

**m55323**

# **Valid range of exp-Golomb signalled syntax elements**

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## ■ Problem statement

- In the current spec, valid ranges of some SEs signalled by exp-Golomb code are not defined.
- It should be defined.

## ■ Proposal

- Definition of valid ranges for following syntax elements are proposed.
  - lifting\_sampling\_period\_minus2[ idx ]
  - geom\_qp\_offset\_intvl\_log2
  - geom\_tree\_depth\_minus1
  - log2\_trisoup\_node\_size

## ■ `lifting_sampling_period_minus2[ idx ]`

- The maximum value can be defined by “Max points in a slice”

`lifting_sampling_period_minus2[ idx ]` plus 2 specifies the sampling period for the level of detail `idx`.

The value of `lifting_sampling_period_minus2[ ]` shall be in the range of 0 to **Max points in a slice – 2**.

## ■ `geom_qp_offset_intvl_log2`

- Same as the above one.

`geom_qp_offset_intvl_log2` specifies the frequency of signalling predictive tree node quantization parameter offsets. The value of `geom_qp_offset_intvl_log2` shall be in the range of 0 to  $\text{iLog2}(\text{Max points in a slice})$ .

## ■ `log2_trisoup_node_size`

- This SE is signalled after `geom_tree_depth_minus1` and `geom_tree_coded_axis_flag`.
- Actual root node size can be used.

`log2_trisoup_node_size` specifies the variable `TrisoupNodeSize` as the size of the triangle nodes as follows. The value of `log2_trisoup_node_size` shall be in the range of 0 to  $\text{Max}(\text{NodeSizeLog2}[0][0], \text{NodeSizeLog2}[0][1], \text{NodeSizeLog2}[0][2])$ . When not present, the value of `log2_trisoup_node_size` is inferred to be equal to 0.

## ■ **geom\_tree\_depth\_minus1**

- **QtBt Off : 0 to MaxRootNodeDimLog2 – 1**
- **QtBt On : 0 to MaxRootNodeDimLog2 – 1 + N**
  - It is proposed N is equal to 4 according to the original proposal of the current explicit QtBt (m53390).

### **Constraints**

Increasing the flexibility of the spiting decision signalling increases the ability for an implementation to generate perverse octree constructions. The worst case would be that in any level of the octree, only one axis is split, resulting in a tree three times as deep as necessary.

To bound this value, **it is proposed to limit the number of extraneous levels to four.**

- Proposed text change (in the case of  $N = 4$ )

**geom\_tree\_depth\_minus1** plus 1 specifies the number of geometry tree levels present in the data unit. When **geom\_tree\_coded\_axis\_list\_present\_flag** is equal to 0, the root geometry node size is a cubic volume with edge lengths equal to  $1 \ll (\text{geom\_tree\_depth\_minus1} + 1)$ , and the value of **geom\_tree\_depth\_minus1** shall be in the range of 0 to  $\text{MaxRootNodeDimLog2} - 1$ . Otherwise (**geom\_tree\_coded\_axis\_list\_present\_flag** is equal to 1), the value of **geom\_tree\_depth\_minus1** shall be in the range of 0 to  $\text{MaxRootNodeDimLog2} + 3$ .

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## ■ It is recommended that the proposal is adopted to the next draft.