# INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

# ORGANISATION INTERNATIONALE DE NORMALISATION

# ISO/IEC/JTC 1/SC 29/WG 11

# CODING OF MOVING PICTURES AND AUDIO

**ISO/IEC JTC 1/SC 29/WG 11 N16570**

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**MPEG issues Committee Draft of the Omnidirectional Media Application Format (OMAF)**

Geneva, Switzerland – The 117th MPEG meeting was held in Geneva, Switzerland, from 16 – 20 January 2017

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The understanding of the virtual reality (VR) potential is growing but the market fragmentation due to lack of appropriate standards on storage and delivery format for such content is becoming one of the strong concerns by the industry. Thus, MPEG has recently started a project referred to as Omnidirectional Media Application Format (OMAF). At the 117th MPEG meeting, the OMAF standard has reached the first milestone, Committee Draft (CD). It currently includes equi-rectangular projection as a projection format but it might include support of additional projection formats with a generalized extension mechanism during its further development. It includes signalling of necessary metadata for interoperable rendering of 360 degree monoscopic and stereoscopic audio-visual data, selection of audio-visual codecs for this application, and the technologies for storage of data in the ISO base media file format (ISOBMFF). The High Efficiency Video Coding (HEVC) standard has been chosen as video codec because of its superior compression efficiency and tiling capabilities and MPEG-H 3D audio has been chosen because of its capability of immersive audio representation. As the size of video is becoming a major bottleneck for VR applications and services, it includes technologies on arranging pixel data of video in numerous ways to improve compression efficiency. The standard will include technologies for the delivery of OMAF content with MPEG-DASH and MMT at a later stage. It is expected that the standard will become Final Draft International Standard (FDIS) by Q4 of 2017.

**MPEG-H 3D Audio Verification Test Report**

At the 117th MPEG meeting, WG11 made available the MPEG-H 3D Audio Verification Test Report. This reported on the results of four subjective listening tests that assessed the performance of the Low Complexity Profile of MPEG-H 3D Audio. The tests covered a range of bit rates and a range of “immersive audio” use cases (i.e., from 22.2 down to 2.0 channel presentations). Seven test sites participated in the tests with a total of 288 listeners.

Statistical analysis of the test data resulted in the following conclusions:

* Test 1 measured performance for the “Ultra-HD Broadcast” use case, in which highly immersive audio material was coded at 768 kb/s and presented using 22.2 or 7.1+4H channel loudspeaker layouts. The test showed that at the bit rate of 768 kb/s, MPEG-H 3D Audio easily achieves “ITU-R High-Quality Emission” quality, as needed in broadcast applications.
* Test 2 measured performance for the “HD Broadcast” or “A/V Streaming” use case, in which immersive audio material was coded at three bit rates: 512 kb/s, 384 kb/s and 256 kb/s and presented using 7.1+4H or 5.1+2H channel loudspeaker layouts. The test showed that for all bit rates, MPEG-H 3D Audio achieved a quality of “Excellent” on the MUSHRA subjective quality scale.
* Test 3 measured performance for the “High Efficiency Broadcast” use case, in which audio material was coded at three bit rates, with specific bit rates depending on the number of channels in the material. Bitrates ranged from 256 kb/s (5.1+2H) to 48 kb/s (stereo). The test showed that for all bit rates, MPEG-H 3D Audio achieved a quality of “Excellent” on the MUSHRA subjective quality scale.
* Test 4 measured performance for the “Mobile” use case, in which immersive audio material was coded at 384 kb/s, and presented via headphones. The MPEG-H 3D Audio FD binaural renderer was used to render a virtual, immersive audio sound stage for the headphone presentation. The test showed that at 384 kb/s, MPEG-H 3D Audio with binaural rendering achieved a quality of “Excellent” on the MUSHRA subjective quality scale.

MPEG-H 3D Audio is an audio coding standard developed to support coding audio as audio channels, audio objects, or Higher Order Ambisonics (HOA). MPEG-H 3D Audio can support up to 64 loudspeaker channels and 128 codec core channels, and provides solutions for loudness normalization and dynamic range control. The verification test shows that the requirements set forth in the 3D Audio Call for Proposals are fully met by the MPEG-H 3D Audio Low Complexity Profile.

**MPEG Workshop on 5-Year Roadmap Successfully Held in Geneva**

In a very well-attended workshop, industry representatives from Bitmovin, DVB, Orange, Sky Italia, and Technicolor shared their experience with immersive services, and informed MPEG about their views on how technology standards need to evolve to support future immersive services. MPEG took their feedback into consideration in an update of its 5-year standardization roadmap.

**Call for Proposals (CfP) for Point Cloud Compression (PCC)**

At its 117th meeting, MPEG issued a Call for Proposals (CfP) for Point Cloud Compression (PCC). This CfP seeks submissions of technologies for the coding of 3D point clouds with associated attributes such as colour and material properties. Point clouds have recently emerged as representations of the real world enabling more immersive forms of interaction and communication to better understand and navigate it. They are typically captured using various setups of multiple cameras, depth sensors, LiDAR scanners, etc., but can also be generated synthetically. Targeted applications include immersive real-time communication, six Degrees of Freedom (6 DoF) virtual reality, dynamic mapping for autonomous driving, and cultural heritage applications.

**Preliminary Call for Evidence on video compression with capability beyond HEVC**

A preliminary “Call for Evidence on video compression with capability beyond HEVC” was issued at the 117th MPEG meeting. This call will be made jointly with ITU-T SG16/Q6 (VCEG). It is addressed to interested parties which are in possession of technology providing better compression capability than the existing standard, either for conventional video material, or for other domains such as HDR/WCG or 360-degrees (“VR”) video. As test cases, the call defines rate points and materials in all of these latter categories, anchors with HEVC encodings are also provided. Submissions are expected for the July 2017 meeting, where assessment will be made based on objective criteria (such as rate savings judged by PSNR quality) as well as subjective quality evaluation (experts viewing). The final version of the Call for Evidence is planned to be issued by the April meeting, where it is anticipated that encodings with the Joint Exploration Model (JEM) algorithm may be included as an additional reference point for comparison. The JEM is being developed by the Joint Video Exploration Team (JVET) of MPEG and VCEG, and is already known to provide bit rate reductions in the range of 20-30% for relevant test cases, as well as subjective quality benefits. Based on the outcome of the call, and promising evidence that potential technology exists, MPEG and VCEG may produce a formal Call for Proposals later in the year, with the intent to enter a more rigid standardization phase for the next generation of video compression standards beyond HEVC. A preliminary target date for completion of a new standard on the subject is late 2020.

**MPEG issues Committee Draft of the Media Orchestration (MORE) Standard**

At its 117th meeting, MPEG promoted its specification for “Media Orchestration” to Committee Draft. The specification supports the automated combination of multiple media sources (cameras, microphones) into a coherent multimedia experience. It also supports rendering a multimedia experience on multiple devices simultaneously, again giving a consistent and coherent experience. MPEG expects Media Orchestration to be especially useful in immersive media settings. The specification contains tools for orchestration in time (synchronization) and space.

**Technical Report on HDR/WCG Video Coding**

At the 117th MPEG meeting, the work was completed for producing a technical report on Conversion and Coding Practices for High Dynamic Range (HDR) and Wide Colour Gamut (WCG) video coding (ISO/IEC 23008-14). HDR/WCG video provides users with a major improvement in perceptual realism, including the ability to show details in dark regions while also showing bright areas and specular highlights in the same scene. The purpose of this document is to provide a set of publicly referenceable recommended guidelines for the operation of AVC or HEVC systems adapted for compressing HDR/WCG video for consumer distribution applications. This document includes a description of processing steps for converting linear light, 4:4:4 RGB video signals into non-constant luminance (NCL) Y'CbCr video signals that use the Perceptual Quantizer (PQ) transfer function defined in SMPTE ST 2084 and Rec. ITU-R BT.2100. Although the focus of this document is primarily on 4:2:0 Y'CbCr 10 bit representations, these guidelines may also apply to other representations with higher bit depth or other colour formats, such as 4:4:4 Y'CbCr 12 bit video. Additionally, this document provides some high-level recommendations for compressing these signals using either the AVC or HEVC video coding standards.

**How to contact MPEG, learn more, and find other MPEG facts**

To learn about [MPEG basics](http://mpeg.chiariglione.org/mpeg-basics), discover [how to participate](http://mpeg.chiariglione.org/who-we-are) in the committee, or find out more about the array of technologies developed or currently under development by MPEG, visit MPEG’s home page at <http://mpeg.chiariglione.org/>. There you will find information publicly available from MPEG experts past and present including tutorials, white papers, vision documents, and requirements under consideration for new standards efforts. You can also find useful information in many public documents by using the search window including publicly available output documents of each meeting (note: some may have editing periods and in case of questions please contact Dr. Christian Timmerer).

Examples of tutorials that can be found there include tutorials for: High Efficiency Video Coding, Advanced Audio Coding, Universal Speech and Audio Coding, and DASH to name a few. A rich repository of white papers can also be found and continues to grow. You can find these papers and tutorials for many of [MPEG’s standards](http://mpeg.chiariglione.org/standards) freely available. Press releases from previous MPEG meetings are also available. Journalists that wish to receive MPEG Press Releases by email should contact Dr. Christian Timmerer at christian.timmerer@itec.uni-klu.ac.at or christian.timmerer@bitmovin.com.

**Further Information**

Future MPEG meetings are planned as follows:

No. 118, Hobart, AU, 03 – 07 April, 2017

No. 119, Torino, IT, 17 – 21 July, 2017

No. 120, Macau, CN, 23 – 27 October 2017

No. 121, Gwangju, KR, 22 – 26 January 2018

No. 122, San Diego, US, 16 – 20 April 2018

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