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| **Title** | Exploration Experiment on Carriage of Random Access Support in Scene Description |
| **Source** | **EE1 Coordinator** |
| **Status** | For discussion |
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# Abstract

This document provides descriptions of the Exploration Experiment on the proposed technologies for random access support for Scene Description for MPEG Media.

# Introduction

The goal of EE1 is to evaluate the proposed solutions on carriage of information, more specifically glTF objects and JSON Patches to enable temporal random access of MPEG scene description and the efficient storage of those elements. This will enable the Scene Description adhoc to validate random access capability, and to evaluate the efficiency and behavior of the proposed solutions. EE1 is expected to provide considerable insights in terms of the cumulative size of temporal random access data, and also the processing steps required, from the Presentation Engine perspective.

# Mandates

The mandates for this EE are as follows:

* To study the types of samples (including their data structure and storage format) which enable temporal random access
* To study the types of samples (including their data structure and storage format) which enable efficient storage of samples for a sequence of scene descriptions documents
* To study possible coding structures to provide efficient access of required data, in terms of
  + The required number of samples to construct an independent version of a scene description
  + The total size of sample payloads to deliver the randomly accessible dynamic scene descriptions
  + The benefit of storing the required samples in either one track or two (or more) tracks
  + Processing steps to construct an independent version of a scene description for random access operation
  + Processing steps to construct an independent version of a scene description for plain playback operation (i.e., normal scene update with no trick play)
* To provide recommendations on the best practices for the composition of the various types of samples
* To mandate text to be incorporated into the Second DIS of ISO/IEC 23090-14

# Participants

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
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(P = proponent, C = cross checker)

# Information about proposed technologies

## Anchor: M56439

See [1] for recommendation on the anchor.

See [2] and [3] for details and proposed specification text for the Second DIS accordingly.

## Method M57079

See [4] for details.

## Method M57542

See [5] for details.

# Evaluation

## Test sequence

* ABC\_v2 is used as the test sequence #1.
  + Use tag: [release “v1.0”] of EE1 test framework [6]
  + Use coding structure that provides random access point on 3rd, 5th, 7th samples
* A sequence generator that automatically generate random sequence is expected to be available by following the timeline.
  + The generator will generate a sequence of glTF/JSON by randomly adding/removing nodes.
  + The number of Scene Description versions and frequency of the random access point can be configured by config file.
  + The sequence generator, one specific sequence from the execution, and the configuration will be discussed then submitted by participants.

## Evaluation criteria

## Evaluation framework

For the evaluation of the technologies, the proponents are invited to use and add their proposal to the evaluation framework located at [7].

The proposed methods should be added to the ‘/methods’ folder of the framework.

## For random access

In this test case, the file is expected to have a first track providing the sequence of scene description documents over time. On top of this, the file provides efficient access to a subset of those scene description documents for enabling random access, i.e., the media player can start at those positions with a minimum of processing. The following criteria are considered for evaluating such technologies:

* Test No. A-1) Total size of sample payloads (from all tracks).
* Test No. A-2) Random access: A simple python code using the evaluation framework to construct an independent version of v3, v5, v7.

For this test case, the anchor to compare against is a track containing one sync sample for each complete scene description document at those positions.

## For efficient storage of glTF document sequence as samples

In this test case, the file is expected to have one track providing the sequence of scene description documents over time. This track may have one or more sync samples for reducing the total size of the track but random access to arbitrary positions is not the purpose. The following criteria are considered for evaluating such technologies:

* Test No. B-1) The required number of samples to construct each independent version (v1, v2, v3, v4, v5, v6, and v7).
* Test No. B-2) Total size of sample payloads (from all tracks if more than one although not expected).
* Test No. B-3) Plain playback: A simple python code or processing steps to construct an independent version of v2 from v1, v3 from v2, v4 from v3, v5 from v4, v6 from v5, v7 from v6.

For this test case, the anchor to compare against is a track containing one sync sample for each complete scene description document.

## Evaluation

Evaluation experiments are to be carried out under the same evaluation criteria compared with other proposals. Option A should be included to assure participant’s common understandings on the evaluation.

## For random access

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Test no |  | Proposed method | Analysis on method A | Analysis on method B | Analysis on method C | Analysis on method D |
| A-1 | all versions | 000 bytes |  |  |  |  |
| A-2 | v3, v5, v7 | Code or report |  |  |  |  |

## For efficient storage of glTF document sequence as samples

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Test no |  | Proposed method | Analysis on method A | Analysis on method B | Analysis on method C | Analysis on method D |
| B-1 | v1 | 0 samples |  |  |  |  |
|  | v2 | 0 samples |  |  |  |  |
|  | v3 | 0 samples |  |  |  |  |
|  | v4 | 0 samples |  |  |  |  |
|  | v5 | 0 samples |  |  |  |  |
|  | v6 | 0 samples |  |  |  |  |
|  | v7 | 0 samples |  |  |  |  |
| B-2 | all versions | 000 bytes |  |  |  |  |
| B-3 | v2, v3, v4, v5, v6, v7 | Code or report |  |  |  |  |

## Timeline

* 2021-07-16: Release of EE1 description
* 2021-08-31: Release of a glTF sequence generator script
* 2021-09-15: Agreement on new added test sequences
* 2021-09-29: Deadline for participants to submit working code to EE1-framework [7].
* 2021-10-06: MPEG document upload deadline
* 2021-10-11: MPEG #136(online) meeting start

## References

1. M57550, Report of Exploration Experiments 1
2. M56439, Carriage of glTF JSON documents and JSON patch documents
3. M57647, Specification text for selected method from EE1
4. M57079, Response to EE on Scene Description
5. M57542, Optimised glTF target file patching
6. <https://gitlab.com/mpeg-i/scene-description/ee1-framework/-/releases#v1.0>
7. <https://gitlab.com/mpeg-i/scene-description/ee1-framework>