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Where Content Comes to Life

APRIL 7–12, 2018 LAS VEGAS NABShow
UHD Worldwide Service Deployment Update

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VP Video Strategy, Harmonic
April’18
Forewords

Ultra HD is a generic technology that can be deployed for VOD & Live

Ultra HD Forum’s activities around Live/Linear workflows

UHD has started in 2015 with VoD/SVoD and HDR is the norm today

Focus on this presentation is Live
Agenda

- Ultra HD Forum
- Market
- Specifications
- Deployment Observatory
- Deployments Analytics
- Synthesis for HDR
- Coming next
Global Advocacy for Next-Gen A/V Delivery

55 Direct members / 300+ indirect members

* https://ultrahdforum.org
Ultra HD Forum Roadmap

Phase A
- 2015
- 2016
- 2017
- 2018
- 2019
- 2020

Guidelines Phase A

Guidelines Phase B

Public interop #1

Public interop #2

5 years project
UHD Live Time Lapse

- 2015: SDR service (DIRECTV)
- 2016: HDR10 trial (NBC Comcast), HLG service (SKY PerfecTV!)
- 2017: SDR service (Korea), HDR10 trial (US), HLG service (ATMOS)
- 2018: HLG & PQ10 services (DIRECTV Dish Comcast), HLG service (travelxp)
Linear Channels & VOD Now Available

Around 70 Unique linear UHD channels available worldwide in 2017, most of them being available by Satellite DTH

More than 250+ linear UHD channels expected in 2020

Content wise, Hollywood studios have a combined 250+ titles already ready to distribute in the format.

UHD Title availability best from OTT streamers like Amazon and Netflix

Unique linear UHD channels by region

Amazon v. Netflix, by Genre

Source: IHS Markit

© 2017 IHS Markit
# UHD Key Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4K Resolution</td>
<td>Clearer, crisper and more detail-rich picture than HD</td>
</tr>
<tr>
<td>WCG Wide Color Gamut</td>
<td>More vibrant colors</td>
</tr>
<tr>
<td>HDR High Dynamic Range</td>
<td>Greater range contrast</td>
</tr>
<tr>
<td>HFR High Frame Rate</td>
<td>Motion rendering closest to real</td>
</tr>
<tr>
<td>NGA Next Generation Audio</td>
<td>Sounds are perceived as coming from infinite points around</td>
</tr>
</tbody>
</table>
## UHD Broadcast Standards

<table>
<thead>
<tr>
<th>Standard</th>
<th>DVB</th>
<th>Ultra HD Forum</th>
<th>ATSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version</td>
<td>UHD-1 Phase 2</td>
<td>Phase A</td>
<td>Phase B</td>
</tr>
<tr>
<td>Released in</td>
<td>2016</td>
<td>2016</td>
<td>2018</td>
</tr>
<tr>
<td>Max Resolution</td>
<td>3840x2160</td>
<td>3840x2160</td>
<td>3840x2160</td>
</tr>
<tr>
<td>Max Frame rate</td>
<td>P120</td>
<td>P60</td>
<td>P120 (1)</td>
</tr>
<tr>
<td>MPEG profile / level</td>
<td>Main 10 / Level 5.2</td>
<td>Main 10 / Level 5.1</td>
<td>Main 10 / Level 5.1</td>
</tr>
<tr>
<td>Color space</td>
<td>BT 2020</td>
<td>BT 2020</td>
<td>BT 2020</td>
</tr>
<tr>
<td>HDR</td>
<td>PQ10/HLG10 (2)</td>
<td>PQ10/HLG10</td>
<td>Dolby Vision</td>
</tr>
<tr>
<td>HDR</td>
<td>NGA (object based)</td>
<td>Stereo or 5.1 multi-channel audio</td>
<td>NGA (object based) : ATMS, MPEG-H</td>
</tr>
<tr>
<td>Audio codec</td>
<td>MPEG-H</td>
<td>AC-3, EAC-3, HE-ACC, AAC-LC</td>
<td>MPEG-H</td>
</tr>
<tr>
<td></td>
<td>AC-4</td>
<td>Dolby-AC-4</td>
<td>Dolby-AC-4</td>
</tr>
<tr>
<td>Backward compatibility for video</td>
<td>HDR : Phase 1 via HLG</td>
<td>HDR :</td>
<td>HDR :</td>
</tr>
<tr>
<td></td>
<td>HFR : via temporal scalability</td>
<td>- Phase 1 via HLG</td>
<td>- DV has a HDR10 base layer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Receiver down conversion to SDR</td>
<td>- SL-HDR1 is BT 2020/709 compatible</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>HFR : via temporal scalability</td>
</tr>
</tbody>
</table>

(1) Max resolution allowed for HFR is 1080p120  (2) New HDR inclusions with meta data support being studied  (3) Candidate standard stage  (4) Recently added (2017)
Ultra HD Forum
Market
Specifications
Deployment Observatory
Deployments Analytics
Synthesis for HDR
Coming next
UHD Deployment Observatory*

Tracking of UHD commercial services

Extensive use of the tool for this presentation

3rd most hit page (after Members & Guidelines)

Everyone can contribute

Ultra HD Forum is here to help you assess who deploys UHD!

* https://ultrahdforum.org/resources/list-of-commercial-uhd-or-4k-services-that-are-live/
Method Used

Count services not channels

Count commercial services not trials

If simulcast (SDR & HDR), count 2 services

51 active UHD services
Specifications
Market
Specifications
Deployment Observatory
Deployments Analytics
Synthesis for HDR
Coming next
Distribution Networks

Source: Ultra HD Forum Deployment Observatory, April'18
HDR

Source: Ultra HD Forum Deployment Observatory, April’18
NGA (Channel Based)

NGA Ratio

- NGA: 92%
- Non NGA: 8%

HDR Distribution

- ATMOS: 100%
- Others: 0%

Source: Ultra HD Forum Deployment Observatory, April'18
HDR Deployment Framework

VOD

Live

IP Network

STB

Broadcast Network

OTT

VOD

Live

IPTV

ABR/SBR

Broadcast

Live
HDR Deployment Types

VOD
- HDR10
- HDR10+
- SDR
- DV

Live
- HDR10
- SDR
- HLG

IP Network
- HLG

Broadcast Network
- HLG

STB

OTT ➔ VOD
IPTV ➔ ABR/SBR
Broadcast ➔ Live
The Big UHD Bang

FIFA Includes UHD HDR In 2018 World Cup Broadcast Plan

All 64 matches will be produced in UHD HDR

Michael Balderston  ·  Oct 26, 2017

ZURICH: If the grass looks greener or the event on the players’ brows seems to be a little more prepossessing at the 2018 World Cup in Russia the answer will likely be able to be traced back to your TV set. FIFA has announced that the 2018 World Cup will be the first to produce all 64 matches in UHD HDR.

With the use of a hybrid UHD/HDR/SDR setup, multiple choices of video formats will be available (SDR, SDR and UHD HDR) at the back of a single production chain. There will also be use of progressive mastering as a baseline production format.

For the games, 37 cameras will be in use, eight with UHD HDR and 29 with SDR dual output and another eight with SDR/SDR dual output. In addition, eight super slow-motion, two ultra-motion cameras and a studio half-cam will be available in each studio. The UHD program will have its own wider-framed main camera, as well as the addition of immersive audio.

FIFA has also announced its digital plan for the 2018 World Cup, integrating the digital production and services offering as part of the overall production plan. This will include the ability to follow matches live in virtual reality as a 360-degree video on demand.

Largest HDR event ever produced
Conclusions

- Live Ultra HD had so far a limited success, HDR ramping up
- After 2 years of Phase A, 8 HDR Live deployments
- 2018 year of HDR commercial deployments with more content available
- New technologies (Next Gen HDR, HFR, NGA, CAE) adopted in Phase B

Ultra HD Forum is here to help you deploy UHD!
Thank you

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