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**V-PCC Core Experiment 2.28 on Designing Conformance Unit and   
SEI messages**

# Abstract

This document provides a description of Core Experiment 2.28 on Designing Conformance Unit and SEI messages.

# Introduction

The goal of Core Experiment 2.28 is to study, select, and design new conformance unit and supplemental enhancement information (SEI) messages that would be appropriate for use with the V-PCC point cloud compression standard.

A few SEI messages, which have been previously defined in the MPEG-4 AVC and HEVC specifications, have already been identified that can be immediately supported, with little if any modification, as is in the V-PCC specification, including the following:

* Buffering period
* Pic timing
* Recovery point
* Regional nesting
* Decoded picture hash
* Post Filter Hint
* Filler payload
* User data registered by Recommendation ITU-T T.35
* User data unregistered
* No display
* Reserved
* SEI manifest
* SEI prefix

The group has also adopted the volumetric tiling information, the active substreams, and component codec mapping SEI messages, and has agreed on appropriately modifying SEI messages that provide frame level 3D transformations and filtering with the introduction of the Geometry and Attribute transformation parameters SEI messages as well as the Geometry and Attribute Smoothing SEI messages. At the last meeting it was also agreed to extend the volumetric tiling information SEI message to also appropriately support independent patches and to include additional functionality relating to indication of volumetric cones.

# Mandates

The mandates for this CE are as follows:

1. To study which SEI messages, that are already defined in video codecs such as MPEG-4 AVC and HEVC, may be also appropriate for inclusion in the V-PCC specification and, if so, determine how these should be appropriate modified and ported based on the decoding and display/processing characterists of V-PCC and point clouds in general
2. To study whether new, V-PCC specific, SEI messages need to be defined for enabling certain functionalities, such as random access and tile extraction, or as carriers for non mandatory information, such as point shape and size.
3. Determine whether essential, for conformance, messages should be placed in a new patch data group unit type, or whether such messages should be included with all other generic SEI messages.
4. Determine commonalities between V-PCC and G-PCC in terms of possible SEI messages. If so, consider unifying the specification of such "common" SEI messages.
5. Define syntax and semantics for any newly defined SEI messages in the context of V-PCC.

# Participants

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(P=proponent, C=cross checker)

# SEI messages to be evaluated or updated in the latest V-PCC spec

## m49957 – SEI Messages for MIV and V-PCC

Contribution m49957 requests that an object id is assigned to each separate patch. It was discussed that such functionality could be handled through an appropriate extension/modification of the volumetric tiling information SEI message.

## m50062 – On V-PCC SEI Messages for Component Changes

Contribution m50062 identifies some shortcomings of the component\_codec\_mapping SEI and how those could be addressed.

## m50826 Signalling of Visibility Cones in V-PCC

This contribution requests signaling of visibility cones in V-PCC, which should be associated with patches and/or volumetric tiling information. It was agreed that this feature was desirable but for the group to work together and provide for improved syntax for the volumetric tiling information that would address also individual patches, handle point styles (size and shape), and be flexible and extensible for future usage.

## m50827 Splitting SEI messages

This contribution requests that certain SEI messages, i.e. the SEI messages for attribute and geometry transformations and smoothing, should be split. This has been already addressed in the DIS version and no further action is needed.

## m51005 Essential SEI messages

This contribution requests that SEI messages are defined to belong under two categories, essential and non essential and that appropriate NAL units are specified in the text to address this. This was adopted and requires appropriate modification in the DIS text.

## m51299 Effect of Geometry Smoothing Mismatch between Encoder and Decoder

This contribution addresses the issue of allowing different geometry smoothing to be used in V-PCC by requiring that smoothing should be performed outside the coding loop. Syntax is also provided that extends geometry and attribute smoothing to allow multiple smoothing methods and addresses also the splitting issues identified by m50827.

# Timeline

* 2019-10-11 MPEG #128 meeting ends.
* 2020-01-08 MPEG document upload deadline
* 2020-01-13 MPEG #129 meeting starts.

# References

1. “Text of ISO/IEC DIS 23090-5 Video-based Point Cloud Compression,” ISO/IEC JTC1/SC29 WG11 (MPEG) output document 18670, Gothenburg, SE, July 2019