

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

**Coding of moving pictures and audio**

**Convenorship: Japan (JISC)**

**ISO/IEC JTC 1/SC 29/WG 11 N19538**

**Document type: Approved WG 11 document**

**Title: Description of Exploration Experiment 13.2 for G-PCC: on Inter-prediction for Attribute Coding**

**Status: Draft**

**Date of document: 2020-07-22**

**Source: 3DG**

**Expected action:**

**No. of pages:**

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**Committee URL:** <http://isotc.iso.org/livelink/livelink/open/jtc1sc29>

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

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**Online – June 2020**

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| **Source:** | **3DG** |
| **Title:** | **Description of Exploration Experiment 13.2 for G-PCC on inter-prediction for attribute coding** |

**Description of Exploration Experiment 13.2 for G-PCC on inter-prediction for attribute coding**

# Abstract

This document provides a description of G-PCC Exploration Experiment (EE) 13.2 on inter-prediction for attribute coding.

# Introduction

This EE is the continuation of the previous EE13.2 [9]. Hence the information of this document will be the same as that in [9].

The goal of 13.2 is to migrate and evaluate the inter-prediction scheme proposed in [1][2] on interEM SW v2, which will be based upon TMC13v7.

# Information about proposed tools

## m49599: [EE13-2] Report on Inter-prediction for Attribute Coding [1]

In this contribution, the result of studying the mandates of EE13-2 is reported. The results regarding the second mandate reveals that interframe coding even without any motion-compensation brings sizeable coding gains both for geometry and attribute coding. In addition, the current global motion-compensation in the interEM SW does not bring an additional coding gain for either the geometry or attribute while the local motion-compensation does to a degree both for the geometry and attribute. The results show that additional coding gains (3%~4% for CY, 1 ~2% bpp for CW) for attributes were obtained by local motion-compensation for ford\_01 and ford\_02 sequence cases.

## m47838: Interframe Prediction for Attribute Coding [2]

In this contribution, it is proposed to use an attribute-value from other point-cloud frames at different time instances in addition to the attribute-values from within the same point-cloud frame for prediction. The method can improve prediction performance especially when point-cloud samples are sparse within the current frame by providing sample attribute-values from corresponding locations in other frames.For the CY (near-lossless attribute coding) test category under the CTC, it achieves the Hausdorff BD-rate savings of -9.1% for the Category3 reflectance data set. For the CW (lossless attribute coding) tests under the CTC, it achieves 5.3% bpp reduction on average.

Note that the tools from m49599 and m47838 were adopted in interEM v2.0 SW. The corresponding code has been migrated to a version that is based on TMCv6 in the following branch:

* <http://mpegx.int-evry.fr/software/MPEG/PCC/CE/mpeg-pcc-tmc13/tree/mpeg129/ee13.2/m53343-interprediction-for-attribute-coding>

Our goal is to further migrate the code to a version that is based on TMCv7.

# Description of Exploration Experiments

## Mandates

Mandates for EE13.2 are as follows:

1. Migration to the interEM v2.0 SW, which will be based upon the TMC13v7 code base.

- Verify the functionality of the migrated SW

- Reproduce the results reported in [1][2]

## Participants

| **Name** | **Company** | **E-mail address** | **Type** |
| --- | --- | --- | --- |
| Wen Gao | Tencent | wengao@tencent.com | Proponent |
| David Flynn | Apple | [davidflynn@apple.com](mailto:davidflynn@apple.com) | Crosscheck |
|  |  |  |  |

## Software

The proposed tools shall be implemented on top of interEM V2.0 [3][4].

## Test configurations

Parameters and configurations for interEM will be provided by the proponent.

## Evaluation Method

Tests will be performed basically following the G-PCC test conditions specified in CTC [8]. Conditions CW (lossless geometry, lossless attribute) and CY (lossless geometry, lossy attributes) will be tested.

Tests will be performed using dynamic content from CTC category 3, namely the Ford (fps=10) and QNX (fps=5) test sequences. In inter mode, a GOP size of 8 frames with the IPPP structure will be used leading to an inter frame period between 1 and 2 seconds.

Objective results will be provided using the result spreadsheet template. Coding efficiency vs. complexity (e.g., number of calculations, memory usage) aspects will also be studied and reported.

## EE.13.2 Coordinators

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# Timeline:

* **2020-09-04**:Source code and results to cross-checkers;
* **2020-09-18:** Preliminary feedback from cross-checkers;
* **2020-10-07**: MPEG document upload deadline.

# References

[1] Report on Inter-prediction for Attribute Coding, ISO/IEC JTC1/SC29 WG11 input document m49599, Gothenburg, SE, July 2019

[2] Interframe Prediction for Attribute Coding, ISO/IEC JTC1/SC29 WG11 m47838, Geneva, CH, March 2019.

[3] Exploratory model for inter-prediction in G-PCC, ISO/IEC JTC1/SC29 WG11 N18096, Macau, CN, October 2018.

[4] An exploratory model for inter geometry-based PCC, ISO/IEC JTC1/SC29 WG11 m44754, Macau, CN, October 2018.

[5] Global motion compensation for point cloud compression in TM3, ISO/IEC JTC1/SC29 WG11 m44751, Macau, CN, October 2018.

[6] On motion compensation for geometry coding in TM3, ISO/IEC JTC1/SC29 WG11 m42521, San Diego, USA, April 2018.

[7] PCC Test Model Category 13 v7, ISO/IEC JTC1/SC29/WG11 w18664, Gothenburg, SE, July 2019.

[8] Common Test Conditions for PCC, ISO/IEC JTC1/SC29 WG11 w18665, Gothenburg, SE, July 2019.

[9] Description of Exploration Experiment 13.2 for G-PCC on inter-prediction for attribute coding, ISO/IEC JTC1/SC29 WG11 w19355, Alpbach, AUT, April 2020.