

## CHANGE REQUEST

**DASH-IF IOP** CR **0116** rev - Current version: **4.0**

**Status:**  Draft  Internal Review  Community Review  Agreed

**Title:** Last Segment Indication

**Source:** DASH-IF IOP

**Supporting Companies:**

**Category:** **C** **Date:** 2017-03-14

Use one of the following categories:

**C** (correction)

**A** (addition of feature)

**B** (editorial modification)

**Reason for change:** <https://github.com/Dash-Industry-Forum/DASH-IF-IOP/issues/116>

**Summary of change:**

- Permit lmsg also for On-demand, for On-demand recommend that parsing only should happen at the end of a Period.
- Recommend to use the segment timeline @r set to the correct number if you do not want that the client needs to parse the segments for lmsg.
- Add a descriptor to signal the number of the last segment in the Representation.

**Consequences if not approved:** See issue above

**Sections affected:** 4.3.2.2.5, 4.3.5.5, 4.3.5.6 (new)

**Other comments:**

## Add section

### 4.3.2.2.5 Representation Information

Based on such an MPD at a specific time *NOW*, a list of Segments contained in a Representation in a Period *i* with Period start time *PSwc[i]* and Period end time *PEwc[i]* can be computed.

If the **SegmentTemplate.SegmentTimeline** is present and the **SegmentTemplate@duration** is not present, the **SegmentTimeline** element contains *Ns* **S** elements indexed with *s*=1, ..., *Ns*, then let

- *ts* the value of the @timescale attribute
- *ato* is the value of the @availabilityTimeOffset attribute, if present. Otherwise it is zero.
- *t[s]* be the value of @t of the *s*-th **S** element,
- *d[s]* be the value of @d of the *s*-th **S** element
- *r[s]* be,
  - if the @r value is greater than or equal to zero
    - one more than the value of @r of the *s*-th **S** element. Note that if @r is smaller than the end of this segment timeline element, then this Representation contains gaps and no media is present for this gap.
  - else
    - if *t[s+1]* is present, then *r[s]* is the ceil of  $(t[s+1] - t[s])/d[s]$
    - else *r[s]* is the ceil of  $(PEwc[i] - PSwc[i] - t[s]/ts)*ts/d[s]$

If the **SegmentTemplate@duration** is present and the **SegmentTemplate.SegmentTimeline** is not present, then

- *Ns*=1,
- *ato* is the value of the @availabilityTimeOffset attribute, if present. Otherwise it is zero.
- *ts* the value of the @timescale attribute
- *t[s]* is 0,
- the *d[s]* is the value of @duration attribute
- *r[s]* is the ceil of  $(PEwc[i] - PSwc[i] - t[s]/ts)*ts/d[s]$  ([see note below](#))

Note that the last segment may not exist and *r[s]* is one less than this computation provides. For more details, refer to section 4.3.5.6.

### 4.3.5.5 Last Segment Message

The content author may signal the last segment of a Representation by using the `lmsg` brand in the segment. If `lmsg` is signaled in the Representation, the @segmentProfiles attribute for this Representation should signal the 'lmsg' brand for this Representation. If the @segmentProfiles includes the 'lmsg' brand for a Representation, then the 'lmsg' brand shall be included for the last segment of the Representation in a Period.

For non-live MPDs, i.e. @minimumUpdatePeriod not present, and if the `lmsg` is signaled in the MPD, the DASH client should search for the `lmsg` brand at at least the last two Segments of a Period, and not request Segments that are later than the one for which the `lmsg` brand was provided. The player may also parse every Segment for `lmsg`.

For live MPDs, i.e. @minimumUpdatePeriod is present, if the @segmentProfiles contains the 'lmsg' brand for a certain Representation, then the 'lmsg' brand for signaling the last segment

shall be applied for any content with `MPD@minimumUpdatePeriod` present and the `MPD@type="dynamic"`.

DASH clients operating based on such an MPD and consuming the service at the live edge typically need to request a new MPD prior to downloading a new segment. However, in order to minimise MPD requests and resulting traffic load, the client may use one or more of the following optimisations:

- If the client fetches the MPD using HTTP, the client should use conditional GET methods as specified in RFC 7232 **Error! Reference source not found.** to reduce unnecessary network usage in the downlink.
- If the `@segmentProfiles` contains the 'lmsg' brand clients may also rely on the 'lmsg' message and request a new MPD only in case a segment is received with an 'lmsg' brand. Otherwise the client may use template constructions to continue determining the URL and the segment availability start time of segments.

If the attribute `MPD@minimumUpdatePeriod` is set to a value greater than 0 then all Segments with availability start time less than the sum of the request time and the value of the `MPD@minimumUpdatePeriod` will eventually get available at the advertised position at their computed segment availability start time. Note that by providing a `MPD@minimumUpdatePeriod` is set to a value greater than 0, DASH servers reduce the polling frequency of clients, but at the same time cannot expect that clients will request an updated MPD to be informed on changes in the segment URL constructions, e.g. at the start of a new Period.

#### **4.3.5.6 Signalling the last segment number in Period.**

As indicated in clause 4.3.2.2.5, the content provider may not offer the last segment that is signaled in the MPD. If this is the case, the content provider should signal that the last segment is not the one indicated in the MPD.

At least the following three options may be considered:

- Use the lmsg signalling as defined in clause 4.3.5.5
- Use the Segment Timeline with `@r` value greater or equal to 0.
- Add a Supplemental Descriptor with `@schemeIdUri` set to <http://dashif.org/guidelines/last-segment-number> with the `@value` set to the last segment number.