HDRWG to address (Wallis, Borg, Revie, Lilley)

HDRWG-20-06 Provide Word version of ICC header to Wallis and Borg (Green)

HDRWG-20-07 Initiate Doodle poll for telecon to discuss problem definition in the first half of December (Wallis, Green)

Open from previous meeting:

HDR-20-03 Prepare draft white papers/proposals addressing current limitations and proposing solutions (Wallis, Derhak, Lianza, Bai, Lilley, Staten, Kunkel)



ICC HDR Working Group

Chair: Luke Wallis
Teleconference
October 20, 2020



Agenda

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2. Minutes from June meeting posted on the WG.
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ICC HDR Working Group Charter

The HDR Working Group exists to promote the use of ICC color management in High Dynamic Range (HDR) imaging.

Specifically, this group will:

- Identify issues and limitations with the current specifications, implementations and use of color management in HDR imaging.
- Work with implementers of HDR color management, other international standard bodies, and working groups in the adoption of ICC HDR in their own specifications.
- Develop proposals for how to include HDR in ICC workflows.
- Prepare white papers and other educational materials to aid developers and users in the appropriate application of color management to HDR.
- Propose revisions to ICC specifications where required to address the needs of HDR workflows.

HDR Tags – open discussion

What should be included in HDR tag?

- **Unique identification of HDR data type (PQ, HLG, etc...).**
- **Steps for converting to SDR and other HDR (basic) formats.**
- **Supported transfer functions by enumeration and/or by formulas.**
- **Tone mapping method for SDR to HDR: display referred vs scene referred.**
- **Tone mapping method for HDR to SDR.**
- **Representation of tone mapping functions: enumeration and/or by formulas.**
- **Supported transfer functions by enumeration and/or by formulas.**
- **Primaries by enumeration and/or values.**
- **Custom tone mapping. Registered with ICC?**
- **... ?**