Usages of DASH for Rich Media Services

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Rich Media Services

- **Services featuring**
  - Multiple media elements
    - audio, video, text, 2D/3D graphics
  - Dynamicity
    - Changing text, animated graphics, …
    - Possibly triggered on server-side (streaming)
  - Synchronization with media elements
  - Interactivity

- **Example of Rich Media Technologies**
  - HTML 5, MPEG-4 BIFS, Flash…
Context

- **Rapid development of HTTP Streaming technologies**
  - MPEG, 3GPP, OIPF, W3C, …

- **Increased usages of Rich Media Technologies**
  - Presentation glue for A/V content (HTML+video)
  - Streamed services including live meta-data (SVG/DIMS, MPEG-4 BIFS)
Research Questions

- How can Rich Media languages use DASH-delivered audio/video content?
  - Study A

- How can Rich Media content be delivered over DASH?
  - Study B
Study A: Description

- **Goal**
  - Provide a generic API for MPD manipulations within a rich media document
  - Compatibility with existing Rich Media languages

- **Hypothesis**
  - Bandwidth related manipulations are handled at the DASH level
  - Trick Mode related manipulations may be handled at both DASH and browser levels

- **Requirements**
  The API shall provide access to:
  - The desired video resolution & frame rate
  - The desired language
  - The desired quality
  - The desired view
Study A: Solutions

- Use of fragment identifiers

```html
<video src="dash.mpd#viewpoint=1&width=176&height=144">
</video>
```

- Use of attributes in DASH namespace

```html
<video src="dash.mpd">
<track kind=subtitles src="dash.mpd"
    dash:qualityRanking="1" srclang="en">
</video>
```

- Use of ECMAScript

```javascript
var track = createTrackFromDASH('subtitles','lang','en');
```
Study B: Description

Goal
- Deliver Rich Media Streams synchronously with related audio/video data
- Automatic repackaging of existing broadcast interactive services over DASH

Requirements
- Enable transposition of the traditional carousel approach
  - Minimize bandwidth, leverage HTTP
  - Preserve interactivity

Use case
- Digital Radio Service [demonstration: http://www.youtube.com/watch?v=Bmer91TZhCo]
  - T-DMB (MPEG-2 TS + MPEG-4 A/V + MPEG-4 BIFS)
Digital Radio Service & Broadcast environment

Digital radio stream

Audio

Data carousel (500 ms)

Data carousel (2 s)

Live data

Digital radio receivers
Approach 1: Basic Segmentation

Digital radio stream segments

- Segment the MPEG-2 TS
  - Possibly with «carousel» alignment
  - Bandwidth inefficient because of carousel
  ⇒ Need to extract «carousel» data out of media segments
Approach 2: Initialization Segment

- Data into IS not yet allowed by the DASH standard
- Problem: how to signal version number increment
  - Without requiring the use of new periods
Approach 3: External data references

Digital radio stream segments

- Media Segment with initial data references
  - ★ = HTTP link to
  - ✪ = HTTP link to

- Media Segment with updated data references
  - ★ = HTTP link to
Approach 3: External data references (cont’d)

- External Data References and Segment formats
  - Not possible with MPEG-2 TS syntax
    - Potentially possible with FLUTE or others but high overhead
  - Possible with DataReferenceBox in MP4
    - Not yet authorized by the DASH standard

- Additional problem
  - Avoid carousel refresh for DASH clients already « tuned-in »
    => Use of « redundant » signaling in MP4
Additional Consideration: Redundant Signaling

- Client 1 starts and requests segment #n
- Client 1 processes segment #n including «Carousel» data
- User interacts with Client 1 and locally changes the Rich Media State
- Client 1 requests segment #n+1
- Client 1 ignores redundant data (preserved interaction)
- Media Segment #n
- Media Segment #n+1
- No change in «carousel» data
- Client 2 starts and requests segment #n+1
- Client 2 processes «Carousel» data

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Study B: Summary of solutions

- **Use of data in Initialization Segment (IS)**
  - Under evaluation for DASH

- **Use of external data references (EDR)**
  - Requires MP4
  - Under evaluation for DASH

- **Use of redundant signaling (RS) in MP4 for RM data**
  - Accepted as an MP4 amendment

- **Possible joint usages:**
  - IS+EDR or EDR + RS or IS+EDR+RS
Implementation

- **GPAC Open Source Projet**
  - DASH Player
    - Supports MPD and M3U8 playlists
  - MP4Box
    - Segmentation tool for MP4 files
  - MP42TS
    - DVB & DMB Mux
    - Segmentation
Thank you

Questions?

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