INTERNATIONAL ELECTROTECHNICAL COMMISSION

IEC TC100:

AGS, SG1 – 3D & UHD Standards Update

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The State of 3D Standardization

Production
3D Home Master

Compression
Multiview Video Coding

Transmission
B'cast, Cable, Sat., HH

Media
Optical Disc

Home Connectivity

Display Technology

Proprietary

TC 110?

Eyewear

Proprietary

Closed Captions

Most 3D standardization opportunities have already been claimed.

Recent 3D Standards Activities

CEA-861-F

- Metadata for Digital Video Interfaces
- Includes 3D & UHD timings
- Ballot passed on 14-May-2013
- Provided to HDMI Forum

CEA R4 WG16

- Considering passive eyewear performance standard
- Might be more appropriate for an optometry standards group

Recent 3D Standards Activities

ATSC

- TG1 S12 is developing a 3D broadcasting standard
- Multiple approaches specified
  1. (Overview document)
  2. Service Compatible Hybrid Coding using Real Time Delivery (MPEG-2 & AVC over same channel)
  3. Frame compatible (2 half bandwidth images, MPEG-2)
  4. Hybrid Delivery of Service Compatible Hybrid Coded 3D (e.g. broadcast + Internet)
  5. Service Compatible 3DTV using Main and Mobile Hybrid Delivery (Fixed + Mobile-Handheld)
  6. Independent Coded 3D (MPEG MVC)
- Publication expected, late 2013

3D Market

3D TV Market largely satisfied

- End to end system established
- 3D TVs continue to sell
- 3D TV installed base continues to grow

However…

- Enthusiasm has decreased
- Not a must-have feature for most buyers
- Eyewear cited as a limiting factor

3D Opportunities

Terminology

Quality – Especially for glasses-free 3D

UHD

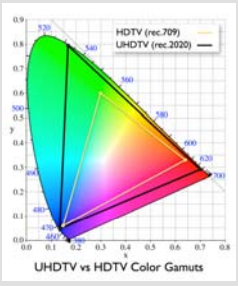
UHD is the current “wow factor” AV feature

Like 3D, standards opportunities are limited

ITU-R BT.2020	SMPTE	HEVC	ATSC	CEA & HDMI
Format	Production	Compression	Broadcast	Consumer

ITU-R BT.2020

- **Resolution: 3840x2160 or 7680x4320**
- **Frame rates: 120p, 60p, 59.94p, 50p, 30p, 29.97p, 25p, 24p, 23.976p.**
- **Bit depth: 10 or 12 bits per channel**
- **Gamut – wider than digital cinema**
- **4:4:4, 4:2:2, or 4:2:0 color resolution**
- **Constant or Non-constant luma**



UHDTV vs HDTV Color Gamuts

CEA

Ultra High-Definition display characteristics:

A display system may be referred to as Ultra High-Definition if it meets the following minimum performance attributes:

- **Display Resolution**—Has at least 8 million active pixels, with at least 3840 horizontally and at least 2160 vertically.
- **Aspect Ratio**—The width to height ratio of the display's native resolution is at least 16:9.
- **Processing**—Has at least one digital input capable of carrying 3840x2160 resolution video and supports presentation of 3840x2160 resolution video from this input in a 3840x2160 or higher format. A qualifying display may not rely solely on up-scaling high-definition video content for presentation in a 3840x2160 or higher format.

Also, CEA-861-F Metadata for Digital Interfaces

SMPTE

Study Group on UHDTV Ecosystem (TC-24TB subgroup)

- **Developing a study document to guide SMPTE in identifying needed UHD content production standards.**

High Efficiency Video Coding (HEVC)

- Successor to H.264/MPEG-4 AVC (Advanced Video Coding)
- Joint development by the ISO/IEC Moving Picture Experts Group (MPEG) and ITU-T Video Coding Experts Group (VCEG) as ISO/IEC 23008-2 MPEG-H Part 2 and ITU-T H.265
- Supports resolutions up to 8192×4320.

UHD in the broadcasting market

View NAB 2013 UHD Video

(Video available for viewing, but not sharing.)

NAB 2013 UHD Video Summary

- 2/3 inch cameras needed
- Single link, professional interface needed
- UHD delivery to consumers to be established

Conclusion

IEC TC100 3D standards opportunities

- Terminology
- Quality – especially for glasses-free 3D

IEC TC100 UHD standards opportunities

- Unclear
- Discuss?

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Thank you

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