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1 Introduction

During its 114th meeting, MPEG produced a TuC document on DASH (N15985). In this document, section 5 asks for "contributions on how to include Initialization Segments or parts of it in MPD". This contribution provides details on these aspects.

2 MPD Transformation

2.1 Process

We wrote an application that takes an MPD URL, fetches the MPD, parses it and changes the links to initialization segments with a URL using the data scheme and the base64 encoding. The principle is simple:

- traverse the MPD tree, propagate templated initialization segment URLs (if any) down the MPD levels (Period, AdaptationSet) to the Representation level (only for the first Period)
- resolve the template (if any) potentially using BaseURL elements (if any), download the resolved IS and add a SegmentTemplate element with a "data:" URL scheme whose content is the base64 encoded IS.

2.2 Examples

We provide at a publicly available URL¹, several MPD transformed using the above process. The original MPD were obtained from the DASH.js web site². The transformed MPD refer to the original MPD by means of a BaseURL element pointing to the original location of that MPD. This is done so that the URLs for media segments remain valid after relocating the transformed MPD on our web site.

¹ http://download.tsi.telecom-paristech.fr/gpac/DASH_CONFORMANCE/TelecomParisTech/base64/

² <http://dashif.org/reference/players/javascript/nightly/dash.js/samples/dash-if-reference-player/index.html>

For example, the following MPD part:

```
<AdaptationSet startWithSAP="2" segmentAlignment="true" id="1" sar="1:1"
mimeType="video/mp4" >
  <InbandEventStream schemeIdUri="tag:rdmedia.bbc.co.uk,2014:events:ballposition"
value="1"/>
  <Role schemeIdUri="urn:mpeg:dash:role:2011" value="main"/>
  <BaseURL>avc3-events/</BaseURL>
  <SegmentTemplate startNumber="1" timescale="1000" duration="3840"
media="$RepresentationID$/$Number%06d$.m4s" initialization="$RepresentationID$/IS.mp4"
/>
  <Representation id="960x540p50" codecs="avc3.64001f" height="540" width="960"
frameRate="50" scanType="progressive" bandwidth="2814440" />
  ...
  <Representation id="192x108p6_25" codecs="avc3.42c015" height="108" width="192"
frameRate="25/4" scanType="progressive" bandwidth="31368" />
</AdaptationSet>
```

was modified to move the templated @initialization attribute from the AdaptationSet/SegmentTemplate element to each Representation/SegmentTemplate element:

```
<AdaptationSet id="1" segmentAlignment="true" sar="1:1" mimeType="video/mp4"
startWithSAP="2" maxPlayoutRate="1">
  <InbandEventStream schemeIdUri="tag:rdmedia.bbc.co.uk,2014:events:ballposition"
value="1"/>
  <Role schemeIdUri="urn:mpeg:dash:role:2011" value="main"/>
  <BaseURL>avc3-events/</BaseURL>
  <SegmentTemplate media="$RepresentationID$/$Number%06d$.m4s" timescale="1000"
duration="3840" startNumber="1"/>
  <Representation id="960x540p50" bandwidth="2814440" width="960" height="540"
frameRate="50/0" codecs="avc3.64001f" maxPlayoutRate="1" scanType="progressive">
    <SegmentTemplate
initialization="data:video/mp4;base64,AAAAHGZ0eXBpc282AAAAWF2YzFpc29tZGFzaAAAA1dtb292
...AAAAAAAAAAAAAAAAAAQc3RjbwAAAAAAAAAA" />
  </Representation>
  ...
  <Representation id="192x108p6_25" bandwidth="31368" width="192" height="108"
frameRate="25/0" codecs="avc3.42c015" maxPlayoutRate="1" scanType="progressive">
    <SegmentTemplate
initialization="data:video/mp4;base64,AAAAHGZ0eXBpc282AAAAWF2YzFpc29tZGFzaAAAA1Ntb292
...AAAAAAAABBzdHNjAAAAAAAAAAAAAAAAAAUc3RzegAAAAAAAAAAAAAAAAAAABBzdGNvAAAAAAAAAA=" />
  </Representation>
</AdaptationSet>
```

2.3 Playback

We implemented support for the data-scheme in IS URLs in MP4Client (GPAC's player). The MPD provided in the link above can be played successfully with MP4Client.

Note: to effectively assess the benefits of this approach and reproduce the gains indicated in the TuC, the modified MPDs need to be hosted on the same servers as the original MPDs (and media segments).

3 Proposal

We propose to modify the definition of HTTP-URL as follows:
replace

HTTP-URL

URL with a fixed scheme of "http" or "https"

With

HTTP-URL

URL with a fixed scheme of “http” or “https” or conforming to RFC 2397

For backward compatibility reason, it is furthermore needed to advertise the usage of data URL scheme. We propose to add an EssentialProperty at the MPD level with the following schemeID (table 22a):

<code>urn:mpeg:dash:url:data:2016</code>	The identifier indicates that the http-URL used in this MPD may contain « data: » scheme as specified by RFC2397. In the absence of an EssentialProperty with this scheme type at the MPD level, all HTTP-URL used in the MPD shall be restricted to « http » and « https » schemes.
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4 Conclusion

Based on the results exposed in the TuC and on the above experiment, we recommend MPEG to adopt the proposal in a new DASH amendment.