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1 Introduction

MPEG-DASH and other systems based on the movie fragments tools defined in the ISO Base Media File Format usually assume fixed frame-rate, at least during the transmission time of a single segment. During some of our experiments with low-delay transmission time of fragmented ISO media file, we found out that the format currently defined is not the most friendly with variable frame rate media.

2 Problematics

ISOBMF stores media sample timing based on their duration, and optional time offsets to handle temporal re-ordering of bi-directionally coded video. Unlike RTP or MPEG-2 TS, it is not possible to send a media frame without knowing its duration. While this is usually not problematic for off-line content or fixed frame-rate content, it may become an issue for live variable frame-rate content, as it is often used in video surveillance. In such cases, in order to produce a segment containing frames of varying durations, one has to know the duration of the last frame, which can introduce a very long latency.
For the purpose of randomly accessing a set of movie fragments, ISOBMF has introduced the `tfdt` tool allowing a client to know what is the time of the first sample in a track fragment, without having to know the overall duration of the past samples. However, the specification states that this duration is *equal to the sum of the decode durations of all earlier samples in the media, expressed in the media's timescale.*
This forces that the previous sample has to be written in the file only when its duration is known.

3 Proposal

We suggest removing this constraint by allowing the `tfdt` to act as an adjustment of the media timing in the case of variable frame rate. This would allow fast transfer of media frames even though their duration is not known. We therefore propose to change the semantics of `tfdt`'s `baseMediaDecodeTime` as follows:

Replace

« `baseMediaDecodeTime` is an integer equal to the sum of the decode durations of all earlier samples in the media, expressed in the media's timescale. It does not include the samples added in the enclosing

track fragment. »

with

« `baseMediaDecodeTime` is an integer equal or greater to the sum of the decode durations of all earlier samples in the media, expressed in the media's timescale. It does not include the samples added in the enclosing track fragment. If greater than the cumulated duration of all earlier samples in the media, the difference in media's timescale is added to the duration of the media sample of this track immediately preceding this track fragment.»

4 Conclusion

We suggest the File Format AhG to update the semantics of the tfdt in order to allow for low-latency transmission of variable frame rate in MPEG-DASH or other solutions based on ISOBMF movie fragments.