

TECHNOLOGY FACT SHEET

UHDTV

The transition to digital television and HDTV is well under way. At the same time, broadcasters must have an eye on the future, recognizing the inevitable evolution of the viewing experience. Without a doubt, steps need to be taken now to be future-proof. The options beyond HDTV include: a more advanced HDTV system 1080p/50 and two levels of Ultra High Definition Television, UHD-1 and UHD-2. In all cases, there are production, delivery and consumer aspects to consider.

BACKGROUND

Television image quality has shown continuous evolution over the last 50 years and is unlikely to stop abruptly now. The factors affecting this have been the improvements in television displays and, in the digital age, improvements in video compression efficiency and increases in chip gate density. All of these trends will continue.

Television systems that provide a better viewing experience will be driven by a combination of the consumer electronics industry's need for new selling propositions and the public demand for ever better and more immersive experiences. Complete or partial worldwide standards are now available for the following future options for broadcasters:

- **1080p/50** – A version of the HDTV format that combines the advantages of HDTV formats used today with greater spatial and temporal resolution; this would provide somewhat more detail and processing headroom.
- **UHD-1** – This is the first of two levels of Ultra High Definition Television (UHDTV). Level 1, the so called '4k' level, provides 8 Megapixel images at normal frame rates, the equivalent of four 1080p/50 images. Details for further parameters such as a higher frame rate (HFR), higher dynamic range, wider colour gamut and a more immersive audio system are under discussion for Phase 2.
- **UHD-2** – Level 2, also called Super Hi-Vision, or the '8k' level, provides 32 Megapixel images, the equivalent of sixteen 1080p images. Compared to UHD-1, further parameters are expected to be improved and refined (e.g. HFR of 100 and 120 Hz, HDR, WCG).

As these new formats imply a higher amount of data, a new and more efficient video compression system – **HEVC** – was developed by the MPEG/ITU VCEG standards group. The standard was published in January 2013. It may be up to 50% more efficient than MPEG-4/H.264 AVC, the compression system currently used. This may significantly enhance the feasibility of broadcasting these new television formats.

THE CHALLENGE FOR PUBLIC SERVICE MEDIA

Broadcasters are obliged to look beyond today's HDTV, and to ask "what's next?" They need to understand the options, their practicability, their cost, and the potential impact on their business models.

They need, for example, to decide on whether production in the 1080p/50 format would be valuable, and in which circumstances. Broadcasting in 1080p/50 may become more practical with upcoming receiver generations. However, with these different 'quality steps' ahead, broadcasters need to decide whether to 'step over' one or other format.

The nascent UHDTV standards include a number of options for elements such as colour encoding, frame rate and bit depth, and here too, broadcasters need to make choices that would result in a significant quality difference compared to HDTV. The performance of the HEVC compression system on UHDTV formats also

needs to be evaluated for optimal service shaping on the different networks (satellite, DTT, broadband, cable, etc).

It would be also conceivable to include an option at lower resolution than 2160p in UHD Phase 2. This could include e.g. 100 Hz and HDR at full HD resolution.

WHAT IS THE EBU DOING?

The EBU is coordinating and participating in various European and global groups which define and influence the development of UHD TV, while also assessing the potential impact of UHD TV for Public Service Media. The EBU's BeyondHD strategic programme is a unique platform in Europe for the industry to exchange knowledge and opinions about these new systems, and to study technical questions together with the EBU Members.

In the last 24 months the EBU has, with key partners, created various test sequences to enable important scientific tests that will help to define the core parameters for UHD TV. Specific activities have included:

- **Resolution and HEVC:** comparative tests of UHD-1 and HD resolution and performance evaluation of HEVC
- **HFR:** under the auspices of the Broadcast Technology Futures group (BTF), tests have been conducted to assess the impact of Higher Frame Rates
- **HDR:** tests of identifying an evaluation methodology of High Dynamic Range content & BTF-HDR
- **Studio codecs:** new studio video codecs such as XAVC and AVC-ULTRA are under investigation
- **Audio:** an Audio project group is investigating potential parameters for more immersive audio

The EBU is playing a key role in federating all industry partners towards creating a common roadmap. A series of workshops has been central to this effort, with the recent joint DVB-EBU HDR workshop which took place at the IRT, Munich, on 17 June. In parallel, with DIF, the Digital Interoperability Forum, the EBU is leading discussions in the Forum for Advanced Media in Europe (FAME) on the business impact and a common roadmap of UHD TV.

Via a formal liaison with DIGITALEUROPE, the trade organization for consumer electronics, the EBU is following carefully the development of a proposed UHD-1 logo. Furthermore, the EBU actively participates in the activities UHD related groups in the DVB Project, SMPTE, MPEG and the ITU.

In 2014, the EBU published a UHD TV Policy Document addressed to senior management. This document, which will in the process of being updated, describes key factors to consider when selecting between UHD TV as future production format.



A test production in HDR and HFR during the Zurich European Athletics Championships 2014.

FIND OUT MORE

EBU BeyondHD group

tech.ebu.ch/groups/beyondhd

EBU UHD TV Policy Document

<https://tech.ebu.ch/docs/techreports/tr028.pdf>