**ISO/IEC JTC 1/SC 29/AG 3  
MPEG Liaison and Communication  
Convenorship: KATS (Korea, Republic of)**

**Document type: Press Release**

**Title: Press Release of 141st MPEG Meeting**

**Status: Approved**

**Date of document: 2023-01-20**

**Source: Convenor**

**Expected action: INFO**

**No. of pages: 5 (including this cover page)**

**Email of convenor: kyuheonkim@khu.ac.kr**

**Committee URL: https://isotc.iso.org/livelink/livelink/open/jtc1sc29ag3**

**INTERNATIONAL ORGANIZATION FOR STANDARDIZATION**

**ORGANISATION INTERNATIONALE DE NORMALISATION**

**ISO/IEC JTC 1/SC 29/AG 3**

**MPEG LIAISON AND COMMUNICATION**

**ISO/IEC JTC 1/SC 29/AG 3 N98**

**Online – January 2023**

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| **Source:** | **Convenor of ISO/IEC JTC 1/SC 29/AG 3** | <https://www.mpeg.org/> |
| **Status:** | **Approved by AG 3** |
| **Subject:** | **Press Release of 141st MPEG Meeting** |
| **Date:** | **20 January 2023** |
| **Serial Number:** | **22250** |

**MPEG reaches the First Milestone for MPEG-4 Audio Conformance (2nd Edition)**

The 141st MPEG meeting was held in Online, 16–20 January 2023

# MPEG reaches the First Milestone for MPEG-4 Audio Conformance (2nd Edition)

At the 141st MPEG meeting, *MPEG Audio Coding* (WG 6) reached the first milestone for the 2nd edition of ISO/IEC 14496-26 (MPEG-4 Part 26, Audio conformance) by promoting the text to Committee Draft (CD) status. This new edition incorporates six amendments and eight corrigenda which span 12 years of standardization activity. The conformance data repository is more than 14 GB of compressed audio streams and associated reference decoded waveforms. The conformance data supports detailed diagnostic assessment of decoder implementations. More than 30 MPEG-4 Audio compression standards are included in the repository, including the very widely deployed Advanced Audio Coding (AAC), and High-Efficiency AAC. This work item is expected to reach the final stage of standardization in April 2024.

# MPEG finalizes the 5th Edition of High Efficiency Video Coding

At the 141st MPEG meeting, the *Joint Video Experts Team* (WG 5) completed development of the 5th edition of ISO/IEC 23008-3, High Efficiency Video Coding (HEVC), promoting it to the Final Draft International Standard (FDIS) stage. This new edition includes the specification of shutter interval Supplemental Enhancement Information (SEI), definitions of new levels for extending the operation ranges of HEVC, and various text improvements. Upon publication, the text of ISO/IEC 23008-3 will be largely aligned with the latest version of the corresponding twin text of HEVC in ITU-T H.265.

# MPEG finalizes the 2nd Edition of Versatile Video Coding Conformance

At the 141st MPEG meeting, the *Joint Video Experts Team* (WG 5) completed development of the 2nd edition of ISO/IEC 23090-15, conformance testing for Versatile Video Coding (VVC), promoting it to the Final Draft International Standard (FDIS) stage. This new edition includes bitstreams to test devices for their compliance with the profiles of VVC version 2 (which features operation range extensions for higher bit depths and high bit rates) as released in 2022, as well as improvements to version 1 testing. The standardization of such tests is beneficial to VVC implementers as it enables them to check the proper functioning of their implementations during product development. It also helps VVC product users to verify conformance claims for such products.

# MPEG reaches the First Milestone for a Technical Report on Film Grain Synthesis Technology

At the 141st MPEG meeting, the *Joint Video Experts Team* (WG 5) reached the first milestone for ISO/IEC 23009-9 entitled “Film grain synthesis technology for video applications” by promoting the text to Committee Draft Technical Report (CDTR) status. This text contains an overview of applications for film grain synthesis, a description of film grain characteristics metadata, analysis and synthesis methods, and will be accompanied by a new software implementation of the film grain characteristics (FGC) supplemental enhancement information (SEI) message for both autoregressive and frequency-domain models. The report provides guidance on the use of film grain synthesis technology in video applications, including using the FGC SEI message defined in AVC, HEVC, and VVC/VSEI standards. Such technology can provide subjective quality benefits for certain video applications and, thus, could effectively achieve improved video compression by removing or reducing the amount of noise that may be present in a video or image signal prior to compression and by resynthesizing and adding back an approximation of the removed noise, given a set of signalled parameters, during decoding. Beyond the historical advent of film grain due to chemical processing as in the case of analog film stock, the possible usage also includes synthetic film grain that is added in post-production to digitally captured high-value content for artistic effect, or to mask imperfections in digital footage, which may otherwise sometimes look too sharp and clear and exhibit contouring artefacts. The term “film grain” can also be used to refer to digital image sensor noise, particularly in low-light and high-speed captures. This document aims to provide a publicly referenceable overview of the end-to-end processing steps for film grain and sensor noise removal, estimation, parameterization, synthesis, and blending for consumer distribution applications. This document includes examples of encoder-side and post-decoding processing steps for grain blending for some of the currently defined technologies.

# MPEG completes 2nd Edition of Visual Volumetric Video-based Coding (V3C) and Video-based Point Cloud Compression (V-PCC)

At the 141st MPEG meeting, *MPEG 3D Graphics & Haptics Coding* (WG 7) completed development of the second edition of ISO/IEC 23090-5 Visual volumetric video-based coding (V3C) and video-based point cloud compression (V-PCC), promoting it to the Final Draft International Standard (FDIS) stage. The V3C standard is an extensible framework for the coding of volumetric video, offering a single bitstream structure with a uniform bridge to systems-level standards, including ISO/IEC 23090-10 Carriage of V3C data and ISO/IEC 23090-14 Scene description. The second edition adds support for ISO/IEC 23090-12 MPEG immersive video (MIV) through the addition of common atlas sub-bitstreams and packed video sub-bitstreams. A future edition of the standard is expected to add support for video-based dynamic mesh coding.

The V3C standard leverages video compression technologies and the video ecosystem in general (i.e., hardware acceleration, transmission services, and infrastructure) while enabling new kinds of applications. The V3C standard contains several profiles that leverage existing video codecs (i.e., Advanced Video Coding (AVC), High Efficiency Video Coding (HEVC), and Versatile Video Coding (VVC)), which can make them suitable to run on existing and emerging platforms. The standard is video-codec agnostic, and readily extensible to using other video specifications such as Essential Video Coding (EVC) and Low Complexity Enhancement Video Coding (LCEVC). V-PCC addresses lossless and lossy coding of 3D point clouds with associated attributes such as colours and reflectance. Point clouds are typically represented by extremely large amounts of data, which is a significant barrier for mass-market applications. However, the relative ease to capture and render spatial information as point clouds as compared to other volumetric video representations makes point clouds increasingly popular to present immersive volumetric data. With the current V-PCC encoder implementation providing a compression ratio in the range of 100:1 to 300:1, a dynamic point cloud of one million points could be encoded at 8 Mbit/s with good perceptual quality. Real-time decoding and rendering of V-PCC bitstreams has also been demonstrated on current mobile hardware. MIV enables the compression of multi-view, multi-view plus depth and multi-plane image source data. MIV was developed to support compression of immersive video content, in which a real or virtual 3D scene is captured by multiple real or virtual cameras. The standard enables the storage and distribution of immersive video content over existing and future networks, for playback with 6 degrees of freedom (6DoF) of view position and orientation. Views may use equirectangular, perspective, or orthographic projection. By pruning and packing views, MIV can achieve bit rates around 15 to 30 Mbit/s using HEVC and a pixel rate equivalent to HEVC Level 5.2. Besides the MIV Main profile for MVD, there is the MIV Geometry Absent profile, which is suitable for use with cloud-based and decoder-side depth estimation, and the MIV Extended profile, which enables coding of multi-plane images (MPI).

# MPEG reaches the First Milestone for two MPEG-I Scene Description Standards

At the 141st MPEG meeting, *MPEG Systems* (WG 3) promoted two MPEG-I scene description standards to the first milestone of the standard development process:

* ISO/IEC 23090-14 Amendment 2, support for haptics, augmented reality, avatars, interactivity, MPEG-I audio, and lighting, reached the Committee Draft Amendment (CDAM) stage. The second amendment adds various technologies to efficiently support important immersive media applications such as augmented reality and haptics by introducing technologies such as the nodes describing real-world reference for avatars, the nodes adding haptic feedback to the materials, the basic signaling for avatars based on the MPEG reference humanoid avatar model, etc. It also adds a generic interactivity framework and video-based lighting extensions.
* ISO/IEC 23090-24, conformance and reference software for scene description, was promoted to Committee Draft (CD) stage.

Both ISO/IEC 23090-14 Amendment 2 and ISO/IEC 23090-24 are expected to be completed (i.e., to reach the status of Final Draft Amendment (FDAM) and Final Draft International Standard (FDIS), respectively) by the beginning of 2024.

# MPEG adds support for Green Metadata to Essential Video Coding (EVC)

At its 141st MPEG meeting, *MPEG Systems* (WG 3) promoted ISO/IEC 23001-11 Amendment 2 – energy-efficient media consumption (green metadata) for Essential Video Coding (EVC, ISO/IEC 23094-1) – to Committee Draft Amendment (CDAM) stage, marking the first step in the standard development process. The standard enhances the ability to signal bitstream complexity information for both the baseline and main profiles of EVC by counting the number of coding units with complexity-intensive operations. The amendment is expected to be completed – i.e., to reach the status of Final Draft Amendment (FDAM) – by the beginning of 2024.

# How to contact MPEG and further information

Those who wish to receive MPEG Press Releases by email should contact Dr. Christian Timmerer at [christian.timmerer@aau.at](mailto:christian.timmerer@aau.at) or subscribe at <https://lists.aau.at/mailman/listinfo/mpeg-pr>. Further information can be found on the MPEG Website: <http://www.mpeg.org/>.

Future MPEG meetings are planned as follows:

No. 142, Antalya, TR, 24 – 28 April 2023

No. 143, Geneva, CH, 17 – 21 July 2023

No. 144, TBD, 16 – 20 October 2023

No. 145, Online, 22 – 26 January 2024

For further information about MPEG, please contact:

Prof. Dr.-Ing. Jörn Ostermann (Convenor of MPEG Technical Coordination, Germany)

Leibniz Universität Hannover

Appelstr. 9A

30167 Hannover, Germany

Tel: +49 511 762 5316

Fax: ++49 511 762 5333

Email: [ostermann@tnt.uni-hannover.de](mailto:ostermann@tnt.uni-hannover.de)

or

Prof. Dr. Kyuheon Kim (Convenor of MPEG Liaison and Communication, Korea)

Department of Electronic Engineering

Kyung Hee University

Seoul, South Korea

Tel: +82 31 201 3810

Email: [kyuheonkim@khu.ac.kr](mailto:kyuheonkim@khu.ac.kr)

or

Univ.-Prof. DI Dr. Christian Timmerer (MPEG Press Officer, Austria)

Alpen-Adria-Universität Klagenfurt | Bitmovin Inc.

9020 Klagenfurt am Wörthersee, Austria, Europe

Tel: +43 463 2700 3621

Email: [christian.timmerer@aau.at](mailto:christian.timmerer@aau.at)