

HDR and IEC TC100



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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

HDR video is coming to the marketplace

Blu-ray Disc Association – 4K Blu-ray Discs

- Announced in September at IFA (Berlin)
- Disc capacity: 66 or 100 GB
- 3840 x 2160 progressive resolution
- Up to 60 frames per second
- HEVC (h.265) coding
- Expanded color gamut
- High dynamic range (HDR)
- Specification: 1st half of 2015
- Market: End of 2015

These aspects affect power consumption measurements where average picture level (APL) of video is involved

HDR-related standards

ITU-R

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

SMPTE

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

MPEG

- HEVC – High Efficiency Video Coding (published)

Blu-ray Disc Association

- 4K Blu-ray Disc Specification (early 2015)

CEA

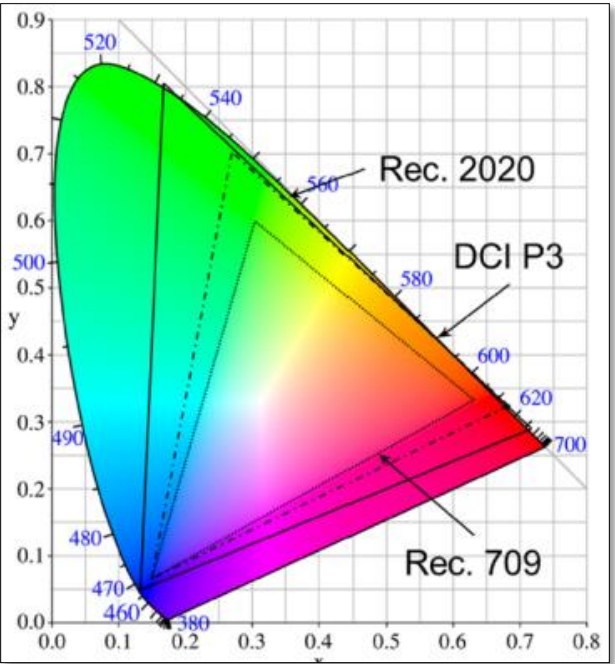
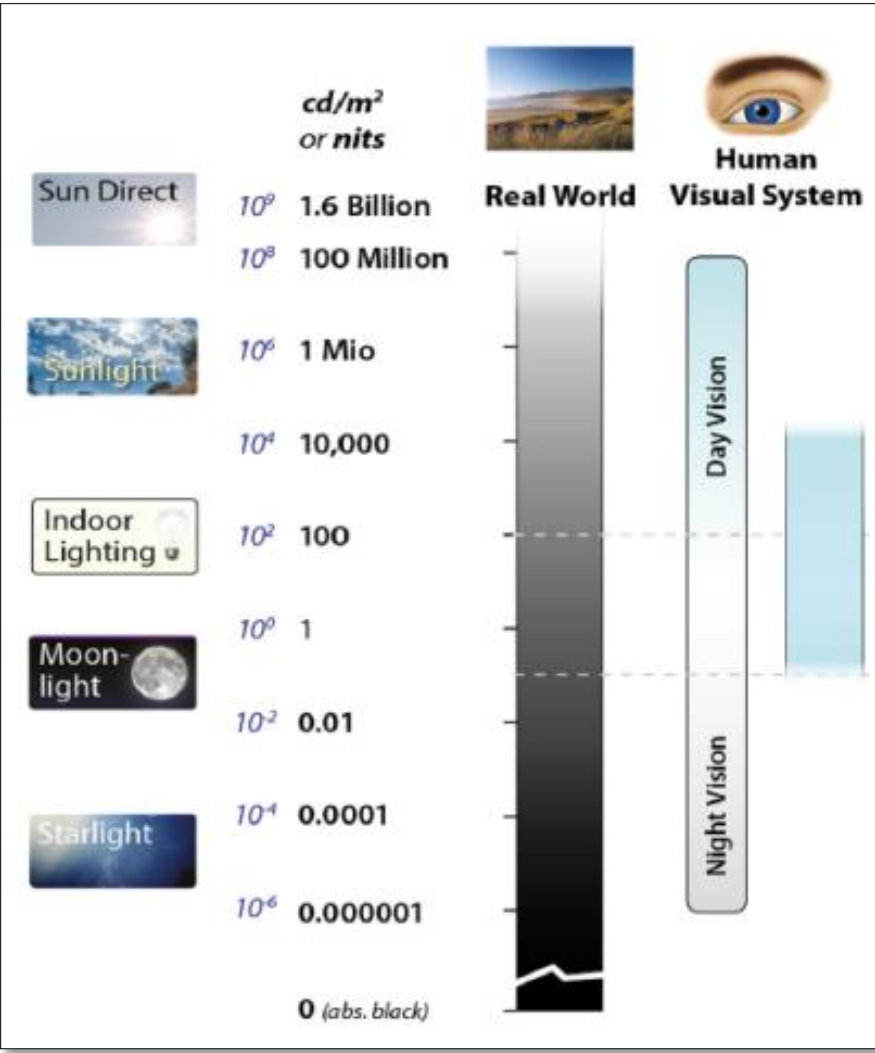
- CEA-861 - DTV Profile for Uncompressed High Speed Digital Interfaces (WG and project to add HDR capabilities active)

ATSC

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



HDR - ranges



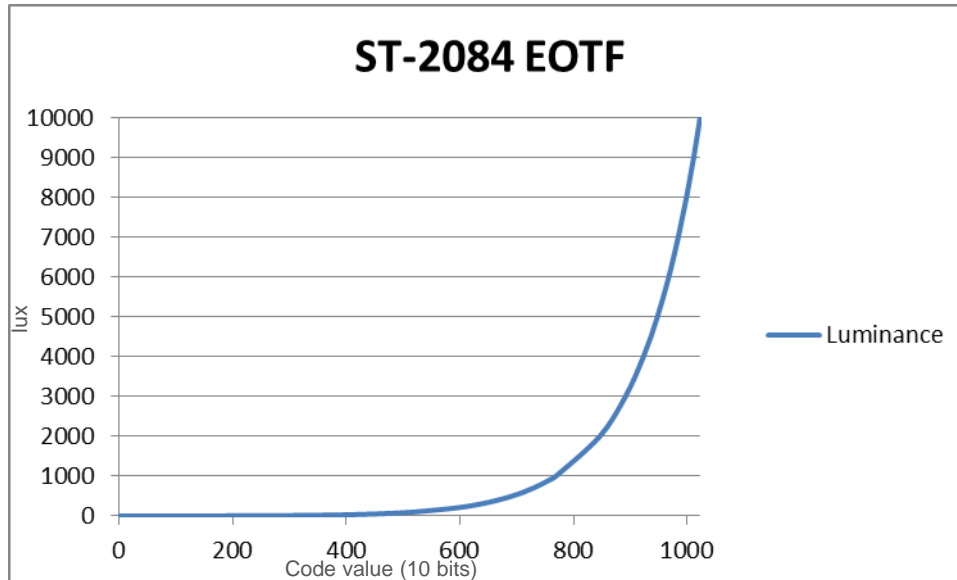
Mastering

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

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



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.

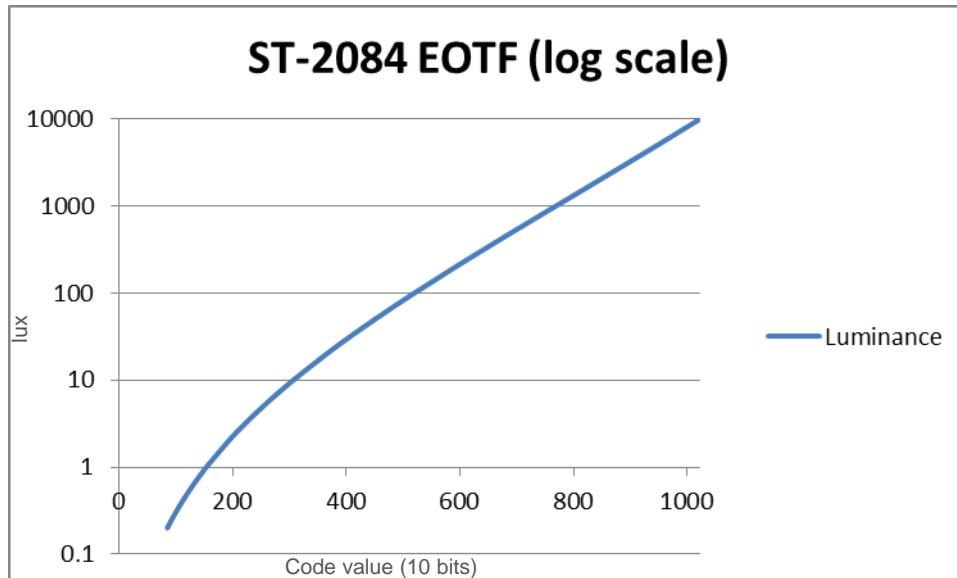
The final 25% of the code values are from 1,000 to 10,000 nits.

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 – power measurement

IEC 62087 – current versions

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

IEC 62087 – next generation

- 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.

**A project could be started in
fall 2015 or in 2016.**

HDR – other opportunities for TC100

HDR quality measurement

Scenarios

- An emissive display might have very high peak luminance, but very low average luminance.
- Local dimming backlit TVs might have higher peaks when the area is limited and lower peaks when distributed over the full screen.
- Small power supplies with large capacitors might deliver high peaks for short bursts

Test cases

- Should consider multiple cases, including
 - Small area peak brightness
 - Large area peak brightness
 - Transient (short burst) peak brightness
 - Sustained (long-term) peak brightness
- Other?



Dimensions

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

A study group could be formed.



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