m54865

# [G-PCC] Profile & Level

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Ver1.0 August 27, @Ad-hoc
Ver2.0 October 13, @ MPEG132

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# Profile

This proposal of ‘Profile’ was reviewed @ ad-hoc and was agreed.

# Proposal



- **Profile Structure**
  - Base on Apple's proposal (m53676+m54679)
  - 4 profiles
    - Simple
    - LiDar (simple+)
    - Main (Dense/Semi)
    - Trisoup

- **Tools**
  - Simple profile: no modification
  - LiDAR / Main profile
    - Change y(mandate) to x(optional) on some tools in order to user can select each tool.
  - Add scalable functionality on LiDAR / Main / Trisoup profile.

# Tools of profile

August,27

| Apple (m53676+m54679) | Simple | LiDAR | Main | Trisoup |
|---|---|---|---|---|
| Entropy bypass stream | y | y | x | ? |
| Entropy continuation | x | x | x | x |
| octree geometry | x | x | y | y |
| predictive geometry | x | x | | |
| Duplicate points | x | x | x | |
| IDCM | x | x | x | |
| IDCM - boost | x | x | x | |
| Bytewise occupancy | y | | | y |
| Bitwise occ coding | | y | y | |
| QTBT | | x | x | |
| N3 (Neigh Availability boundary = 0) | y | y | | y |
| N6 (Neigh Availability boundary > 0) | | | y | |
| Adjacent child neighbours | | | y | |
| Planar | | ? | y | |
| Angular | | x | | |
| Angular - Azimuthal | | x | | |
| Angular - Planar | | ?if planar | | |
| Intra occ prediction | | | x | |
| Geometry scaling | ?qp%4 | ?qp%4 | x | |
| Trisoup | | | | x |
| Parallel octree levels | | | x | |
| Lifting | | ? | x | x |
| Predicting | y | x | x | x |
| adaptive prediction | x | x | x | x |
| intra lod prediction | y | y | x | x |
| inter component prediction | x | x | x | x |
| LoD generation using distance | | | y | y |
| LoD generation using decimation | y | y | | |
| scalable LoD generation | | | | |
| RAHT | | x | x | x |
| transform domain prediction | | | x | x |

| Panasonic suggestion | Simple | LiDAR | Main | Trisoup |
|---|---|---|---|---|
| Entropy bypass stream | y | y | x | ? |
| Entropy continuation | x | x | x | x |
| octree geometry | x | x | y | y |
| predictive geometry | x | x | | |
| Duplicate points | x | x | x | |
| IDCM | x | x | x | |
| IDCM - boost | x | x | x | |
| Bytewise occupancy | y | | | y |
| Bitwise occ coding | | y | y | |
| QTBT | | x | x | |
| N3 (Neigh Availability boundary = 0) | y | y | x | y |
| N6 (Neigh Availability boundary > 0) | | | x | |
| Adjacent child neighbours | | | x | |
| Planar | | x | x | |
| Angular | | x | | |
| Angular - Azimuthal | | x | | |
| Angular - Planar | | x | | |
| Intra occ prediction | | | x | |
| Geometry scaling | ?qp%4 | ?qp%4 | x | |
| Trisoup | | | | x |
| Parallel octree levels | | | x | |
| Lifting | | x | x | x |
| Predicting | y | x | x | x |
| adaptive prediction | x | x | x | x |
| intra lod prediction | y | y | x | x |
| inter component prediction | x | x | x | x |
| LoD generation using distance | | | y | y |
| LoD generation using decimation | y | y | | |
| scalable LoD generation | | x | x | x |
| RAHT | | x | x | x |
| transform domain prediction | | | x | x |



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# Level

This is new proposal.

# Level Parameter (Geometry Precision)

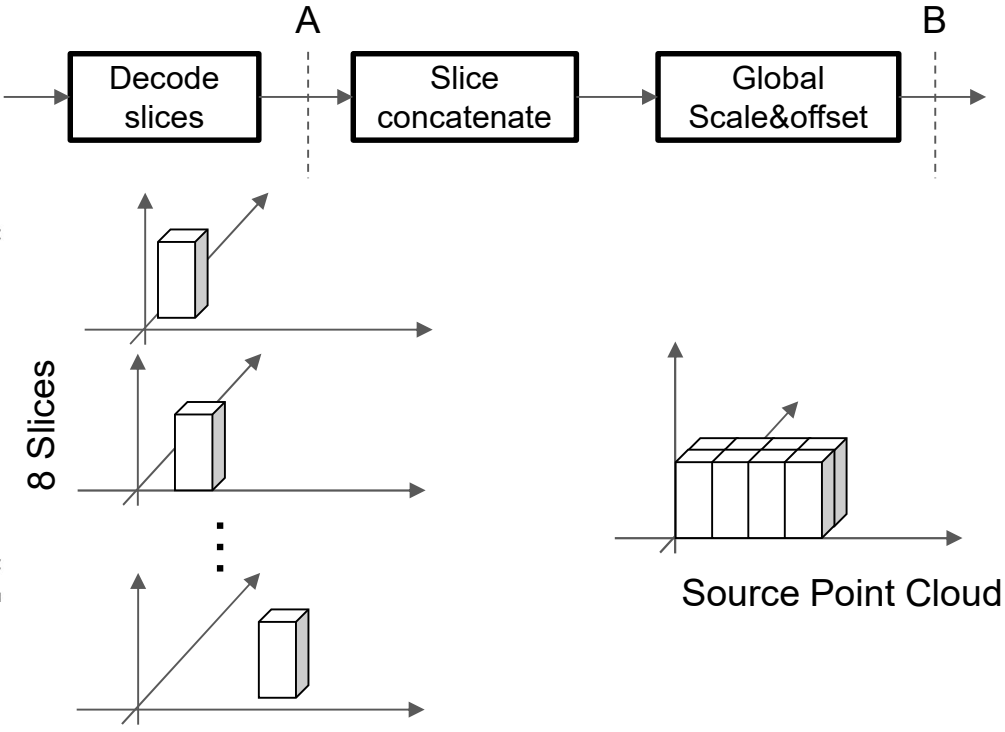
Specification: Two parameters for geometry precision

A. MaxRootNodeDimLog2: Max bit depth of slice
= 21bit ⋯ as the Morton code is stored in 64bit (m52732)
B. MaxCoordinateValLog2: Max bit depth of Source point cloud
= 21bit ... Same as MaxRootNodeDimLog2 Is it enough?

Specification

Table A. 1 — Level limits

| Level | Max points in a slice | MaxRootNodeDimLog2 | MaxCoordinateValLog2 |
|---|---|---|---|
| 4 | 1,100,000 | 21 | 21 |



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# [Analysis] Geometry precision of source point cloud

We use <=21 bits content for CTC simulation

| | |
|---|---|
| cat1-a | 10~13bit |
| cat1-b | 12~20bit |
| cat3-fused | 20~21bit |
| cat3-framed | 18bit |

Bit precision of CTC content

G-PCC need to support more larger point cloud considering the actual possible point cloud.  (larger range, fine resolution)

Resolution

| Range | 1mm | 100um | 10um | 1um |
|---|---|---|---|---|
| 1m | 10 | 14 | 17 | 20 |
| 10m | 14 | 17 | 20 | 24 |
| 100m | 17 | 20 | 24 | 27 |
| 1km | 20 | 24 | 27 | 30 |
| 10km | 24 | 27 | 30 | 34 |

Geometry precision [bit]

# Proposal

- Support up to 27bits for source point cloud(MaxCoodinateValLog2)

- If geometry precision is larger than 21bit,
  source point cloud should be scaled or partitioned to slice or tile so that the geometry precision of the slices (MaxRootNodeDimLog2) is within 21 bits.

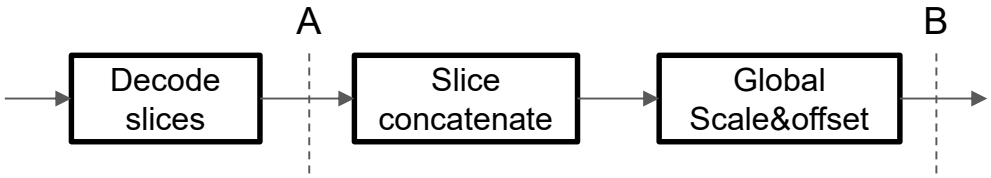


Table A. 1 — Level limits

| Level | Max points in a slice | MaxRootNodeDimLog2 | MaxCoordinateValLog2 |
|---|---|---|---|
| 4 | 1,100,000 | 21 | 21 |
| 5 | 1,100,000 | 21 | 27 |