

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