

**INTERNATIONAL ORGANISATION FOR STANDARDISATION
ORGANISATION INTERNATIONALE DE NORMALISATION
ISO/IEC JTC1/SC29/WG11
CODING OF MOVING PICTURES AND AUDIO**

**ISO/IEC JTC1/SC29/WG11 MPEG2012/M28137
January 2013, Geneva**

Source **Telecom ParisTech**
Status **For consideration at the 103nd MPEG meeting**
Title **On Low Latency Live**
Author Jean Le Feuvre, Cyril Concolato

1 Introduction

This contribution proposes a few add-ons for live DASH, especially on startup delays.

2 MinimumUpdatePeriod

For dynamic MPDs, the specification currently forces an MPD to either have @minimumUpdatePeriod different from zero or @mediaPresentationDuration specified. This means that it is not possible to use a single, static MPD for an indefinite live case. To the best of our knowledge, there is no real justification for this, and we suggest removing this constraint, especially considering that inline messages in media segments may be used to force reloading MPD even if no update period was set.

3 \$Time and sidx

When using SegmentTemplate and \$Time identifiers, the specification currently forces the usage of sidx boxes. However, it only forces values between SegmentTimeline and sidx box to be aligned, in other words using only the SegmentTimeline is sufficient to resolve the segment URL template. Furthermore, forcing usage of sidx for low latency cases may be problematic, as one has to wait for the entire segment to be generated to produce the sidx, even when timing of segments is known in advance. We therefore suggest removing this limitation, and changing the specification from:

«

- at least one Segment Index ('sidx') box shall be present
- the values of the **SegmentTimeline** shall describe accurate timing of each Media Segment. Specifically, these values shall reflect the information provided in the Segment index ('sidx') box [...]

»

to

«

- the values of the SegmentTimeline shall describe accurate timing of each Media Segment.
- if a Segment Index ('sidx') box is present, the values of the SegmentTimeline shall reflect the information provided in the Segment index ('sidx') box [...]

»

4 MPD Bootstrap

One issue using ISOBMF file format as a media segment is that it requires an initialization segment (IS) to be downloaded. In the best case, this means that a client will need to issue one HTTP request for the MPD, and one HTTP request for the IS of the representation selected for initial playback. In the worst case (no HTTP pipelining and *@bitstreamSwitching=false*), this means NbRepresentation+1 HTTP requests before playback.

In order to avoid this double download, it should be possible to add the missing information in the MPD itself.

One simple yet working approach could be to base64 encode the initialization segment in the MPD.

When looking more closely at the problem, it appears that most useful information present in the initial segment moov is either present in the mpd, such as width, height, codec profiles, samplerate, timescale ("It is recommended that the @timescale attribute in the MPD matches the timescale field in the Media Header Box of a present track.").

Another more subtle approach is to add missing information for moov reconstruction.

The important parts missing from the MPD to reconstruct the moov (or at least parse movie fragments) are:

Decoder Configuration (as typically provided in an SDP description):

- stsd table for audio, or at least AudioObjectConfig encoded
- for any other media, writing the stsd table in the MPD is sufficient to process the media,
- For AVC or HEVC, when using in-band storage of Parameter Sets, nothing is needed

Fragments Configuration:

- For multiplexed representation, TrackID is needed. Otherwise a single track is used, trackID can be ignored
- Default sample properties and flags are needed. Looking more closely, default sample flags are usually set to a default value (all 0 except sample_is_non_sync), default sample description is set to 1 and only sample duration is set. By choosing careful default values in the MPD, only sample duration would need to be indicated. The fragmentDuration present in the optional "mehd" box could also be indicated.

We therefore propose a new element called *<ISOBMFMoov>*, child of SegmentList, SegmentTemplate or ContentComponent with the following attributes:

Element or Attribute Name	Use	Description
trackID	O	contains the trackID value. Mandatory for multiplexed

		representations, optional otherwise (trackID is then indicated in the traf header)
defaultSampleFlags	OD	hexa-decimal value of default sample flags; default value is 0x10000 (sample_is_non_sync=1)
defaultSampleSize	OD	default sample size of samples; default is 0
defaultSampleDescriptionIndex	OD	default sample description index of samples (default is 1)
sampleDuration	M	default sample duration of samples
mediaTimescale	CM	If present, indicates the media timescale of the track; otherwise, the media timescale is indicated in the @timescale attribute
stsd	O	If present, contains the base64 encoded value of the stsd box of the initialization segment.

When the *<ISOBMFMoov>* is present, an implementation may choose to use the information of this element to reconstruct a compatible initialization segment, or may choose to retrieve the indicated initialization segment, if any.

5 Conclusion

In this contribution, we have shown some restrictions of the current specification for Live cases, and proposed to remove them. We have also proposed a mechanism to fast-bootstrap a DASH session in the case of ISOBMF-based segments, which remains compatible with existing DASH deployments.