

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

**Coding of moving pictures and audio**

**Convenorship: UNI (Italy)**

**ISO/IEC JTC 1/SC 29/WG 11 N19096**

**Document type: Approved WG 11 document**

**Title: Description of Exploration Experiment 13.3 for G-PCC on SNR-scalability for lifting**

**Status: Draft**

**Date of document: 2020-02-10**

**Source: 3DG**

**Expected action:**

**No. of pages:**

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**INTERNATIONAL ORGANISATION FOR STANDARDISATION**

**ORGANISATION INTERNATIONALE DE NORMALISATION**

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

**CODING OF MOVING PICTURES AND AUDIO**

**ISO/IEC JTC 1/SC 29/WG 11 N19096**

**Brussels, BE – January 2020**

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**Description of Exploration Experiment 13.3 for G-PCC on SNR-scalability for lifting**

# Abstract

This document provides a description of G-PCC Exploration Experiment (EE) 13.3 on SNR-scalability for lifting.

# Introduction

The goal of EE 13.3 is to investigate the coding performance of the CGS SNR-scalable lifting as proposed in m52721 [1] and its alternative. In addition, any updates on improving the FGS SNR-scalable lifting proposed in m51159 [2] will be reported.

# Information about proposed tools

## m52721: Report on SNR-Scalable Lifting – Coarse Granular Scalability [1]

In this contribution, the result of SNR-scalable lifting with coarse-granular-scalability (CGS) is reported. When providing 6 quality-scalable decoding points under C1 coding conditions as per CTC, it roughly halves the total bitrates compared with simulcast while its BD-rate penalty against non-scalable version is around 10%~13%.

## Alternative method for coarse-granular-scalability (CGS)

It was discussed during the 129th MPEG meeting that an alternative way of attaining coarse-granular SNR-scalability would be based upon selective-decoding of subband coefficients depending upon the target QP.

## m51159: [EE13.3] Lossless Lifting Scheme - SNR Scalability [2]

In this contribution, the result of EE13.3 on lossless lifting for attribute coding is reported. Specifically, the bitplane coding of lifting coefficients as proposed in m49603 is reported after migration to TMC13v7. It achieves lossless reconstruction at 4.7% and 8.1% higher bpp’s with respect to the Predicting-Transform anchor under the CW test condition for color and reflectance, respectively. This result is slightly better than its non-scalable version in m51158 and corresponds to -1.6% and 0.8% bpp differences for color and reflectance, respectively, relative to the lossless RAHT with the added benefit of SNR-scalability.

# Experimental description

In this EE, the proposed SNR-scalable lifting scheme will be evaluated in terms of its coding efficiency and implementation aspects.

## Mandates

1. Explore the ‘alternative method’ of Section 2.2 and compare with the method of Section 2.1 [1] to enable CGS (Coarse Grain Scalability) for the lifting transform.

2. Explore improvements of the FGS (Fine-Granular Scalability) method of Section 2.3 [2].

## Participants

| **Name** | **Company** | **E-mail address** | **Type** |
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|  |  |  |  |

### Software

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

### Test configurations

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

### Evaluation Method

The point cloud test material will be tested under the following conditions of the CTC [3]:

* C1 Lossless Geometry – Lossy Attributes
* CW Lossless Geometry – Lossless Attributes

The performance of SNR-Scalable coding (CGS/FGS) will be measured as follows:

* Given a total of N QP’s including the final target QP (highest quality), compare the size of the embedded bitstream that includes these N quality points against:

1) the sum of the sizes of N bitstreams coded at the N QP’s above.

2) the size of the bitstream coded at the final target QP.

* Change N from 1 (non-scalable) to 6 (scalable, supporting 6 QP points under the C1 test)
* If the highest quality is set to be lossless, the bitstream size will be compared with that of the CW anchor (i.e., Predicting Transform).

## EE.13.3 Coordinators

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# Timeline:

* **2020-03-20**: Deliver source code and results for cross check;
* **2020-04-03**: Report of preliminary cross check results;
* **2020-04-15**: MPEG document upload deadline.

# References

1. Report on SNR-Scalable Lifting – Coarse Granular Scalability, ISO/IEC JTC1/SC29 WG11 m52721, Brussels, BE, January 2020

[2] [EE13.3] Lossless Lifting Scheme - SNR Scalability, ISO/IEC JTC1/SC29/WG11 m51159, Geneva, CH, October 2019

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

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