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**ISO/IEC JTC 1/SC 29/WG 11**

**CODING OF MOVING PICTURES AND AUDIO**

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# Abstract

In this document, we provide descriptions for the core experiment 13.22 on the study of improvements on tree-based geometry coding for Geometry-based PCC. This is a continuation of the Core Experiment [5].

The current implementation of the octree representation of the geometry in G-PCC may suffer from non-optimal compression performance in case of strong acquisition priors, e.g. acquisition by a Lidar, or in very sparse regions of the point cloud due to the nature of the octree that requires many nodes to represent a single point.

The goals of this Core Experiment are now focused on:

* introducing new representations of the geometry at the node level of the octree

# CE 13.22 on Improvements to Octree coding

## Mandates

* study the impact on compression performance of the proposed new representation (azimuthal mode)
* evaluate the trade-off compression performance vs complexity of such representation

Related changes to the G-PCC Specification Text [2] shall be reported.

## Participants, description of tools, and implementation notes

The following people are participating in this CE. Their specific roles are detailed in the next section. Proposals are based on the input contributions

1. m51596, *The new azimuthal coding mode*

Proponents and cross checkers are

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## Information on proposed tools

### *The new azimuthal coding mode* from m51596

For Lidar-acquired point clouds, some priors of the sensing system may be used to improve the compression of the geometry.

It is proposed to introduce the azimuth coding mode, plugged over the planar mode or Inferred Direct Coding Mode (IDCM), such as to obtain an improved plane horizontal position prediction or horizontal point coordinate prediction by using the knowledge of positions and angles of sensing laser beams as well as information on the Lidar head rotation like the number of sensing per turn. By doing so, planar mode and IDCM syntaxes are much better compressed, leading to overall significant gains of compression for the octree-based geometry coding.

## Information for conducting tests

Adoption of the tool should be based on the discussion of the compression gains and the complexity of said tools.

### Software

TMC13v9 shall be used for these experiments. The proposed tools shall be implemented on top of TMC13v9.

### Test configurations

Parameters and configurations for the modified TMC13v9 software will be provided by the proponent.

### Evaluation Method

The point cloud test material will be tested for the test sequences of category

* (3) Dynamic Acquisition

as defined by the CTC [3]. The following test conditions will be under evaluation

1. *CW AI lossless geometry – (lossless attribute)*
2. *C2 AI, lossy geometry – (lossy attribute)*

Note that the tested technologies should have an impact on geometry compression only and that attribute compression performance are reported informatively.

## CE 13.22 Coordinators

Sébastien Lasserre ([slasserre@blackberry.com](mailto:slasserre@blackberry.com))

# Timeline:

* **2020-01-31**: Expected date for TMC13v9 release;
* **2020-02-07 [TMC13v9 + 1week]**: Expected date for exploratory model TMC13v9 + EMLLv0 release including performance results and documentation;
* **2020-03-20 [TMC13v9 + 7 weeks]** Deliver source code and results for cross check;
* **2020-04-03 [TMC13v9 + 9 weeks]** Deliver cross check results;
* **2020-04-15**: MPEG document upload deadline.

# References

1. “*G-PCC Test Model v9*”, ISO/IEC JTC1/SC29/WG11 Doc. N19083, Brussels, Belgium, January 2020
2. “*Text of ISO/IEC 23090-9 DIS Geometry-based PCC*”, ISO/IEC JTC1/SC29/WG11 MPEG2019 Doc. w19088, Brussels, Belgium, January 2020
3. “*Common Test Conditions for PCC*” ISO/IEC JTC1/SC29/WG11 N19084, Brussels, Belgium, January 2020
4. The new azimuthal coding mode, m51596, BlackBerry
5. “*CE 13.22 Improvements on tree-based geometry coding*”, ISO/IEC JTC1/SC29/WG11 N18902