

m54615

Point indexes definition for lifting morton sort skip

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■ Problem statement

- Morton sort skip was adopted at the previous meeting.
- It is not defined explicitly that how to label indexes to points in the current spec.
- Therefore, processing order at attribute decoding is ambiguous when Morton sort skip is used.

■ Proposal

- The following two aspects are proposed.
 1. Point indexes are defined explicitly in the spec according to geometry decoding order,
 2. Morton sort skip can be enabled only when predictive coding is used.

- Morton sort skip is a functionality realizing low-latency attribute coding.
- When Morton sort skip is enabled, sorting process by Morton code order is skipped and attribute coding are processed according to index i.

```
unprocessedPointCount = PointCount
for (i = 0; i < unprocessedPointCount; i++) {
    unprocessedPointIndexes[i] = lifting_morton_sort_skip_enabled_flag ? i : Order[i]
}
for (lod = 1; lod < LevelDetailCount; lod++)
    unprocessedPointCountPerLevelOfDetail[lod] = 0;
unprocessedPointCountPerLevelOfDetail[0] = PointCount
```

- However, it is not defined explicitly how to label “index i” to points in the spec.
- When Morton sort skip is not enabled, the processing order is unique because it can be defined as Morton code order regardless of point indexes.

- **Aspect 1 : Point indexes are labeled as geometry decoding order**
 - **How to label point indexes are defined explicitly in the spec according to geometry decoding order.**

8.3.2.1 Level of Detail Generation

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First, an index i is labeled to each point according to geometry decoding order. Then, if `lifting_morton_sort_skip_enabled_flag` equal to 0, the point sorting process based on Morton code in clause 5.9.8 is invoked. Let `Order[i]` be the array of point indexes sorted according to their Morton codes and `McodeUnsorted` the array of unsorted Morton codes.

- **Aspect 2 : Morton sort skip can be enabled only when predictive coding is used**
 - **On top of the aspect 1, it is proposed that Morton sort skip can be enabled only when predictive coding is used because of the following reasons.**
 - When predictive coding is not used, geometry decoding order seems to be still ambiguous due to IDCM and so on.
 - Additionally, Morton sort skip can realize low-latency coding only when predictive coding is used.

7.4.2.4 Attribute parameter set semantics

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lifting_morton_sort_skip_enabled_flag equal to 1 specifies that the sorting process based on Morton code is skipped. **lifting_morton_sort_skip_enabled_flag** equal to 0 specifies that the sorting process based on Morton code is applied. When the value of **gps_predictive_mode_enabled_flag** is equal to 0, the value of **lifting_morton_sort_skip_enabled_flag** shall be equal to 0.

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■ It is recommended that both aspect 1 and 2 are adopted to the next draft.