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

1   Introduction

This is the report of the AHG on MPEG immersive video. Section 2 is copied from the README. Section 3 provides a summary of the AHG recommendations, and Section 4 was automatically generated from the real-time notes on GitLab using the video.py script of the AutomationTools repository.

2   AHG on MPEG immersive video

- Mandates:
    1. Prepare WD2 of ISO/IEC 23090-12 MPEG immersive video 2nd edition
    2. Define common test conditions for MPEG immersive video 2nd edition
    3. Carry out MPEG immersive video 2nd edition core experiments
    4. Study new technologies for immersive video coding
    5. Promote MPEG immersive video outside of MPEG
- Chairs:
    1. @bartkroon (chair)
    2. @dmieloch (vice-chair)
- Reflector: mpeg-i-visual@lists.aau.at
- Subscribe: https://lists.aau.at/mailman/listinfo/mpeg-i-visual
- Offline discussion: MPEG/Video/MIV/Contributions
- Meetings (in MPEG calendar, Video tab):
    1. Online: August 29, September 12, September 26, October 10
    2. Hannover: Sunday October 15
    3. All calls are **11:30 – 13:00 UTC** unless specified otherwise
        - Zoom: Join from PC, Mac, Linux, iOS or Android, password: MPEGIVisua

This is an AHG of ISO/IEC JTC 1/SC 29/WG 04 *MPEG video coding*, and the Convenor is the convenor of WG 04.

Active AHG guidelines are: AG 02 N 0046

2.1 Contributing

GitLab registration process:

1. Register an account at https://mpeg.expert/software – pending approval
2. Inform the Convenor to request the account approval and join the MIV group as Reporter or Developer

To register an input document within the mandates of this AHG:

- Register for the upcoming WG 04 meeting as a delegate of your national body
- Register and upload to the MPEG document management sytem (MDMS)
  - Prefix the title with "[MIV]"
  - Set standard to MPEG-I.
  - Set working group to the best fitting WG/AG → when not WG 04, the AHG chairs may consult with the Convenor if discussion is appropriate.

We welcome non-members to get involved:

- Please request permission of the Convenor to participate.
- The information at https://mpeg-miv.org should get you up to speed.

2.2 Related repositories

- MPEG-internal repositories: MIV-related repositories, 23090-5
- Public mirrors: TMIV, IV-PSNR, IVDE, RVS

2.3 Way of working

This AHG has a way of working as described in the following subsections.

Design principles:

- The AHG/BoG's use only GitLab (this repository)
- Automation tools are used to:
  - generate GitLab issues for input documents
  - generate AHG and BoG reports
- Issue description templates are used for output document and core experiment issues

2.3.1 GitLab labels

The definition of a label can be read by hovering over the label. There are three types of labels:

Label type	Responsible	Purpose
Signal progress	Depends on the label	Communication between proponents and chairs, track progress in meetings
Signal recommendations	AHG or BoG chair	Record recommendations for presentation in the Video plenary
Signal decisions	BoG chair	Communication between the BoG chairs and the convenor

To signal decisions:

- The AHG/BoG chairs set ProbableAgreement when consensus has been reached (and there is at least one recommendation)
- The recommendation is presented in the WG 04 plenary
- When accepted, the label ProbableAgreement is removed and Accepted is added
- The other MPEG-wide "Chair use only" labels are currently not used by the WG 04 convenor

The entire activity can be viewed as a finite state machine. The real-time status is visible on the board.

2.3.2 Meeting notes

The AHG or BoG chair captures notes as comments on GitLab issues. To be able to automatically generate reports, the second comment line is empty and the first line is one of:

- `# Notes of the AHG`
- `# Notes of the BoG`
- `# Notes of the plenary`
- `# Notes of the joint meeting`

No other comments may start with a header (#).

3 AHG recommendations

Adopt into ISO/IEC 23090-12 MIV 2nd ed.:

- m64710 [MIV] ASPS MIV edition 2 extension
- m64720 [MIV] Signaling of the chroma scaling bit depth
- m65392 [MIV] Report of CE1 results → background view flags

Request WG 07 to adopt into ISO/IEC 23090-5 V3C 3rd ed.:

- m64714 [V3C] ASPS MIV edition 2 extension

Start a permanent document in preparation for a second edition of ISO/IEC 23090-23 MIV C&RS, but do not yet request the project.

Integrate into TMIV:

- m64709 [MIV] Implementation of MIV DSDE sub-profile in TMIV

Joint meeting WG 04 + WG 07 on V3C:

- m64714 [V3C] ASPS MIV edition 2 extension
- m65241 [V3C] Clarification on inferred flags
- m65630 [V3C][V-PCC][MIV][V-DMC] Organization of V3C family of standards

Joint meeting WG 04 + WG 05 on MPI:

- m65002 [MIV] On MIV Extended Restricted Geometry Profile and MPI coding
- m65401 [MIV] On MPI information SEI

Issue an updated CTC:

- m64708 [MIV] New depth maps for selected CTC sequences -> J01 (Fencing)
- m64727 [MIV] Optimized IV-PSNR software with invalid pixel detection
  - Release IV-PSNR 5
  - Output document with updated manual
- Update QP's if needed

View in an informal viewing session:

- m64807 [MIV] Adaptive Patch Packing Block Size Adjustment
- m65401 [MIV] On MPI information SEI
- m65411 [MIV] CE2.1 Effective-Information-Based cluster merging and better cluster splitting

Core experiments:

- CE 1 on foreground-background separation: **continue**
- CE 2.1 on effective information: **continue**
- CE 2.2—2.4 on geometry quantization: **on hold** for a meeting, work on impl.
- CE 3 on depth cameras: **on hold** for a meeting, work on implementations
- CE 4 on coloured depth: **start** based on m65118, request more contributions

4 Meeting notes

4.1 WD2, capture device information (AHG call)

There was a discussion about the depth confidence model. Standard deviation of normalized disparity may match with time-of-flight cameras but may be less natural for active stereo class devices.

Search for good references on capture devices (distortion parameters, device classes).

Have a discussion on MIV 2 profiles in a BoG.

Discuss what could be written in the test model document about capture device information.

At least one bitstream needs to provided for conformance reasons.

Do we need to request a new edition of part 23? No, let's wait until it is needed because otherwise we need to specify a timeline. We can have a permanent document.

4.2 CTC and anchor (AHG call)

Adrian has generated the A65 anchor. Crosscheck may start.

Bart has started the A65 anchor this morning.

From the curves of Adrian it appears that QP tuning is not needed => no QP tuning.

CTC document can be prepared and released.

4.3 MPEG/Video/MIV/Contributions

Offline discussion and document tracking for the AHG and BoG's on MPEG immersive video

4.3.1 m64658 AhG on MPEG immersive video

Authors	Bart Kroon (Chair) Dawid Mieloch (Vice-chair)
Abstract	
Gitlab	MPEG/Video/MIV/Contributions#774

Disposition	

4.3.1.1 Notes of the AHG call (2023-10-15)

* Max. 60 min. of viewing -> arrange with Mathias
* WG 4 + WG 7 on V3C specification text
* WG 4 + WG 5 on MPI
* 3x MIV BoG of 1 h
  * 1st: discuss how to simplify MIV
  * 2nd: discussion on capture device information
  * 3rd: review CE descriptions

Labels: DocAvailable, MIV report

4.3.2   m64707 [MIV] Summary of MPEG immersive video 2nd edition Core Experiments 3

Authors	Dawid Mieloch
Abstract	
Gitlab	MPEG/Video/MIV/Contributions#779
Disposition	

4.3.2.1 Notes of the AHG call (2023-10-15)

* Camera calibration of source data was improved
* IVDE was run directly and with Kinect depth maps as input
* Stability of depth maps was too low for rendering

Progress this meeting:

* Better calibration input from UPM
* IVDE was improved to inject Kinect depth maps

Put CE 3 on hold for one meeting. Maybe CDI-based experiments could be added.

Labels: CE, ProbableAgreement

4.3.3 [m64708](#) [MIV] New depth maps for selected CTC sequences

Authors	Dominika Klóska Dawid Mieloch Jakub Kit Adrian Śliwiński Gwangsoon Lee
Abstract	This document presents a proposal of enhancing depth maps by estimating them separately for the background and moving objects and then combining them into final temporally-stable depth map. Proposed approach is dedicated to be used with natural sequences and was used to enhance the quality of depth maps in a set of CTC sequences. The recommendation is to include proposed depth maps in the new CTC.
Gitlab	[MPEG/Video/MIV/Contributions#800](#)
Disposition	

4.3.3.1 Notes of the AHG call (2023-10-15)

Summary

New method for depth estimation by splitting background and foreground. The background is calculated by computing the median frame over time. This works best if a calibration sequence is used because there are no foreground objects in such a video. When applying the method on the sequence itself then some regions have to be removed and inpainted. The regions are removed by the Detectrion2 library. Foreground depth is estimated using IVDE 8, with background mask.

L01 (Fencing), objectively -5%, subjectively probably bigger

L03 (MartialArts): subjective degradation -> outmost views have bad depth maps, when removing those the quality is improved (no BD-rate calc.), less artifacts, smaller viewing space.

The proponent recommends to replace the L01 depth maps.

Discussion

It is suggested to define an experiment to try this on other sequences.

AHG recommendations

The AHG recommends to replace L01 depth maps.

Labels: CTC, DocAvailable, ProbableAgreement

4.3.4 [m64709](#) [MIV] Implementation of MIV DSDE sub-profile in TMIV

Authors	Błażej Szydełko Adrian Dziembowski Gwangsoon Lee Jun Young Jeong
Abstract	In this contribution we propose an implementation of basic features of the MIV Extended DSDE sub-profile, i.e., input depth map assistance (IDMA). The proposal does not add any syntax, but adds the possibility of transmitting a partial geometry information, i.e., depth maps for a subset of basic views (called "essential views").
Gitlab	[MPEG/Video/MIV/Contributions#776](#)
Disposition	

4.3.4.1 Notes of the AHG call (2023-10-15)

Implementation of MIV Extended DSDE sub-profile using input depth map assistance (IDMA).

The proposal adds some configuration parameters to TMIV (and an "IDMA" configuration):

 * decoderSideDepthEstimationFlag (true)
 * maxGeometryAtlases (defaults to "all")
 * outputEssentialViews (true)
 * maxEssentialViewsCount (4)

It determines "essential views" for which geometry is transmitted. This is a subset of the basic views.

No changes to A65 and G65.

Labels: DocAvailable, Late, ProbableAgreement, TMIV

4.3.5 [m64710](#) [MIV] ASPS MIV edition 2 extension

Authors	Adrian Dziembowski
Abstract	This proposal proposes syntax and semantics for ISO/IEC 23090-12 MPEG immersive video 2nd edition to allow for adding new functionalities which require per atlas or per patch signalling. This proposal has a related WG 7 proposal (m64714).

Gitlab	MPEG/Video/MIV/Contributions#777
Disposition	

4.3.5.1 Notes of the AHG call (2023-09-12)

Signalling asme_patch_margin_enabled_flag requires an ASPS MIV 2 extension similarly to how VPS and CASPS extensions were requested last meeting.

ASPS MIV 2 extension is complementary to ASPS MIV extension, so both extensions can be signalled.

Comments on the syntax:

Q: 7 reserved bits?
A: No byte alignment, so no use.

Q: Order of semantics
A: Use same order as for syntax

Q: Which syntax structure?
A: Clarify which syntax structure is meant.

Q: Suggest to use asme2_ prefix for clarity
A: Possible but needs to be the same for the other extensions. No need to change.

The proponent recommends adoption conditional on the V3C proposal.

Labels: DocAvailable, MIV, ProbableAgreement

4.3.6 m64714 [V3C] ASPS MIV edition 2 extension

Authors	Adrian Dziembowski
Abstract	This proposal requests the ASPS extension for ISO/IEC 23090-12 MPEG immersive video 2nd edition to be added to the 3rd edition of ISO/IEC 23090-5 V3C + V-PCC. This proposal has a related WG 4 proposal (m64710).
Gitlab	MPEG/Video/MIV/Contributions#778
Disposition	

4.3.6.1 Notes of the AHG call (2023-09-12)

* Relates to #777
* Adds the ASPS MIV 2 extension similarly to how other extensions have been added before

An error was spotted: remove "Common" after 8.3.2.10

@bartkroon suggested to @adziembowski to have an editors draft and implement in the TMIV main branch.

Labels: DocAvailable, Joint meeting, ProbableAgreement, V3C

4.3.7 [m64716](#) [V-DMC][V3C][Editorial] Alignment of V3C and V-DMC working drafts and improvements to V-DMC working draft

Authors	Lukasz Kondrad (Nokia) Danillo Bracco Graziosi (Sony) Ali Tabatabai (Sony) Jungsun Kim (Apple) Oliver Mocquard (InterDigital) Vladyslav Zakharchencko (Oppo)]
Abstract	The contribution provides editorial changes to working drafts of V3C and V-DMC to ensure alignment between the documents. Additionally, number of editorial changes to V-DMC is provide to improve the quality of the WD document.
Gitlab	[MPEG/Video/MIV/Contributions#804](#)
Disposition	

There are no minutes.

Labels: DocAvailable

4.3.8 [m64720](#) [MIV] Signaling of the chroma scaling bit depth

Authors	Adrian Dziembowski Bart Kroon
Abstract	This proposal proposes to move the chroma scaling bit depth flag from MIV view parameters list to the CASPS MIV 2 extension. Such a change will remove the parsing dependency between IRAP and non-IRAP CAFs in the case of chroma scaling updating.
Gitlab	[MPEG/Video/MIV/Contributions#782](#)

Disposition	

4.3.8.1 Notes of the AHG call (2023-09-13)

Q: The removal of mvp_chroma_scaling_bit_depth_minus1, keep those 5 bits?
A: No, because that syntax element was added in the 2nd edition so can be taken out.

Labels: DocAvailable, MIV, ProbableAgreement

4.3.9 m64727 [MIV] Optimized IV-PSNR software with invalid pixel detection

Authors	Jakub Stankowski Adrian Dziembowski
Abstract	The document presents an improved version of IVPSNR software. The output of the new version is the same as for IVPSNR v4.0, so they can be used interchangeably. Recommendations: * create IVPSNR 5.0 based on this proposal, * issue an output document for the IV-PSNR 5.0 manual.
Gitlab	MPEG/Video/MIV/Contributions#783
Disposition	

4.3.9.1 Notes of the AHG call (2023-10-15)

* IV-PSNR was optimized -> no functional difference
* Additional functionality
  * Option how to handle invalid pixels (stop, skip, clamp)
  * Option how to check names (warning or error)

The proponent recommends to issue IV-PSNR + public output document.

Labels: CTC, DocAvailable, ProbableAgreement

4.3.10 m64806 [MIV] CE2.4: Adaptive patch-wise depth range linear scaling

Authors	Sung-Gyun Lim Hyun-Ho Kim Yong-Hwan Kim
Abstract	
Gitlab	MPEG/Video/MIV/Contributions#784
Disposition	

4.3.10.1　Notes of the AHG call (2023-10-15)

Implementation of CE 2.4 was difficult and not ready in time. Same for CE 2.2 and CE 2.3.

The AHG recommends to have a discussion on if TMIV 18 can be simplified by removing as much code as possible, to make it easier to perform new experiments.

Let's put CE 2 on hold for one meeting cycle to prepare TMIV 18.

Labels: CE, ProbableAgreement

4.3.11 m64807 [MIV] Adaptive Patch Packing Block Size Adjustment

Authors	Hyun-Ho Kim Sung-Gyun Lim Yura Kim Yong-Hwan Kim
Abstract	In MIV_ed2, patch packing block size (PPBS, 'blockSizeDepthQualityDependent' value in json) has become four times larger than the previous CTC. This can cause patch loss, and also cause problems in creating and restoring atlases. Additionally, due to this patch loss, whenever a new packing method is applied, it is likely that previously missing patches will be packed into the atlas or previously packed patches will be lost. It is somewhat questionable whether these results can be considered appropriate experimental results. On the positive side, the large PPBS works as a guard-band for the valid area within the patch. However, as flickering removal [1] was proposed at the 142nd meeting (Antalya) and applied to TMIV, the huge guard-band no longer had much meaning. That is because most of the valid region will not exist around the edges of the patch in most frames. In this document, we first present the results of an experiment in which PPBS was reduced by 1/4 to make it the same as the previous CTC parameter. Secondly, based on the above experimental results, we propose a method that can adaptively change the PPBS depending on the amount of patch-loss for each sequence or group of frames (GOF).
Gitlab	MPEG/Video/MIV/Contributions#785
Disposition	

4.3.11.1 Notes of the AHG call (2023-10-15)

Three contributions:

* Change patch packing block size (PPBS) back to 1/4 of in current CTC
* Refine the calculation of amount of unused pixels (by ignoring small clusters?)
* Adaptive patch packing block size

Significant objective gain (BD-PSNR 0.7 dB)

* For sequences with patch loss bitrate and PSNR goes up. (More information.)
* For sequences without patch loss, bitrate and PSNR goes down. (Patches are closer together.)

Adaptive PPBS:

* Three methods of applying PPBS adaptation
  * Method 1: same for entire sequence, reducing patch loss for B02, B03, J02 and L02
  * Method 2: each intra period can have different PPBS and atlas size
  * Method 3: like method 2 but with redundancy removal OFF
* If patch loss is more than 5% PPBS is halved
* Repeated at most two more times, so PPBS can be 100%, 1/2, 1/4 or 1/8

With Method 2 error in L02 at frame 64 when PPBS is 32 --> OPEN AN ISSUE

Objective gains for method 1 and 2, not 3.

The proponent suggests to have a configuration for minimum and maximum PPBS and the packer can aim to minimize patch loss.

For this final experiment, PPBS max is [64, 64] and min is [8, 8]

The proponent recommends to integrate method 2: adaptive PPBS in every GOF + minimum patch packing block size.

It was crosschecked.

Recommendations

The AHG recommends to have a viewing session and view at least this contribution.

Labels: DocAvailable, View

4.3.12 m64816 [MIV] Performance of NNPF on Decoded Views

Authors	Jin Young Lee

Abstract	
Gitlab	MPEG/Video/MIV/Contributions#786
Disposition	

4.3.12.1 Notes of the AHG call (2023-10-10)

VSEI message including a neural network post-filer (NNPF) activation SEI message was discussed in JVET.

The SwinIR (Image Resotration Using Swin Transformer) was used with training on BVI-DVC dataset.

An experiment was performed on part of the CTC with TMIV 14.

The network was applied to the colour images only.

Labels: DocAvailable, Presented

4.3.13 m64923 [MIV] Support for linear normalized depth quantization

Authors	Lauri Ilola Lukasz Kondrad Patrice Rondao Alface
Abstract	The contribution proposes to enable uniform linear normalized depth quantization support for ISO/IEC 23090-12 MPEG immersive video 2nd edition in addition to the existing depth quantization modes.
Gitlab	MPEG/Video/MIV/Contributions#787
Disposition	

There are no minutes.

Labels: BoG, DocAvailable

4.3.14 m64997 [MIV] Support for multiple lens distortion models in MIV v2

Authors	Gauthier Lafruit Mehrdad Teratani Eduardo Juarez

Abstract	WD2 of MIV v2 defines in its section "distortion parameters semantics" a couple of successively refined distortion models, all based on OpenCV's unique distortion model. We propose to go beyond the OpenCV distortion model and allow a variable number of parameters to be included in each model, instead.
Gitlab	MPEG/Video/MIV/Contributions#788
Disposition	

4.3.14.1 Notes of the AHG call (2023-10-15)

Current working draft has OpenCV distortion models.

For wide angles there are other models that work better according to literature.

It is proposed to have a variable number of coefficients per distortion model, and also non-OpenCV models such as the division undistortion model that perform well.

Maybe it is possible to have a general model with a variable number of coefficients above and below the division operator.

The contribution provides suitable references.

Labels: BoG, DocAvailable, NeedsRevision

4.3.15 m64998 AHG9: On the Proposed Multiplane Image Information SEI Message

Authors	T. Lu P. Yin S. Oh S. McCarthy W. Husak G. J. Sullivan (Dolby)
Abstract	
Gitlab	MPEG/Video/MIV/Contributions#807
Disposition	

There are no minutes.

Labels: DocAvailable

4.3.16 m65002 [MIV] On MIV Extended Restricted Geometry Profile and MPI

coding

Authors	T. Lu S. Oh P. Yin S. McCarthy W. Husak G. J. Sullivan (Dolby)
Abstract	
Gitlab	MPEG/Video/MIV/Contributions#790
Disposition	

4.3.16.1 Notes of the AHG call (2023-10-15)

Summary

Analysis of the capabilities of V3C, MIV and TMIV for frame-packed or temporally interleaved MPI.

A problem is reported: Attribute count is mandatory to be two but not present when video is packed.

Based on this the proponent assumes that there are three decoder instances:

* Case 1 (AVD): 2, correct
* Case 2 (PVD): 3, incorrect
* Case 3 (temporally interleaved): not supported

TMIV MpiEncoder does not support PVD case. Setting the `framePacking` flag has no effect.

The TMIV Multiplexer fails to multiplex output of VVC sub-picture merge tool.

Discussion

The problem with the specification (Table 1 of Annex A) is that vps_attribute_video_present_flag has to be 0 when vps_packed_video_present_flag, but this restriction is not made. The MIV editors will study this and fix the problem or at least clarify.

The proponent suggests to have different profiles for packed video and non-packed video.

There was a discussion on profiles. The suggestion is to have MIV 2 profiles that are lower complexity and better tailored to market needs.

Temporally interleaving: not supported by V3C. Favorable to avoid needing to go higher up in level for video decoders.

It may be considered to merge the TmivMpiEncoder code into the TmivEncoder to support additional functionality like VVC and frame packing.

Labels: DocAvailable, Joint meeting

4.3.17 m65005 [MIV] Proposal of a new multi-ToF natural content with a movable camera: BreakTime

Authors	Jaime Sancho Manuel Villa Alejandro Martinez de Ternero Gonzalo Rosa Alberto Martin Guillermo Vazquez Pallab Sutradhar Miguel Chavarrias Gauthier Lafruit Mehrdad Teratani Eduardo Juarez Cesar Sanz
Abstract	This document proposes a new natural dynamic test sequence with a movable camera, BreakTime, as a follow-up of the work performed in m63212 (CoffeeTime sequence) and m64277 (ConferenceTalk). The main difference is the use of a camera moved during the recording, which is tracked using an external tracking system. It has been captured by 7 multi-ToF (Time of Flight) RGBD static cameras array placed in a line with different heights plus the movable camera. The movable camera is placed over an xy and pan-tilt actuator that can change its position in a plane parallel to the ground and change its orientation in two axes. The cameras employed to capture the sequence are the Microsoft Kinect Azure DK. They are RGBD cameras that provide aligned full HD RGB images and Depth Maps. It is proposed to be included into the MIV CTC after testing its quality by compressing it using the newest TMIV.
Gitlab	MPEG/Video/MIV/Contributions#791
Disposition	

4.3.17.1 Notes of the AHG call (2023-10-15)

A new sequence with ToF cameras and one camera is moving.

* The camera can move in XY and PanTilt directions.
* Tracking of cameras was added to the set-up: opti-track.
* A real-time renderer was used to check the acquisition.
* Checker boards were used both for intrinsics and extrinsics.
* A calibration from opti-track to optical sensor extrinsics is made.

The sequence has a JSON with view parameters for each frame.

The sequence is suitable for experiments:

* with dynamic view parameters
* with ground truth pose trace

Labels: DocAvailable, Presented

4.3.18 m65109 [MIV] Experimental results of applying non-Lambertian region handling to TMIV

Authors	Hong-Chang Shin Gwangsoon Lee Won-Sik Jeong Junyoung Yun
Abstract	In the last meeting, a method of representing non-Lambertian regions was presented. The visual comparison results with the anchor were also demonstrated. This document presents a method of applying non-Lambertian region handling to the current TMIV and shows preliminary results.
Gitlab	MPEG/Video/MIV/Contributions#792
Disposition	

4.3.18.1 Notes of the AHG call (2023-10-15)

Manually created masks for non-Lambertian regions.

Based on the mask either the current (VWS) method is used or the proposed method.

The current result is based on a manually created mask for a single frame. The proponent expects to be able to create an automatic mask creation tool.

Labels: DocAvailable, Presented

4.3.19 m65118 [MIV] Higher bit-depth geometry coding using colorized depth representation

Authors	Kwan-Jung Oh
	  Gwangsoon Lee
	  Yoonseob Lee
	  Byung Tae Oh

Abstract	In the current MIV system, 16-bit geometry information is quantized to 10-bit to fit the input format of video encoder/decoder. However, the quantization error for geometry would degrade the rendered view quality. Because the MIV renderer can support up to 16-bit geometry information, we propose the colorized depth representation scheme to include higher bit-depth geometry information using chrominance components, which could minimize the quantization error. Experimental results show that the proposed colored depth representation method reduces the BD-rate 5.46% on average.
Gitlab	MPEG/Video/MIV/Contributions#806
Disposition	

4.3.19.1 Notes of the AHG call (2023-10-15)

Use chroma components of geometry video data to have a higher effective bit depth. Achieves 5% BD-rate reduction.

Chroma has residual.

The VVC encoder chroma QP coefficients are adjusted in this experiment.

Four sequences were used that have 16-bit input depth maps.

The proponent recommends to start a new core experiment: CE 4 and @Kwan-Jung can provide a text. More proposals in this area are welcome.

Labels: CE, DocAvailable, ProbableAgreement

4.3.20 m65158 [MIV] How to achieve a low complexity MPI with the MIV standard

Authors	Bertrand Chupeau Gaelle Martin-Cocher (InterDigital)

Abstract	This informative contribution explains how the current MIV profile corresponding to an MPI representation of the 3D scene (so called "MIV Extended - Restricted Geometry" profile) can be tuned for low complexity encoding and decoding, by using existing syntax elements to impose some desired restrictions.
Gitlab	MPEG/Video/MIV/Contributions#793
Disposition	

4.3.20.1   Notes of the AHG call (2023-10-10)

The aim of the proposal is to explain how the MIV Extended Restricted Geometry profile can be further constrained for low-complexity MPI transmission.

The proponent indicates that it was considered to add another profile, but there is a concern with multiplying the number of profiles.

Instead, the proponent provides advice on how (e.g. in another SDO or in an application context) the existing profile can be further restricted to have the following characteristics:

* A single 2D video bitstream: packed video, signaled in the VPS
* Complete layers vs. pruned layers: atlas view enabled MIV SEI message
* Controlling the maximum number of depth layers: geometry 3D bit depth

The additional constraints are presented as modifications on MIV Annex A Table 1.

Q: Does the AVE SEI message support this application?
A: The specification was shown:

![image](/uploads/c26896f9fc5731da166a85cf1e39d236/image.png)

There is ambiguity here.

There could be something like a "complete layers flag" if needed, but that need is not yet clear.

Controlling the maximum number of depth layers.

The asps_3d_geometry_bit_depth_minus1 cannot be set to a low number because it also determines the bit depth of the patch coordinates.

Labels: BoG, DocAvailable, Revised

4.3.21 m65213 [MIV] Enhanced basic tiles

Authors	Adrian Dziembowski Dawid Mieloch Gwangsoon Lee Jun Young Jeong
Abstract	The document presents a proposal of splitting basic views into basic and non-basic tiles. Only basic tiles are packed to the atlas without pruning, while non-basic tiles are treated as additional views (are pruned, split, and packed as a mosaic of patches). Proposed approach is adapted for class B and C sequences (ERP, non-full 360 cameras) and allows for packing non-pruned information from more directions.
Gitlab	MPEG/Video/MIV/Contributions#796
Disposition	

4.3.21.1 Notes of the AHG call (2023-10-15)

Improvement of the previous proposal on basic tiles from the last MPEG meeting.

From each view the "most extreme" part of the view is taken as basic tile, e.g. "left side" for "left view".

Max delta Y-PSNR was reduced by -36% for class B and -51% for class C.

Objective loss is due to less pixels being directly represented in the atlases.

According to the proponent there is a subjective gain for Guitarist, similar quality for Museum and Cyberpunk, just different for Chess and Hijack.

The proponent wishes to study further.

Labels: DocAvailable, Presented

4.3.22 m65241 [V3C] Clarification on inferred flags

Authors	Gurdeep Singh Gaëlle Martin-Cocher Ahmed Hamza Bertrand Chupeau (InterDigital)
Abstract	
Gitlab	MPEG/Video/MIV/Contributions#805

Disposition	

There are no minutes.

Labels: DocAvailable, Joint meeting

4.3.23 [m65392](#) **[MIV] Report of CE1 results**

Authors	Jai Young Oh Xin Li Tianyu Dong Kwan-Jung Oh Gwangsoon Lee Euee S. Jang
Abstract	Through this contribution, we report on the current status of Core Experiment 1 (CE1) that includes CE1.1 (foreground and background separation and coding) and CE1.2 (Spatio-temporal merge of backgrounds). In CE1.2, there are 3 proposed methods such as SM, TM and STM. In this contribution, we discussed the results of CE1.1 and SM (Spatial Merge of backgrounds) of CE1.2. We also proposed a syntax change to fulfill the functionality for object-based coding in MIV v2.
Gitlab	[MPEG/Video/MIV/Contributions#797](#)
Disposition	

4.3.23.1   Notes of the AHG call (2023-10-15)

* CE 1.1:
  * Foreground and background separation and coding performed on B01
  * Separate patches for foreground and background
  * Three atlases in total
  * Higher bitrate compared to CTC anchor
* CE 2.2 Spatial merge of backgrounds:
  * Two atlases in total: one foreground, one background objects
  * Bit rate unexpected, need to study

Propose syntax elements:

* `casme_background_separation_enable_flag`
* `mvp_view_background_flag`

Discussion

Continue CE 1 to optimize the methods. There is some problem with the object edges.

It would be good if more sequences can be used by having automatic background-foreground. Practically L01 can be added.

The syntax and semantics as proposed will be added to the working draft and maybe further improvement in the context of CE 1.

Labels: CE, DocAvailable, MIV, ProbableAgreement

4.3.24 m65401 [MIV] On MPI information SEI

Authors	T. Lu S. Oh P. Yin S. McCarthy W. Husak G. J. Sullivan (Dolby)
Abstract	
Gitlab	MPEG/Video/MIV/Contributions#798
Disposition	

4.3.24.1   Notes of the AHG call (2023-10-15)

Summary

Study of coding of MPI using constituent pictures: top-bottom, side-by-side or temporal interleaving.

Metadata carried in SEI (JVET-AE0066). Implemented in VTM22.0.

Comparison between MPI SEI and MIV Extended Restricted Geometry Profile

* V3C unit parsing
* Two decoders needed
* Temporal interleaving not supported
* No benefit for MPI content with only a few layers
* Bitrate overhead when having a few layers

The proponent argues that the SEI message and MIV profile can co-exist because quite different in functionality.

* MIV larger scope
* MIV 6Dof instead of 3DoF+
* MIV (many) partial layers instead of few full layers

The proponent notes m65158 on MPI simplifications.

With full layers temporal interleaving helps with spatial resolution due to max luma sample rate.

The packing information has overhead compared to supporting only a few layouts in the SEI message. 3693 bit vs. 528 bit.

Some experiments with the MpiEncoder with only a few layers.

Discussion

Is there basis for two separate use cases?

Is there a demo to show the quality of the SEI?

The small number of layers resulting in a small viewing space could be solved by server adaptation.

Recommendations

The AHG recommends to view the MPI SEI content if possible, and continue this discussion in a joint meeting.

Labels: DocAvailable, Joint meeting, View

4.3.25 m65411 [MIV] CE2.1 Effective-Information-Based cluster merging and better cluster splitting

Authors	YuxiaoBai LuYu
Abstract	This contribution newly use effective information in cluster merging process to avoid two cluster with large difference on effective information density to be merged, making effective information distributed more evenly in one cluster. For current effective-information-based cluster splitting, we adjust the threshold to make cluster splitting more adequately, but also newly using a priority queue to dynamically control the effective information splitting process to avoid unnecessary splitting, keeping the region coherency. Both improvements make packing decision more accurate and preserve more important cluster and patch in atlases. Under TMIV 17.0 the experiments result show a great gain on coding efficiency.
Gitlab	MPEG/Video/MIV/Contributions#799

Disposition	

4.3.25.1 Notes of the AHG call (2023-10-15)

Refinement of information-based cluster splitting and merging methods in the TMIV encoder.

BD-rate improvement -12% on average. Degradation for Chess. Good improvement for CBA Basketball and Guitarist. According to the proponent subjectively Chess is improved.

Pose trace videos are available.

The proponent wants to integrate into TMIV and continue CE 2 to study tile-level optimizations.

Labels: CE, DocAvailable, View

4.3.26 m65630 [V3C][V-PCC][MIV][V-DMC] Organization of V3C family of standards

Authors	Lukasz Kondrad
Abstract	With V-DMC, V3C, MIV under development it seems a good time to generalise V3C specification. This contribution discusses ways to do this in the backward compatible manner that ensures future proof extension and allow creation of additional V3C derived specifications without the need of changing the V3C spec.
Gitlab	MPEG/Video/MIV/Contributions#802
Disposition	

There are no minutes.

Labels: Joint meeting, Late

4.3.27 m65632 [MIV] Crosscheck of m64807

Authors	Jong-Beom Jeong Jun-Hyeong Park Jaeyeol Choi Eun-Seok Ryu

Abstract	This document is a cross-check report on KETI's proposal m64807, adaptive patch packing block size. It was verified that the crosscheck results completely match those reports in m64807.
Gitlab	MPEG/Video/MIV/Contributions#803
Disposition	

There are no minutes.

Labels: DocAvailable, Informative, Late