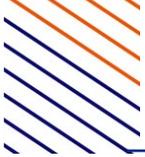


m60244

[G-PCC][CE0.5-related][new]

Comments on Call for LiDAR Test Sequence

Satoshi Komorita, Kyohei Unno, Yohei Hanaoka, Chihiro Nakatsuka (KDDI)



- **G-PCC is considering additional LiDAR test sequences**
- **We are considering providing the data to improve G-PCC performance**
- **Based on the previous discussions, we'll confirm the requirements for the data in advance**

The current response to requirements for PCC

■ [WG11 N17353] Requirements for Point Cloud Compression

Requirements	Category 1	Category 2	Category 3
a) 3D positions	✓	✓	✓
b) Pre-defined attributes	✓ (colors)	✓ (colors)	✓ (colors, reflectance)
c) Generic attributes	x	x	x
d) View-dependent attributes	x	x	x
e) Time-varying	-	✓	x(✓)

('✓' = Supported, 'x' = Not supported yet, '-' = Not applicable)

■ [WG7 N0248] Proposed call for G-PCC content (draft version, not published)

- This document describes the requirements for LiDAR technology
- In addition to traditional 360-degree spinning LiDAR, it should be non-spinning scanning
- Current MPEG content does not support them.

The current response to use cases

■ [WG11 N16331] Use_Cases_for_Point_Cloud_ Compression_(PCC)

Use Case	Main Cat.	Insufficient Contents
Real-Time 3D immersive telepresence	2	-
Content VR viewing with Interactive Parallax	2	-
3D Free viewpoint Sport Replays Broadcasting	2	- Multiple clusters/groups of points (different players)
Geographic Information Systems	1	- Billions of points - Points have additional attributes related to geographic properties.
Cultural heritage	1	- Multiple clusters/groups of points
Autonomous Navigation Based on Large-Scale 3D Dynamic Maps	3	- Color attributes - Additional attributes

■ [m56747] Discussion about G-PCC codec dedicated to LiDAR

- This specifies future use scenarios for LiDAR. In addition to the autonomous vehicles, it proposed the following scenarios

- b. Indoor cleaning robots
- c. 3D surveillance cameras
- d. Drones
- e. Industrial
- f. Smart cities

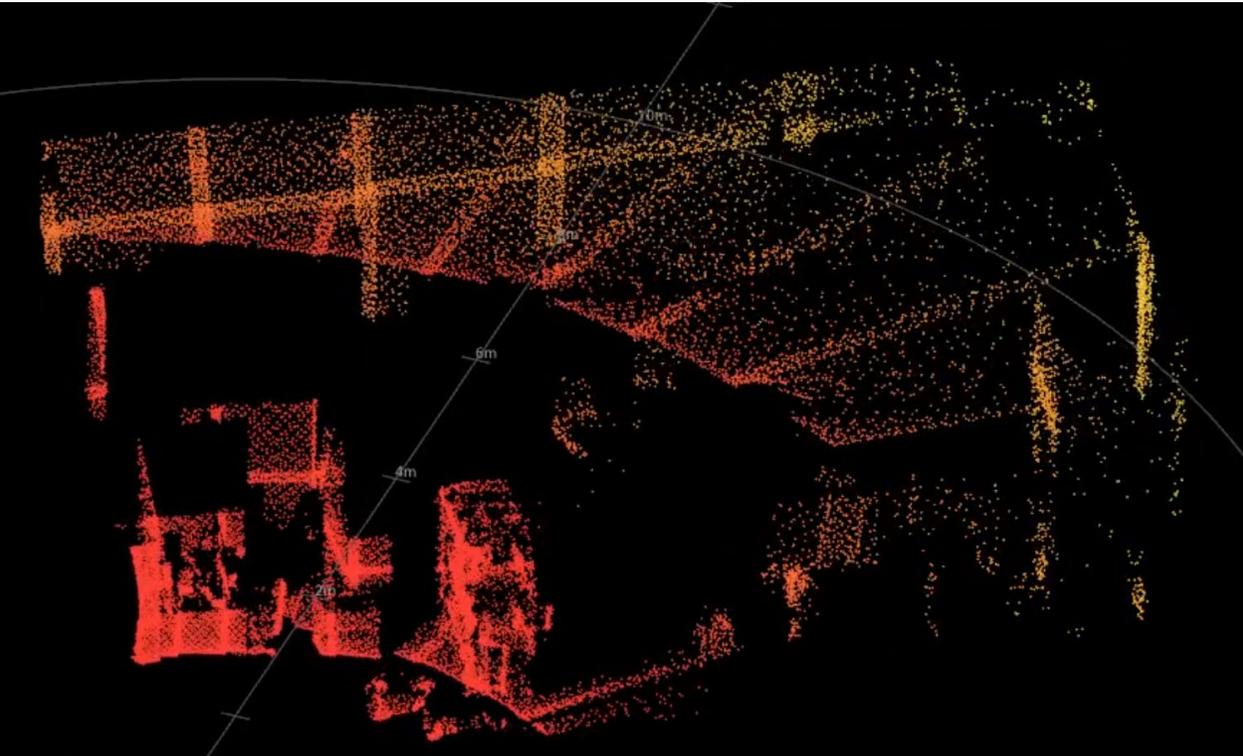
Requirements for new test sequences

- Based on the requirements and use cases in the previous slides, the following elements are primarily considered to be missing

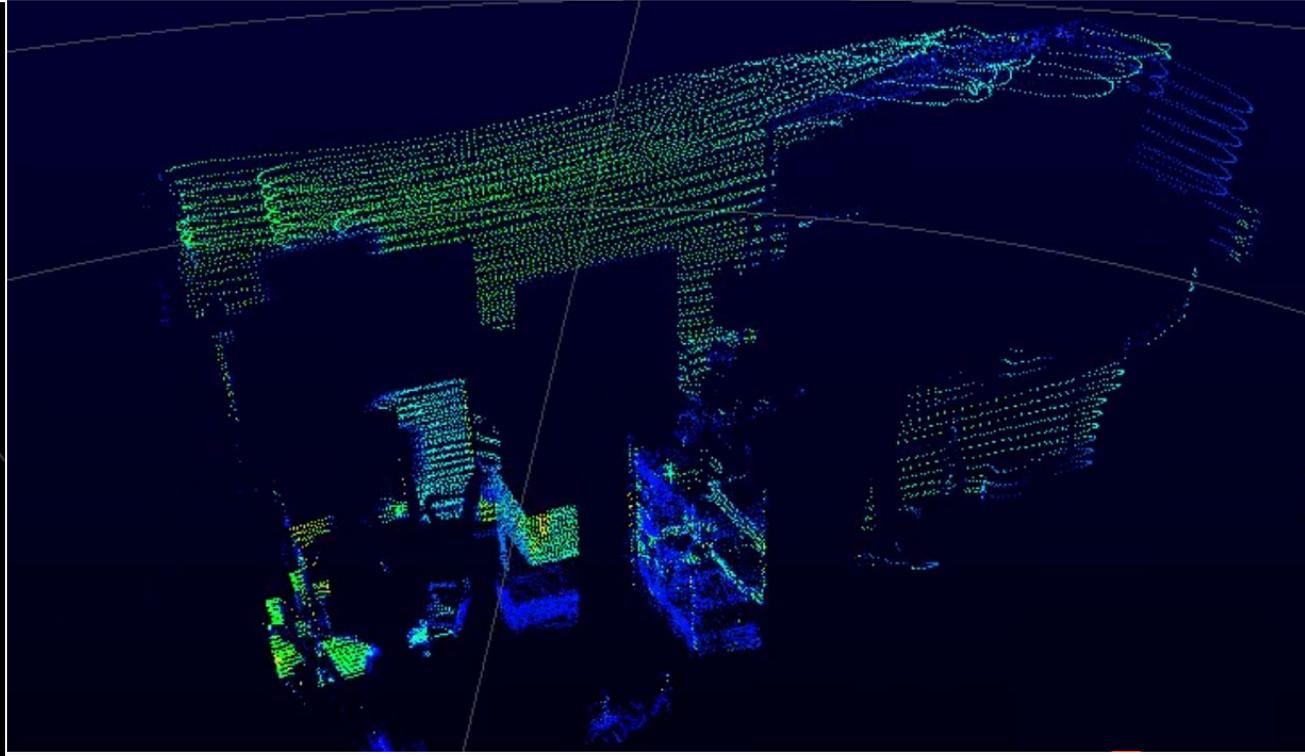
Items	Current Content	Required	Reasons
Scanning Method	Spinning LiDAR	Non-Spinning LiDAR (MEMS, Flash, etc.)	Inexpensive, used in automobiles, and expected to become more popular in the future
Attribute	Reflectance	RGB	More devices are capable of acquiring colors together with RGB cameras
The number of LiDAR	One	Two and more	Data combined from multiple LiDARs for Multiple clusters/groups. Unable to project to one depth image
Carrier	Vehicle	Fixed, Drone, Robot, Person	Increasingly lightweight, portable equipment. This has an impact on global mostion.
Targets	Road	Intersection, Terminal, Building, Room	Environments with a mixture of moving and stationary objects are expected

Examples) Non-Spinning LiDAR

- Non-Spinning LiDAR has different characteristics



(a) Non-Spinning LiDAR (Cepton)
Micro Motion Technology



(b) Non-Spinning LiDAR (Livox)
Original Non-repetitive way

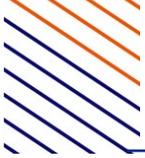
Examples of our future data

■ We now try to generate the following data first

Targets	LiDAR Type	No. of LiDARs	Attributes	Carrier
Building	Non-Spinning	One	RGB/Reflectance	People(Walking Around)
Building	Spinning	Two and more	RGB/Reflectance	Fixed
Open square + People	Non-Spinning	One	RGB/Reflectance	People(Walking Around)
Room	Non-Spinning	One	RGB/Reflectance	People(Walking Around)
Room + People	Non-Spinning	Two and more	RGB/Reflectance	Fixed
Swaying Trees	Non-Spinning	One	RGB/Reflectance	Fixed



Ex. building



Conclusion

- We have narrowed down the necessary data and proposed candidates for our future data

- In addition, given the current popularity of LiDAR, we recommend that use cases using LiDAR should be expanded beyond the initial use

- We plan to provide the new test sequences at the next or subsequent meetings

- Recommendations
 - Further study. We'll start to generate the data
 - We need opinions on the data and conditions to be generated
 - We would like to be included in the CE0.5 process when the data is submitted

