MSE/EME:
Potential implementation issues on TV sets
A Case Study of IPTV Forum-Japan Player

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Overview / Background
- ▸ Why and How did we develop it?

Demo
- ▸ How does it work?

Issues in implementing a VoD service on TV
- ▸ Stable Playback for High-quality(2k/4k/8k) Video
- ▸ Time-accurate Presentation with Video
- ▸ Seamless Transition between Periods

>Background

Hybridcast Technical Specification 2.0 (IPTVFJ STD-0010/11)

➢ Includes support for MPEG-DASH

IPTVFJ STD-0013 (operational rule)

➢ Defines IPTVFJ MPEG-DASH profile based on the use of MSE/EME

"IPTVFJ Dash Player" is under development

➢ A Mutual MPEG-DASH Player

>Requirements

To Be Near and/or Beyond the Broadcasting Services

- UHD Ready
- Seamless "Broadcasting to Streaming" Switching
- AD insertion and Playback control

UHD Capability

- Some Contents has created in UHD, while most of Broadcasting platform is HD.
- Streaming UHD playback controlled by Broadcasting signal

VoD services on Hybrid-TV Platform

- AD insertion and playback control
- Multi-Device Deployment
- Subtitling

>IPTVFJ Dash Player

to achieve best performance on TV platform.

- Derived from "dash.js"
- Running under Low Computing Power
- Applicable for One Video Decoding Engine
  - Only one <video> can be used at the same time.
  - Seamless Period transition for AD-insertion.
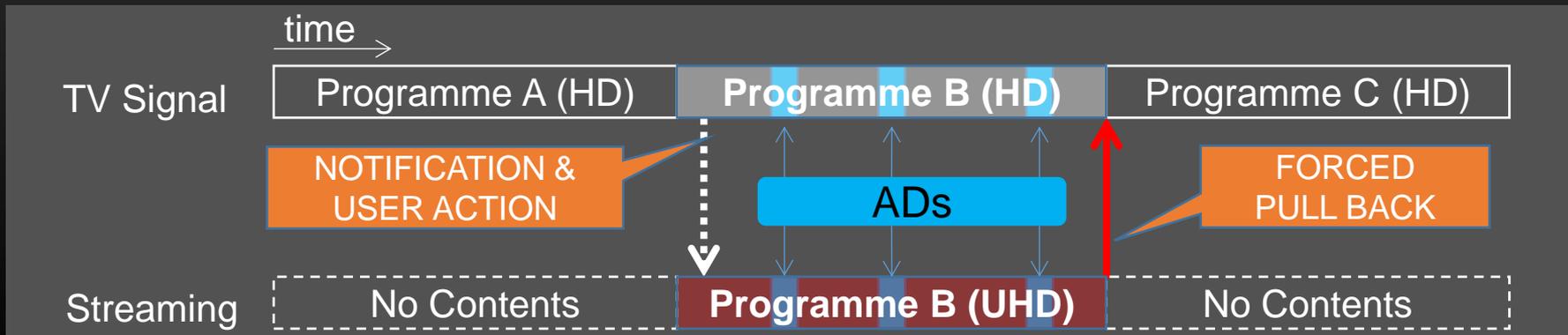- Managing Short MSE Buffer

>DEMO:

2 types of Use Cases:

    A)   (quasi-) Seamless Switching form TV to Streaming

    B)   AD Playback control

>DEMO
## (A). Seamless Switching from TV to Streaming

- User has a Hybridcast 2.0 compliant UHD TV.

- Broadcasters can control UI to switch from TV to Streamed UHD content.

- User can watch Contents in UHD format by streaming <u>on the same timeline</u>.

- Screen should "pulled back" to TV Signal after UHD contents ends.

time →

| TV Signal | Programme A (HD) | **Programme B (HD)** | Programme C (HD) |

NOTIFICATION & USER ACTION

ADs

FORCED PULL BACK

| Streaming | No Contents | **Programme B (UHD)** | No Contents |

>DEMO
(B) AD insertion and Playback Control

- Disabling Trick play (Search, FF, REW) during AD insertion.

- Most of VoD Sites Supports this Function.
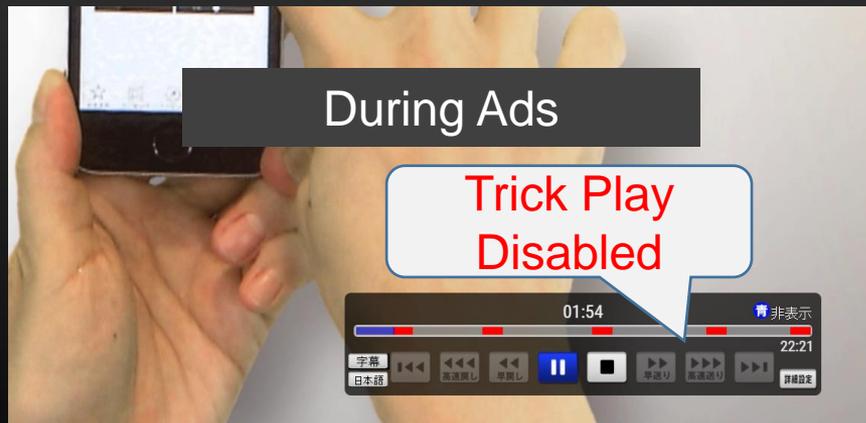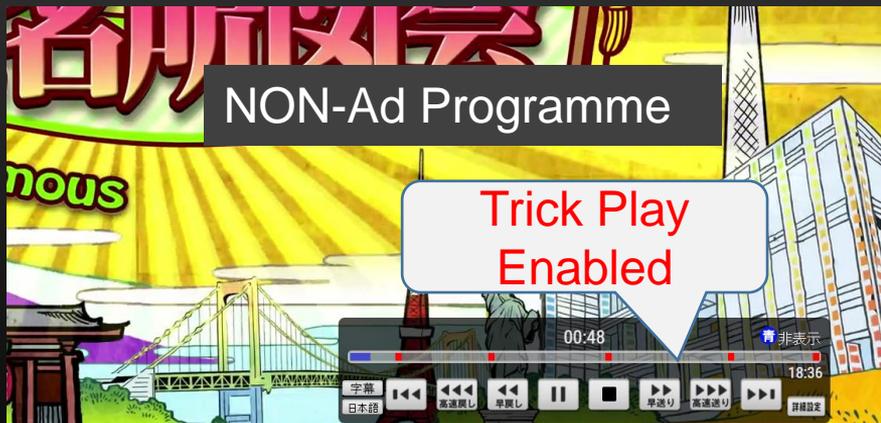
>DEMO

For more detail informaiton and conversation, plaease Visit our Demo Site in Hall-B.

>Issues
 in Implementing a VoD Service on TV

1) Stable Playback for High-quality(2k/4k/8k) Video

2) Time-accurate Presentation with Video
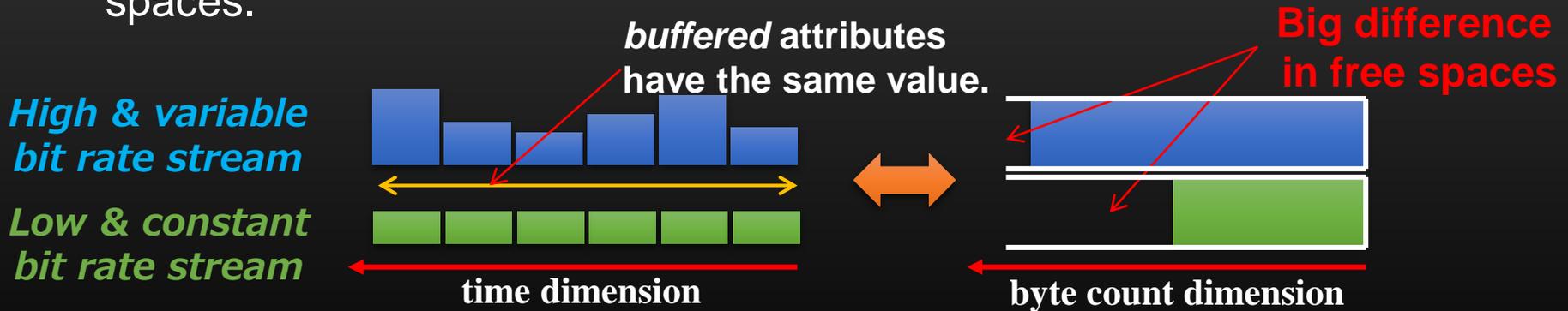
3) Seamless Transition between Periods

1) Stable Playback for High-quality(2k/4k/8k) Video

- **Requirement:**
  - ▸ Stable high-quality video playback on TV devices with small buffer size.

- **Issues:**
  - ▸ No APIs are defined to know how much space left in a ***SourceBuffer***.
  - ▸ *Using **buffered** attribute (TimeRanges) is not enough to estimate free spaces.*

buffered **attributes have the same value.**

Big difference in free spaces

High & variable bit rate stream

Low & constant bit rate stream

time dimension

byte count dimension

  - ▸ *Using **HTMLMediaElement.readyState** and **QuotaExceededError*** exception seems to be the proper way. But they are not widely or correctly implemented.

2) Time-accurate Presentation with Video

- Requirement:
  - ▶ Present texts and graphics in sync with video at low processing load.

- Issues:
  - ▶ Since the interval of *timeupdate* event depends on implementation, it is difficult to find a good balance of the accuracy and processing load through different models.

  - ▶ A use of *setInterval* can control frequency and accuracy but requires additional processing load.

  - ▶ It is ideal if the event mechanism like *cuePoint** in *Actionscript* is available, but such methods are not yet defined.

* http://help.adobe.com/en_US/ActionScript/3.0_UsingComponentsAS3/WS5b3ccc516d4fbf351e63e3d118a9c65586-7feb.html
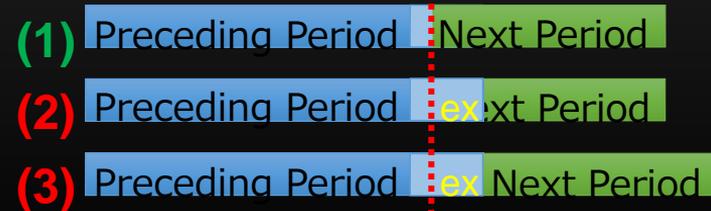
3) Seamless Transition between Periods

- Requirement:
  - Seamless ad-insertion with a single video tag.

- Issues:
  - Since programme content and ads are encoded from different sources, gaps tend to be created in *SourceBuffer* at Period boundaries.

  - Such gaps cause stalling.

  - Seamless transition can be achieved by slightly overlapping media data of each Period.

  - We expect overwriting behavior as defined in the spec(depicted in **(1)**). However there exist different implementations(**(2)**,**(3)**).

Period duration

Preceding Period | Next Period

Actual media length | **Gap**

Period duration | Next Period

Preceding Period | ex

Extra cuts

(1) Preceding Period | Next Period

(2) Preceding Period | ext Period

(3) Preceding Period | ex Next Period

- We raised three issues that we have been facing in implementing a VoD service on Hybrid TV.

- We look forward to solutions for these issues in order to provide good quality of services that meets broadcasting industry requirements.

Thank you!