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**ISO/IEC JTC 1/SC 29/WG 7 MPEG 3D Graphics Coding**

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| **Title** | **EE 4.1 on V-DMC testing procedures** |
| **Source** | **WG 7, MPEG 3D Graphics Coding** |
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**Introduction**

This document provides a description of an exploration experiment (EE4.1) for V-DMC testing procedures. The study is aimed to identify individual coding tools for different components and evaluate the tool-on/tool-off coding performance.

1. **Data pre-processing for encoding**
   1. **Group of frames and key-frame separation**

As a pre-processing process, the input stream of mesh frames is separated into sub-bitstreams representing a group of frames. The GoF allows alternative frame re-ordering methods to support various prediction structures.

It is suggested to conduct test(s) to identify the optimal predicting structure for dynamic mesh bitstreams.

1. **Video-based Dynamic mesh coding architecture analysis**
   1. **Mesh decimation**

The initial mesh simplification process is used to generate the base mesh.

It is suggested to conduct test(s) to study the efficiency and resiliency of the base mesh generation process.

* 1. **Atlas attribute map re-meshing**

The attribute image is re-generated with UVatlas [6] tool.

An in-depth investigation of re-meshing effects and alternative methods for re-meshing is suggested.

* 1. **Base mesh coding**

An external standard is suggested for base mesh encoding.

It is suggested to study the efficiency of the proposed existing solutions and methods proposed in CfP responses.

* 1. **Mesh subdivision and lifting transform**

The mesh sub-division (tessellation) process depends on the wavelet transform process. The transformed quantized coefficients are packed in the image and coded with a video encoder. The displacements can be expressed in either local or global coordinate systems.

It is suggested to study the coordinate system representation, transform, and subdivision process in detail.

* 1. **Displacement quantization, representation, and coding**

The transformed geometry displacement coefficients after transform are quantized using different methods for the normal, tangent, and bitangent displacement transformed coefficients.

It is suggested to study the methods to compress displacement coded coefficients, quantization, and image packing processes in detail.

* 1. **Attribute coding**

External video coding standard is used for attribute image coding.

It is suggested to study the efficiency of existing video coding standards and investigate mechanisms of coding tool identification.

1. **Summary report for coding tools performance available in the preliminary test model**

The detailed results shall be provided in the EE4.1 report for the MPEG 140th meeting.

1. **Mandates**

The mandates for this EE are as follows:

* Create the pipeline to evaluate the individual coding performance tools of the contributions [1]-[5].
* Make recommendations to the group on the testing procedures and performance reporting.
* Prepare procedure for conformance bitstream generation.

1. **Participants**

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1. **Timeline**

* 2022-09-01: Expected date for the release of TM1 response source code
* 2022-09-10: Expected date for the release of the finalized EE 4.1 description
* Virtual meetings will be organized monthly to discuss the progress in connection with EE4.2
* 2022-10-21: MPEG document upload deadline

**References**

1. [V-CG] Nokia’s response to CfP for Dynamic Mesh compression, m59274, April 2022
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3. [V-CG] Apple’s Dynamic Mesh Coding CfP Response, m59281, April 2022
4. [V-CG] Tencent’s Dynamic Mesh Coding CfP, m59295, April 2022
5. [V-CG] Sony’s Dynamic Mesh Coding Call for Proposal Response, m59284, April 2022
6. https://github.com/microsoft/UVAtlas