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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**

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# Abstract

This document provides a description of Core Experiment 13.15 on LoD generation for spatial scalability.

# Introduction

The goal of Core Experiment 13.15 is to evaluate the Level of Details generation method for the lifting scheme for the spatial scalability.

The performance of the technique [3][4] is evaluated in the scope of the CE 13.15, in terms of RD performance.

# Mandates

The mandates for CE are as follows:

1. To study the coding performance compared with the anchor scalable lifting algorithm
2. To study m50743 on the difference coding performance of luma/chroma channels depending sequences

# Participants

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# Methods to be evaluated

## m50743 [G-PCC](New Proposal) CE13.15 Related on improved weight derivation for spatial scalable lifting

The proposed method modifies the weight derivation for the lifting reference structure.

## Weight Derivation

The weight derivation of proposal is as follows:

{

}

To introduce the original non-scalability algorithm essence, the proposal weight derivation considers the number of predicted nodes in the lower Lods.

## Lifting reference modification

The reference structure modification to only leaf node [m49044] was adopted in MPEG128. In the CE, the reference structure modification is applied to any Lod levels.

## [m51408](http://wg11.sc29.org/doc_end_user/current_document.php?id=71665&id_meeting=180) [G-PCC][New Proposal] on improved spatial scalable lifting

The proposed method modifies the reference node selection to reduce distance distortion caused with distance normalization.

## Reference node selection

The distance normalization is as follows:

Dist = ( Quant(**P**ref, LoD) − Quant(**P**i) )2

, where Quant(x, LoD) is defiend as ((x>>LoD)<<LoD).

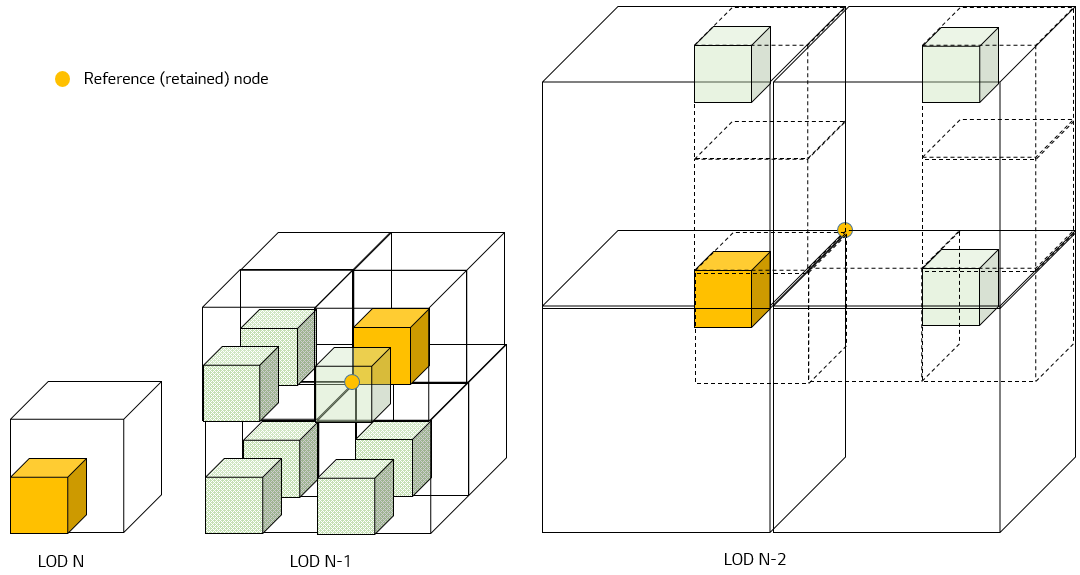
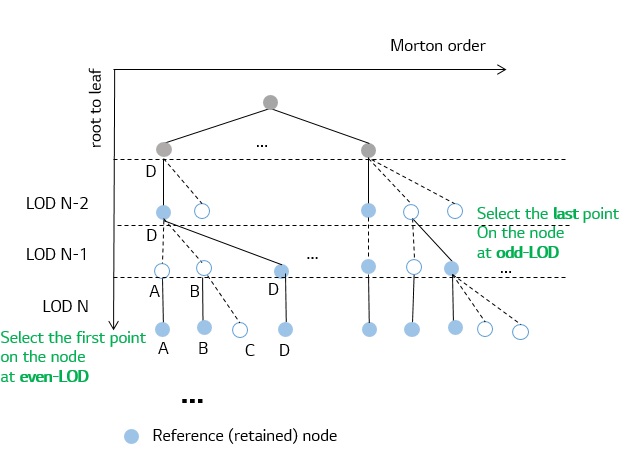
Quant(x, LOD) makes position of a point to center position of each node at the LoD. With the Quant(x, LOD), distance distortion issue is happened and this issue is more affected to the lower LoDs.

Therefore, to reduce distance distortion with distance normalization, we need to choose reference node closed to center of each node at the LoD.

To do that, the reference node selection of proposal is as follows:

* If the LOD is even, select first child node of node as reference node.
* If the LOD is odd, select last child node of node as reference node.

The following figure shows example of reference node selection.



# Evaluation method

## Test condition

Following conditions will be studied under CTC[2].

1. CTC anchor (w/o spatial scalability)
2. anchor with spatial scalability coding (in TMC13 release-v8.0[1])
3. Proposed method described in Section 4.1
4. Proposed method described in Section 4.2

## performance evaluation

For the full resolution point cloud, BDRate in the CTC spreadsheet is evaluated.

# Timeline

* 2019-11-01: Expected date for release of cross-verified TMC13v8 software and anchors
* 2019-12-13: CE Software and results are released to cross-checkers
* 2019-12-20: Preliminary feedback from cross-checkers to proponents
* 2020-01-08: MPEG document upload deadline

# References

1. “G-PCC Test Model v8”, ISO/IEC JTC1/SC29/WG11 MPEG2019 Doc. w18882, Geneve, CH, October 2019
2. “Common Test Conditions for PCC” ISO/IEC JTC1/SC29 WG11 MPEG2019”, ISO/IEC JTC1/SC29/WG11 MPEG2019 Doc. w18883, Geneve, CH, October 2019
3. “[G-PCC] New proposal CE13.15 Related on improved weight derivation for spatial scalable lifting”, ISO/IEC JTC1/SC29 WG11 (MPEG) input document m49044, Geneve, CH, October 2019
4. “[G-PCC][New Proposal] on improved spatial scalable lifting” , ISO/IEC JTC1/SC29 WG11 (MPEG) input document m51408, Geneve, CH, October 2019