

**INTERNATIONAL ORGANISATION FOR STANDARDISATION  
ORGANISATION INTERNATIONALE DE NORMALISATION  
ISO/IEC JTC 1/SC 29/WG 4  
MPEG VIDEO CODING**

**ISO/IEC JTC 1/SC 29/WG 4 m63515**  
**April 2023, Antalya**

**Title:** BoG on MPEG immersive video (MIV)  
**Source:** Bart Kroon (Philips), Dawid Mieloch (PUT)

## **1 Abstract**

This document is the report of the BoG's on MPEG immersive video (MIV).

The related AHG report is m62472.

## **2 Meeting notes**

### **2.1 Viewing of pose trace videos**

Verification test:

- Watch the pose trace videos after the joint meeting with AG 5
- Jörn also wants to see the verification test videos -> he was not in the session.

New proposals:

- The pose trace videos are available on the FTP link; please watch them before MIV BoG #2 -> only a few comments were received.
- Watch the pose trace videos F2F on Thursday morning -> only a few people were in the room.

### **2.2 Start Edition 2?**

- Study use cases and requirements
  - Coding of natural scenes captured with moving cameras and/or adjustable focus -> interesting, and it is possible to provide content that matches with this use case
  - Geometry representation using colour: useful and doable to do an experiment; there are some volunteers
  - Unaligned texture and geometry: useful and we also have in principle content and tools available that can be tested
  - Use cases: all are either supported or can be supported; and there is sufficient will to work on them

- Requirements: handling of heterogeneous object-specific parameters -> some current interest that may result in an input document
- The edition-2 of the specification shall enable composition of multiple MIV bitstreams into a single MIV bitstream -> how to satisfy? make a TmivMerger tool? t.b.d.
- The edition-2 of the specification shall maintain/enhance support for independent object-level encoding and decoding in the bitstream. -> needs some more thoughts, EE7 is clearly in this direction
- The edition-2 of the specification shall improve the quality of output viewport renders with a significant increase in MOS scores -> should be doable given the current MOS scores.
- The edition-2 of the specification shall enable heterogeneous 6DoF contents (at least multi-view video and point cloud) in the same video sub-bitstream of a V3C bitstream. -> needs more discussion with WG 07 but we expect that technology can be added to MIV and V3C to support this requirement
- Mobile device profile? --> need an WG02 input document, and timing is not urgent
- Let's define new EE's based on the use cases

**Start MIV edition-2 with a 36-month schedule.**

### 2.3 DoC

will be handled by [@bartkroon](#) and an output document will be presented in a Video plenary for review.

### 2.4 Output documents

**The BoG recommends issuing the following output documents:**

Title	Editors	Public	Due Date
Verification test report of MPEG immersive video	<b><u>Dawid</u></b>	<b>Yes</b>	2023-06-02
Request for ISO/IEC 23090-12 MPEG immersive video 2nd edition	<b><u>Bart</u></b>	No	2023-04-28
Disposition of comments received on ISO/IEC DIS 23090-23 conformance and reference software for MPEG immersive video	<b><u>Bart</u></b>	No	2023-04-28
Text of ISO/IEC FDIS 23090-23 conformance and reference software for MPEG immersive video	<b><u>Bart</u></b> , Franck	No	2023-05-12
Test Model 16 for MPEG immersive video	<b><u>Adrian</u></b> , Gwangsoon	<b>Yes</b>	2023-05-26
WD1 of ISO/IEC 23090-12 MPEG Immersive video 2nd edition		No	2023-05-26
Description of MPEG immersive video 2nd edition Core Experiments 1	<b><u>Yuxiao</u></b>	No	2023-05-26
Description of MPEG immersive video 2nd edition Core Experiments 2	<b><u>Kwan-Jung</u></b>	No	2023-05-26
Description of MPEG immersive video 2nd edition Core Experiments 3	<b><u>Dawid</u></b>	No	2023-05-26
Common test conditions for MPEG immersive video	<b><u>Adrian</u></b> , Bart, Joel	<b>Yes</b>	2023-06-09
Report of MPEG immersive video CTC anchor generation	<b><u>Adrian</u></b> , Bart, Jun Young	No	2023-06-09

### 2.5 **m63503 Atlas flickering removal**

- The proposal shows an improvement by increasing temporal stability

- The proposal undoes part of a previous proposal of the same proponent (m51603)
- The complexity of the TMIV encoder will reduce when this proposal would be integrated
- There is support for this proposal

It was viewed and this is a large subjective difference

The BoG recommends:

- Integrate into the test model
- Generate a new anchor because of the significant change

## **2.6 m62642 Liaison statement from ITU-T SG MV to SC 29/WGs on requesting collaboration on metaverse standardization work**

The BoG recommends:

- That WG 02 drafts a single response:
  - Have a liaison on SC29 level
  - Include relevant specifications including MIV edition-1, V3C editon-2
  - Include relevant use cases and requirements for upcoming standards including MIV 2 use cases and requirements

[@yulu](#) will communicate with Igor (WG04 -> WG02 convenor)

## **2.7 m62463 Liaison statement from ITU-T FG MV to SC 29/WG 2 on audio/video media coding specifications for metaverse services and applications**

The BoG recommends:

- That WG 02 responds with:
  - Description of V3C and MIV
  - Specifications MIV edition-1, V3C editon-2
  - MIV 2 use cases and requirements

[@bartkroon](#) will communicate with the Market needs AHG on this liaison statement.

- ⇒ Wednesday 14:00 (UTC+3) Market needs BoG #1
- ⇒ The MIV BoG #2 start is delayed to 14:20

## **2.8 m63397 Chroma dynamic range modification**

- v2 adds more experimental results showing chroma only
- the concern about mobile devices could be addressed later by defining MIV 2 profiles for mobile and non-mobile usage
- there is support for this proposal
- The BoG recommends integrating into TMIV 16, pending viewing of the pose traces.

- In the blocking artifacts that occur at RP4 the chroma element is removed: the artifacts become grayscale
- This is a clear improvement, although the quality of RP4 is still not acceptable
- Further TMIV encoder technology may help to avoid this artifact in general. It is caused by having many block-shaped patches.
- It was also considered to start a TuC but no further improvement in this area is expected and this idea was dismissed.
- The syntax was reviewed but has problems and we cannot adopt the contribution into WD1:
  - it was suggested to check the possibility of using  $u(v)$  instead of  $u(16)$  for syntax within 'chroma\_scaling' structure,
  - adding of `casme_chroma_scaling_present_flag` to the `casps` structure breaks the compatibility with MIV1, it was suggested to find a way to resolve this problem:
    - by adding new extension, i.e., the `miv2_extension`, or
    - by finding reserved bits and use them for signalling MIV2-related syntax,
- the proponent is encouraged to prepare an early contribution regarding this issue before next AhG call.

The BoG recommends to:

- Integrate into the test model (with approximate HLS) and enable in the CTC
- Verify when issuing the CD if the syntax is really needed
- Re-tune the CTC QP's meaning that we have to issue a new CTC document (just for that) and an anchor generation report
- Provide an updated proposal with improved HLS

## **2.9 m63213 [MIV] EE8 report: Encoder-side Effective Information (ESEI) Based optimization of multi-view atlas generation 10 of 10 checklist items completed**

Big improvement in Chess and Guitarist, and some improvement is also seen in Basketball.

Integrate into TMIV 16 and enable in the CTC.

## **2.10 m63112 Proposal of IVDE 8.0**

- When viewed by a small group, we noticed artifacts in different places, but overall a similar amount
- Due to the large reduction in computational complexity, it is good to integrate the proposal into IVDE and enable in the CTC
- The new functionality can be configured and entirely turned off for non-CTC experiments

The BoG recommends to integrate into IVDE.

## 2.11 m62701 Adaptive patch-wise depth range linear scaling

- The proposal requires new syntax for which more evidence is needed
- We have defined CE experiments in this area

## 2.12 m63015 New depth maps for Breakfast sequence

We have watched the pose trace videos and confirm that there is a clear improvement.

## 2.13 New experiments

### 2.13.1 Existing experiments:

- For bullet time more input is needed such as test conditions.
- For heterogenous coding more discussion with WG 7 is needed.

### 2.13.2 CE1 Object-based coding

Continuation of EE7.

[@Kwan-Jung](#) will arrange with participants and create a description

- CE 1.1 Foreground and background separation and coding (Hanyang Univ., ETRI)
- CE 1.2 Spatio-temporal merge of backgrounds (Hanyang Univ., ETRI)

### 2.13.3 CE2 Atlas generation

Continuation of EE8. [@yuxiaobai](#) will coordinate

- CE 2.1 Information-based pruning and packing
- CE 2.2 Per-patch geometry offset with MIV 1 (Philips, PUT)
- CE 2.3 Per-patch geometry offset and scaling with MIV 1 (Philips, PUT)
- CE 2.4 Per-patch geometry offset and scaling improvements (KETI)

### 2.13.4 CE3 Depth cameras

New CE. [@dmieloch](#) will coordinate.

Participant list: PUT, UPM, Philips

- CE 3.1 Coding of depth camera content
  - A: Prepare depth camera content for MIV experiments (UPM, PUT)
  - B: Extend IVDE to allow input of depth maps from depth cameras (PUT)
  - Coding of A and B with MIV Main anchor (Philips)
  - Coding of A and B with MIV Extended DSDE (PUT)