Welcome
• Thierry Fautier, President, Ultra HD Forum

LIVE UHD SERVICES TODAY
Lessons learned by operators from early commercial deployments of live UHD services
• Ben Schwarz, Ultra HD Forum, Moderator
• Phil Layton, BBC
• Dolf Schinkel, KPN
• Matthieu Parmentier, France TV
• Emili Planas Quintana, Mediapro
• Simon Jones, BT

DVB SPECIFICATION FOR HDR
How DVB came to consensus for the final set of HDR options.
• Peter Siebert, DVB

STATE OF THE UHD MARKET
September 2019 worldwide consumer TV market.
• Maria Rua Aguete, IHS Markit

ULTRA HD ENCODING WORKSHOP
Video encoding techniques for UHD, impacts of spatial and temporal resolutions on bit rates & quality. Emergence of CAE, 8K, latest up-conversion technologies, ...
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• Guillaume Arthuis, BBright
• Mark Donnigan, Beamr
• Thierry Fautier, Harmonic
• Madeleine Noland, ATSC
• Mickael Raulet, Ateme
• Yuriy Reznik, Brightcove

Break

Close
Ultra HD Forum Presentation

Phil Layton
Head of Broadcast & Connected Systems
BBC, Research & Development
Phil.Layton@bbc.co.uk
BBC UHD Trials

FIFA World Cup Final in Ultra High Definition

Mark Chapman introduces live coverage of France v Australia in Group C.

Tell us what you think: bbc.in/newhome
BBC iPlayer UHD Content

- Planet Earth II (8 minute show reel)
- Blue Planet II (7 episodes)
- Dynasties (5 episodes)
- Live FA Cup Final
- Live FIFA World Cup 2018 (29 matches)
- Live Wimbledon tennis (2 weeks)
- Live Wimbledon tennis (2 weeks)
- Live FA Cup Semi-Final
BBC have run surveys for every event
• Many thousands of varied responses
• Very many happy viewers who want more
• Equally viewers reporting issues related to ISP, WiFi, home device
  • Not all ISPs are equal
• Long latency (~40s) was a common comment

Audience sizes typically 40000-50000 concurrents
• Need to protect our standard services
• Demand only exceeded our capacity once, our capacity has increased

Over 700 (and growing) devices certified for iPlayer UHD
Our To-Do List

Better audio
- Remains an issue mainly due to receiver issues
- Testing NGA solutions
- May need to wait for HbbTV to complete work on APIs

Audience perception
- Still get reports of poor picture quality on certain TVs
- Often driven by SDR modes on TVs being very bright

Production
- Craft skills still learning how to make good HDR and SDR simultaneously
- Apply single production workflow to different camera suppliers
- Some optimisations in cameras and workflows

Distribution Encoding
- Reduce live UHD video rates closer to VoD (36Mbit/s to 22.7Mbit/s)
- Reduce VoD video rates
KPN:

Introduction of Ultra HD TV service

Dolf Schinkel
Why launch Ultra HD?

2016: KPN introduces 4K STB & 4K subscription around European Football Championship

2017: STB upgraded with HDR-HLG, PQ10 and HDMI 2.0B support

2018: 4k event channel for FIFA World Cup and Eurosport tennis

2019: New STB with full 4K HDR support and immersive audio
General iTV architecture
Architecture

UHD Distribution varieties

- Production
  - S-log3
  - Conversion HDRC-4000
  - HDR10
  - HLG

- Broadcast
  - Taker 1
    - Conversion
    - HLG
  - Taker 2
    - Conversion
    - HDR10
    - STB 2
    - TV 2
  - Taker 3
    - Conversion
    - HDR10
    - STB 3
    - TV 3
  - Taker 4
    - Conversion
    - HLG
    - STB 4
    - TV 4
  - Taker 5
    - Conversion
    - HLG
    - STB 5a
    - TV 5
  - Taker 6
    - Conversion
    - SDR
    - STB 5b
    - TV 5

- Distribution
  - STB 1
  - TV 1
  - STB 2
  - TV 2
  - STB 3
  - TV 3
  - STB 4
  - TV 4
  - STB 5a
  - TV 5
  - STB 5b
  - TV 5
  - STB 6
  - TV 6

- Compare

4 KPN ULTRA HD Forum IBC 2019 Dolf Schinkel
Customer segmentation

The Ultra HD services have up to this moment been addressed to:

- Customers with High Bandwidth availability subscribed to the 4K package
- Small fraction of tv-customers has 4K
- Active migration
- At least half of all customers penetration goal for 4K STB
Customer Feedback

- Customer satisfaction with 4K/HDR high
- Contradiction in the market:
  - impact of HDR vs. 4K customer recognition

Technical issue

- STB’s are forced in HDR mode when changing to HDR channel
  - TV set SDR/HDR switching confuses customers
Issues still faced

• Mix of 50 Hz and 60 Hz content
• Backward compatibility
• Lack of Premium Content holds success back
• Mitigated issues
  • HDR/SDR switching
  • Colour space backward compatible
HDR on road map

- 4K and HDR services are available since 2018
- Expansion of HDR services
- Set Top Box is there!
Roland Garros 2019
UHD

france.tv

france.tv sport

4K
Ultra HD
Video production

France TV OBvan – Toulouse

• 14 UHD native cameras
• 3 HD upconverted cameras (super-slow-motion)
• 6 HD slow-motion servers
• 1 single switch on the video mixer, 2 logical layers:
  • HD 1080p50 SDR
  • UHD 2160p50 HDR (HLG)

RG2019 specificities

• 15 days to let many occasions for improving the result
• FTV is the International Signal producer:
  • 1080i25 signal of each camera remains mandatory
  • no possibility to run only one UHD-HDR production then down-convert the others
• Same number of technicians
• Very passionate and motivated team, mostly self-trained to manage 2 video dynamic and 2 color gamuts at the same time
• Panasonic cameras are ideal for this kind of double production HD/UHD
Immersive/interactive audio production (NGA)

Roland Garros NGA specificities

• 3D ambience (5.1 + 4) / 5.1 compatible, also binauralized
• Shotgun digital microphones AES42
• Live descriptive metadata
• Allows the adaptation of the rendering depending on the device skills
• Same number of audio technicians
• Another very passionate and motivated team!

NGA configuration, transport and encoding

• Commentaries are considered as object, switchable on demand
• IP contribution link was kept uncompressed (16 PCM streams / 16 Mbps)
• Descriptive metadata could be edited/corrected at MCR
• Each content/programme can run its own metadata config
• 3 NGA codecs available: Dolby AC-4, DTS-X et MPEG-H audio
• Only MPEG-H is used, as production tools are available and successfully tested on a 24/7 basis
Master Control Room - UHD

UHD MCR – HDR10 – NGA

- Playlist, automation, graphics
- Record/playout servers
- Live contribution link UHD – HDR – NGA
- Operated by the regular MCR team
- Full IP configuration targeted (ST.2110 / 25 GbE ports to support 2 UHD real-time streams) but several 4x3G-SDI units had to be used instead

Overall project in 3 phases

1. 4x3G-SDI spare equipments to run Roland Garros 2019
2. Deployment of ST.2110 equipments during Summer/Fall 2019
3. Full IP redundant configuration for RG2020 then Tokyo Olympics
User experience

4 distribution networks

- Satellite broadcasting on fransat (Eutelsat), over the whole country, using 4K-HDR10-HE-AAC+MPEG-H then 4K-SDR-HE-AACx3
- IPTV broadcasting over the Orange fiber network using 4K-SDR-HE-AACx3

Issues found

Video – HDR10

- Correct display over recent UHD-TVs > 2015
- No display over older UHD-TVs
- Wrong display over older (or bugged) UHD-TV when the reception is done with another equipment + HDMI link.

Audio – MPEG-H

- Short range of products on the EU market
- MPEG-H decoders in TVs are not plugged on RF inputs => manufacturers’ decision in favor of Dolby AC-4 codec for DVB
- No end-to-end NGA solution for now
- A « NGA-like » UX is possible but cost-effective, by offering:
  - 1 French Version
  - 1 French Version with enhanced commentaries
  - 1 International Version - ambience only
  - 1 Internationale Version binauralized for headphones
  - etc.
Thank You
UHD-HDR Live Sports Production

Emili Planas
CTO and Operations Manager
Mediapro
[eplanas@mediapro.tv]
Why: Launch Rationale for UHD Service

- 2015-16. Start first UHD Live Prod using Cinema cameras and lenses (Sony F55) -2 Matches-
16-17: A complete season for learning!

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• 2016-17. UHD-HDR double production, -35 Matches-. Start of Simulcast production -3 Matches-
17-18 Two HDR productions per week

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- 2017-18. Simulcast UHD-HDR Live Production -72 Matches-
Don’t Stop!

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- 2018-19. Simulcast UHD-HDR Live Production, including VAR and GoalCams -HLG + bt.2020 - 72 Matches-
How: workflow, architecture,...

- Production needs to be SIMULCAST
  - Same number of cameras, replays, ... for both HD and UHD-HDR
  - Same or better Quality of Service than for HD productions
    - Reliability
    - Time to solve
    - No limitations to accept new requirements or novelties
    - HDR can’t be excuse if something goes wrong
  - Same or better Picture Quality for the HD feed than in a native SDR production
How: workflow, architecture,...
Roadblocks / Challenges

- New paradigm when shading: White and Lights are not the same
- Constant increasing on HDR quality, not affecting SDR feeds
- Complex integration with complex workflows: File sharing, ...
- Market is interested but not asking for

Next scenario

PRODUCTION | BROADCAST

ITU-R BT.2100 | UHD-HDR 2160p
ITU-R BT.709 | UHD-HDR 1080p
SIMULCAST HDR-SDR | HD-SDR 21080i
Countries where LaLiga Right Holders receive UHD-HDR
From SD to UHD-HDR

Dr Simon T Jones
TV Architect
BT
BT – UK Telco addressing UK customers
BT TV Evolution

BT Vision - December 2006
• DTT SD linear TV channels
• SD Video on Demand
  • HD and 3D post launch

BT TV
• Multicast Linear TV Channels

Youview – July 2012
• PSB Players
• Multiple VoD services
  • Netflix, Amazon, ...

BT TV App
• iOS and Android

Customer segment
• Over 1.8m BT Broadband
BT Sport Innovation - UHD Channel

BT Sport - August 2013
• 3 HD Channels, 5.1 audio
• IPTV, satellite, cable, App

BT Sport UHD - August 2015
• 3 HD Channels, 5.1 audio
• IPTV, satellite, cable, App
• 3840x2160p50 10 bit BT.709
• IPTV and cable only

Dolby Atmos – January 2017
• Immersive 5.1.4 audio
• UHD Channel only

Interactive App Experience
• Timeline, restart, events and clips
360° VR Video June 2016
• Live feeds and event clips
360° VR Video - May 2019
• FA Cup final live 8K VR

Audience
• 11.3m for UCL Final 2019
• 57% TV : 43% Digital
BT Sport End to End

OB Production

OB Links

Production Hub

Playout

Sports Management Centre

Headend

Broadband

Access

Hub

STB & devices
BT Sport Ultimate – August 2019

Trials
• Parallel production workflow:
  • June 2017 UCL final in UHD-HDR
  • March 2018 Live HD-HDR to mobile
• Single production workflow
  • June 2019 UCL Final in HDR to mobile
  • All BT Sport App customers with HDR device

Service Launch – August 2019
• Small screen: iOS and android
• Large screen: Samsung TV, Apple TV 4K

Production
• Single UHD-HDR workflow - Primarily Slog-3 Live
• Single UHD-HDR PQ feed OB → Studio → Playout
  • HEVC and TiCo

Playout
• Single UHD-HDR PQ input
• HDR to SDR down-mapping – under OB control
• SDR to HDR up-mapping - advertising insertion
• Parallel UHD-HDR PQ & UHD-SDR BT.709 outputs

Distribution
• HDR Format
  • PQ (HDR10)
• Encoding
  • AWS Elemental Live
  • HEVC for UHD and HDR
  • AVC for legacy devices
• Packaging
  • AWS MediaPackage in cloud
  • HLS-TS, HLS-fmp4 and DASH
  • IPTV HEVC-TS in RTP
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TV Architect
BT
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10:55 Break

12:15 Close