

HDR and IEC TC100



IEC TC100 AGS SS9, 16-April-2015

Jon Fairhurst, SS9 Leader



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COMMISSION

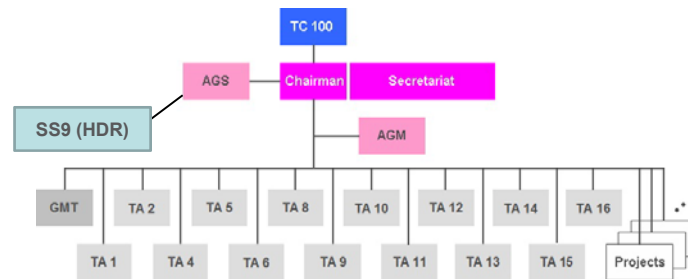
Proposed Agenda

1. Call to order and introductions
2. Agenda approval
3. AGS Study Session overview [Inokuchi]
4. Existing HDR standards overview. [Fairhurst]
5. HDR Overview [Husak]
6. HDR Workflow [Hunt]
7. HDR picture measurement opportunities. [Fairhurst]
8. HDR power measurement opportunities. [Fairhurst]
9. Open discussion [all]
10. Summary of decisions and action items [Fairhurst]
11. Adjournment



IEC TC100 AGS SS9 (HDR) Overview

IEC (International Electrotechnical Commission)
TC100 (Audio, Video and Multimedia Systems and Equipment)
AGS (Advisory Group on Strategy)
SS9 (Study Session on HDR)
• Created Nov 2014



IEC TC100 – Technical Committees

TC100 (Audio, Video and Multimedia Systems and Equipment)

- **TA 1:** Terminals for audio, video and data services and content
- **TA 2:** Colour measurement and management
- **TA 4:** Digital system interfaces and protocols
- **TA 5:** Cable networks for television signals, sound signals & interactive services
- **TA 6:** Storage media, storage data structures, storage systems and equipment
- **TA 8:** Multimedia home server systems
- **TA 9:** Audio, video and multimedia applications for end-user network
- **TA 10:** Multimedia e-publishing and e-book technology
- **TA 11:** Quality for audio, video and multimedia systems
- **TA 12:** AV energy efficiency and smart grid application
- **TA 13:** Environmental aspects in the field of audio, video and ICT equipment
- **TA 14:** Interfaces & methods of measurement for personal computing equipment
- **TA 15:** Wireless Power Transfer
- **TA 16:** Active Assisted Living (AAL), accessibility and user interfaces



IEC TC100 AGS SS9 (HDR) Overview

SS9 Goals

- Study possibly standards activities for IEC TC100
- Report results to the AGS

The AGS may

- Abandon the topic
- Request development of a Technical Report from SS9 as a Stage 0 Project
- Authorize or encourage creation of a project team, which would be assigned to TC100 or an existing Technical Area
- Create a new Technical Area for HDR project management

Possible IEC project team outputs

- Technical Report (TR)
- Technical Specification (TS)
- International Standard (IS)



Existing HDR-related standards overview

ITU-R

- BT.2020 – includes wide color gamut (published)

SMPTE

- ST-2084 – HDR Electro-Optical Transfer Function (published)
- ST-2086 – HDR Mastering Display Metadata (published)
- HDR Study Group – Identify additional HDR standards (active)

MPEG

- HEVC – High Efficiency Video Coding (published; additional work ongoing)

Blu-ray Disc Association

- 4K Blu-ray Disc Specification (2015)

CEA

- CEA-861.3 - DTV Profile for Uncompressed High Speed Digital Interfaces (published)

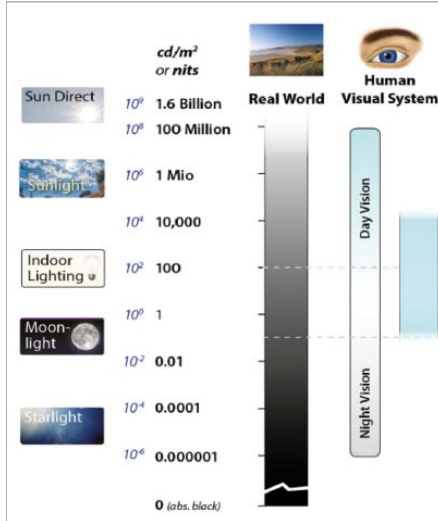
ATSC

- ATSC 3.0 – Next generation broadcasting system (CS by end of 2015)

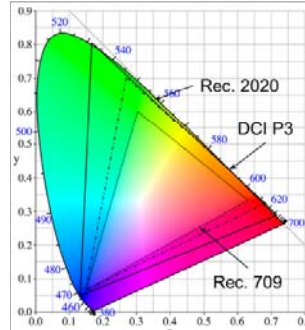
Additional? HDMI Forum published HDMI 2.0a, including HDR.



HDR - ranges



Source: SMPTE annual conference 2013, Pat Griffiths, Making a better pixel

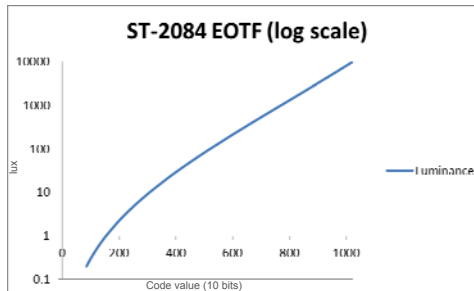
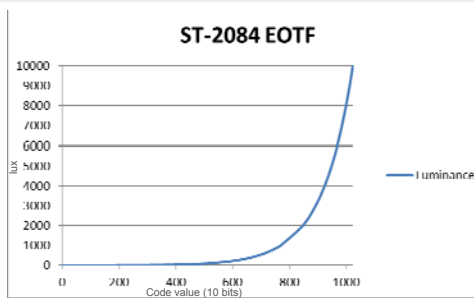


Mastering

- Current TV: 100 nits, Rec.709
- Cinema: 48 nits, DCI P3
- HDR: Up to 10,000 nits, Rec.2020



HDR – SMPTE ST-2084 EOTF



The first 50% of the code values are from 0 to 100 nits.

The next 25% of the code values are from 100 to 1,000 nits.

The final 25% of the code values are from 1,000 to 10,000 nits.

Not all code values must be used. (The peak per program, clip, or frame may be much less than 10,000 nits.)

10 bits may be enough for consumer use (one may dither, if necessary)

12 bits are claimed to show no visual quantizing errors.

More bits may be necessary for video production.



HDR Overview

Presentation by Walt Husak, Dolby



HDR Workflow

Presentation by Brad Hunt, Technicolor

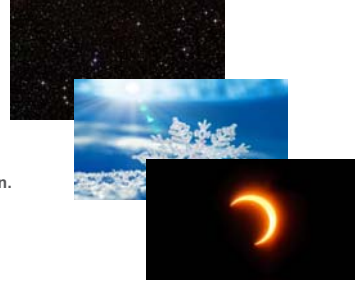


HDR picture measurement opportunities

HDR picture measurement

Scenarios

- Reference monitors
 - Strive for absolute accuracy.
 - “Complexity” of the design is secondary to quality.
- Consumer Televisions
 - Strive for value (quality/complexity).
 - “Complexity” of the design is a primary consideration.



Existing measurement standards

- SID/ICDM/VESA - IDMS v1.03, June 2012
 - Includes many test signals and test methods.
 - Does not include HDR ranges.
 - Does not target applications (reference monitor, TV, PC monitor, tablet, phone) specifically.

Key considerations for consumer products

- Peak luminance
 - Over a reasonable area. (Single pixel peak luminance does not deliver consumer value.)
 - Over a reasonable duration. (Single frame peak luminance does not deliver value.)
- Other considerations? (mid-gray calibration, absolute black, color gamut (HDR + WCG))

Dimensions

- Should the measurement results be independent?
- Should the measurement results be combined into a weighted single score?

A technical report or technical specification could be written, or a new project could be formed.



HDR power measurement opportunities

IEC 62087 – current versions

- HD resolution (exercises up-converter processing for UHD TVs)
- 2D
- Standard dynamic range
- Rec.709 color
- Based on measurement of 200 hours of primetime broadcast in 5 countries.

IEC 62087 – next generation proposal

- 4K (4K UltraHD TVs are becoming popular, though 4K content is limited today).
- 2D (3D did not become popular).
- High and Standard dynamic range versions will be needed.
- Rec.709 and Rec.2020 color versions might be needed.
- Unfortunately, there is no HDR content to measure – yet.
- Standard studio practices have not yet been established.
- There are few HDR displays available today at any price.

2015, Q4	2016, Q1	2016, Q2	2016, Q3	2016, Q4	2017, H1	2017, H2	2018
4K BD with HDR released	Industry practices stabilize		Other HDR sources emerge; Introduce NP	Begin Measurements	Measurements & CD	Media creation & CDV	Publication

A project could be started in late 2016 in TA12.



Open discussion

What additional HDR standards opportunities exist for IEC TC100?

- No new proposals at this time



Summary of Decisions and Actions

Decisions and Recommendations

- HDR Picture measurement
 - Maybe this belongs in IDMS. (A Stage 0 Group could write a TR.)
 - If done in TC100, TA11 is a possible target.
- HDR Power measurement
 - Propose NP by Q3 2016.
 - TA12 is the recommended target.
- Color (HDR & WCG)
 - TA2 may study new opportunities in this area.
- Other? None at this time.

Actions

- Fairhurst to report to AGS on 23-April in Milan, Italy
- Fairhurst to share the documents from the meeting.





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