

UHDTV in the UK – Hot or not?

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Yvonne Thomas
Strategic Technologist
DTG



Who are we?

The DTG is the unique self-funding UK collaboration centre for innovation in digital television.

Our membership comes from across the digital television delivery chain from studios through to digital networks, broadcasters, platforms, manufacturers and consumer groups



DOLBY

Panasonic



TIVO

DigitalUK

BBC

Microsoft

fastly

BT

Freesat

Freeview

sky

SAMSUNG

SONY

itv

SAGEMCOM

LG

iabm

DVB WORLD 2020





- The battle: HEVC vs VVC vs AV1 vs EVC
- A new codec = new STB
- AV1 started to be in STBs at IBC but slow take off prevents further developments, it's royalty free and attractive to streaming services (You Tube, Netflix uses AV1 for Android) but requires a lot of computing power (in the Cloud)
- VVC encoding is 12 times higher than HEVC and is yet to be supported by silicon vendors
- EVC is a royalty free alternative for the basic set
- Currently no plans to deliver HFR or 8K transmissions in the near future
- Follow what devices support and consider any codec that would allow to address a sizable device population
- DVB CM-AVC0528 document summarizes details quite well



- Immersive audio currently delivered via STB to sound systems
- Personalised audio: BBC & Amazon have provided multiple audio tracks for football coverage
- No fully object-based audio service yet, only at R&D level or few over IP
- Need to become technology agnostic!
- All High-end receivers will deliver Atmos and DTS:X
- 1 of 6 soundbars will support either Atmos or DTS:X or even both
- TV sets mainly have a built-in NGA “immersive” systems due to the fact TVs get thinner
- Dolby Atmos build in Amazon Echo Studio (content available through Amazon Music HD)
- Consumers are not aware of their NGA options (37% know about Dolby Atmos)



- 1080p50HDR is not true UHD - 4K SDR is UHD
- Vivid mode might make most consumers think they have HDR/UHD
- Volumetric Video: need to address the computational complexity, cost per second per customer will be massive
- Providing the best experience of what combination of device and network can support
- Stop at 1080p50 over mobile connections to reduce impact on data usage and no visual benefit



- 8k likely needs a shift to full IP and a migration away from SDI
- Currently no 8k broadcast until end of the decade but first trials in Sports
- Screen resolution may peak at 8k and further improvements are expected in the areas of colour space and gamut as well as enhanced audio
- TV panels include micro LED, backlighting and higher refresh rates – together with dynamic metadata we create great picture but move away from only a higher pixel count

- Fibre provides ability to get the max resolution in ABR deliveries and stream more live UHD content
- FTTC is giving good coverage for a single UHD channel, it requires customers to have 44 Mbps lines so that they can watch UHD, record HD and browse the Internet at the same time
- As more consumption is direct to devices over access networks, it is difficult to ensure the viewer can enjoy the UHD experience due to bandwidth limitations
- It is likely that 5G will have a bigger reach than fibre in the UK
- DVB-I is being looked at as viable option
- Content is still king!



- The customer experience is key in delivering a consistent product
- Will consumers use the Filmmaker mode?
- 4K in streaming devices is mature and well understood
- Differences in operating systems might cause issues with Smart Homes (vendor lock-in)
- OLED TVs in the UK market in 2019 had a penetration of 67%
- Super large screens (>70") have 26 % of the market share in the UK and had a real price drop in the last year → second screen in bed rooms
- Still logo confusion and what UHD really is → needs consumer education











- HDR & Colour
 - HLG10 & PQ10
 - >55% BT.2020 colour space
- MPEG-DASH / DVB-DASH
- Audio
 - Currently being updated to add NGA (Immersive)
- HTML5 / HbbTV 1.4.1
- MSE, EME (inc Clear Key) & at least 1 recognised DRM
- At least 2 recognised OTT services that support HDR
- HDMI 2.0b / HDCP2.2



- Display Resolution
 - at least 33 million active pixels, with at least 7680 horizontally and 4320 vertically within a 16:9 viewable window
 - established guidelines for measurement of visible resolution specified in version 1.03c, section 7.8, of the International Display Measurement Standard (IDMS) specified by the International Committee for Display Metrology (ICDM)
- Up-conversion
 - upscaling SD, HD and 4K video and displaying it at 8K display resolution or better
- Digital Input
 - one or more HDMI inputs supporting the following characteristics:
 - Resolution of 7680x4320 pixels
 - Bit depth of 10-bits
 - Progressive scan
 - Frame rates of 24, 30, and 60 frames per second as well as at the associated 1000/1001 fractional frame rates
 - Frame rates of 25 and 50 frames per second for displays intended for use in 50 Hz regions
 - HDR transfer functions as specified by ITU-R BT.2100
 - RGB Colorimetry and the Non-Constant Luminance Y'CbCr signal format, as specified by ITU-R BT.2100
 - At least one of the 7680x4320 HDMI inputs shall support HDCP v2.2 or equivalent content protection
- Bit Depth
 - capability to receive 10-bit 8K images and render an image that shows responsiveness to changes to any of the 10 bits. The exact manner of processing is not specified.

- Resolution: 7680 x 4320 pixels
- Input Frame Rate: 24p, 30p and 60p frames per second
- Display Luminance: More than 600 nits peak Luminance
- Codec: HEVC
- Interface: HDMI 2.1
- Additional performance and interface specifications (available to members)?



Principal Members with a Board Seat		
		
		
		
Principal Members		
		

- HDR & Colour
 - Brightness of 0,05-1000 nits or 0,0005-540 nits *
 - BT.2020 colour space with >90% P3 color of display reproduction *
 - Min. 10 bit colour depth*

- Resolution
 - 3840 x 2160 pixel
 - 60 pixel/degree *

- Audio
 - NGA support is recommended *

UHD
ALLIANCE

ULTRAHD
PREMIUM™

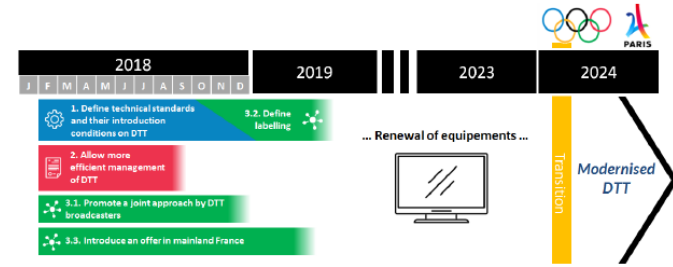
MOBILE HDR
PREMIUM™

amazon	amlogic	arcadyan	arçelik	ASUS A POWERED BY ASUS	Charter
Dell	DOLBY	Fraunhofer	Google	Hisense	intel
kaleidescape	LG Ultra HD	NIVATEK	NVIDIA	ONKYO	Panasonic
Philips	pixelworks	QUALCOMM	REALTEK	SAMSUNG	SKYWORTH
SONY	Synaptics	TCL	technicolor	TRUPHONY	TOSHIBA
TPVISION	UNIVERSE	VESTEL	VIZIO	WB	Westinghouse
XPERI					

*recommended for mobile devices

In comparison...to the UK

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Japan	BS in Right Hand Circular Polarization (RHCP)						4K Test Broadcasting		4K Broadcasting			
	BS in Left Hand Circular Polarization (LHCP)								4K / 8K Broadcasting			
	CS110							4K Test Broadcasting	4K Broadcasting			
	CS124 / CS128					4K Test Broadcasting	4K Broadcasting					
	Cable TV					4K Test Broadcasting, VOD Trial	4K Broadcasting					
	IPTV					4K Test Broadcasting, VOD Services	4K Broadcasting					
USA	Network Contents	YouTube 4096, 16:9			YouTube Ultra HD				YouTube 8K			
	OTT							Amazon Prime Video, Netflix 4K services				
	Satellite Broadcasting						DISH Networks 4K Broadcasting	DirectTV 4K Broadcasting				
Korea	Terrestrial Broadcasting			4K Experimental Broadcasting	4K Experimental Broadcasting	4K Experimental Broadcasting						
	Satellite Broadcasting								SkyUHD 4K Broadcasting			



Conclusion

- HEVC is the currently used standard
- VVC and EVC are expected to be good alternatives, but requires to well define the use cases, licensing and a wide implementation in STBs
- AV1 is interesting for streaming and the usage for broadcasters is not yet defined
- The chosen NGA system must be easy to use and technology agnostic to become successful
- Currently Atmos is the most known and implemented solution
- 1080p50HDR is not UHD!
- No 8k services planned until the end of the decade
- 8k+ resolution in production is very useful, but requires to look at the lenses
- New technologies, such as micro LED, backlighting and higher refresh rates, paired with dynamic metadata can create a great experience
- Interoperability is key!

UHD is HOT for 4k premium services, event-based productions and 4k/8k displays
but NOT yet for „full linear channel“ or 8k services

