

MULTI-DRM BACKENDS & STREAMING FORMATS

Stefan Pham, 10/19/2016, HbbTV Symposium

AGENDA

1. Motivation

2. Media Formats & Standards

- Adaptive Streaming
- Content Protection

3. DRM Overview

- Platform & Device Support

4. Outlook

1. Motivation

INTERNET DELIVERED MEDIA

Where we are:

- Very popular commercial OTT streaming services, e.g. Netflix, “Mediatheken”, Spotify, ...

What we work with and where we start:

- Different device platforms & multi-screen functionality – *how to reach them all?*
- Other factors: *Regulatory* (DRM, parental control), *Scalability* (CDNs), *Monetization* (subscription, advertisement), *Quality/UX* (4K)

Outlook and solutions:

- ⇒ *The Web Browser nowadays represents the common app platform across devices*
- ⇒ *Plugin/NPAPI plugins (Flash, Silverlight) are replaced with HTML5 <video> and media extensions*

DEVICE DIVERSITY



*www.apple.com



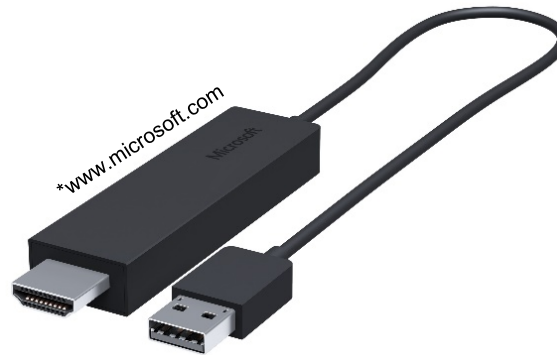
*www.sony.com



*www.google.com



*www.amazon.com



*www.microsoft.com



*www.sony.com



*www.microsoft.com

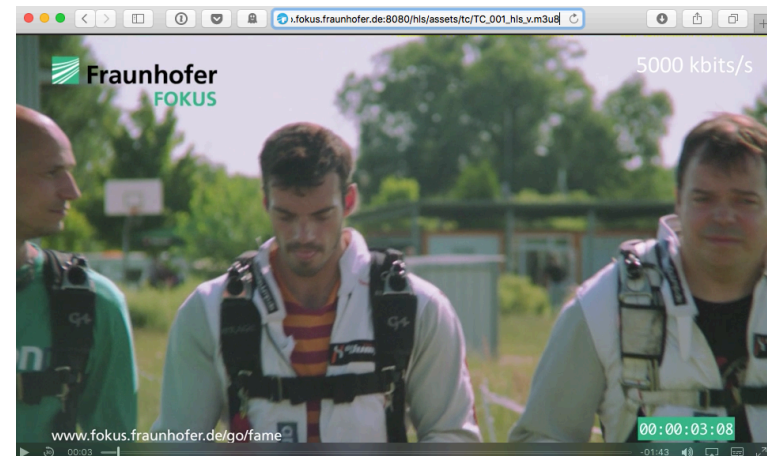
2. Media Formats & Standards

DELIVERING MEDIA: TECH TO UNDERSTAND

- **DASH** – MPEG **D**ynamic **A**daptive **S**treaming over **H**TTP for live and on demand video
- **HLS** – Apple **H**TTP **L**ive **S**treaming for live and on demand video
- **CMAF** – MPEG Draft **C**ommon **M**edia **A**pplication **F**ormat
- **CENC** – MPEG **C**ommon **E**ncryption for multi-DRM
- **MSE** – W3C **M**edia **S**ource **E**xtension to trick-function HTML5 video-objects via JavaScript (control AV media streams)
- **EME** – W3C **E**ncrypted **M**edia **E**xtension to play back DRM-protected media in standard browsers w/o the use of proprietary plug-ins
- **CDM** – **C**ontent **D**ecryption **M**odule - addition to the browser that provides functionality for one or more Key Systems

TYPES OF BROWSER-BASED PLAYBACK

- Type 1: HTML5 <video>
`<video id="video" controls width=1280 height=720 src="dash.mpd"></video>`
- Type 2: HTML5 <video> + ABR API
- **Type 3: Media Source Extension (MSE)**

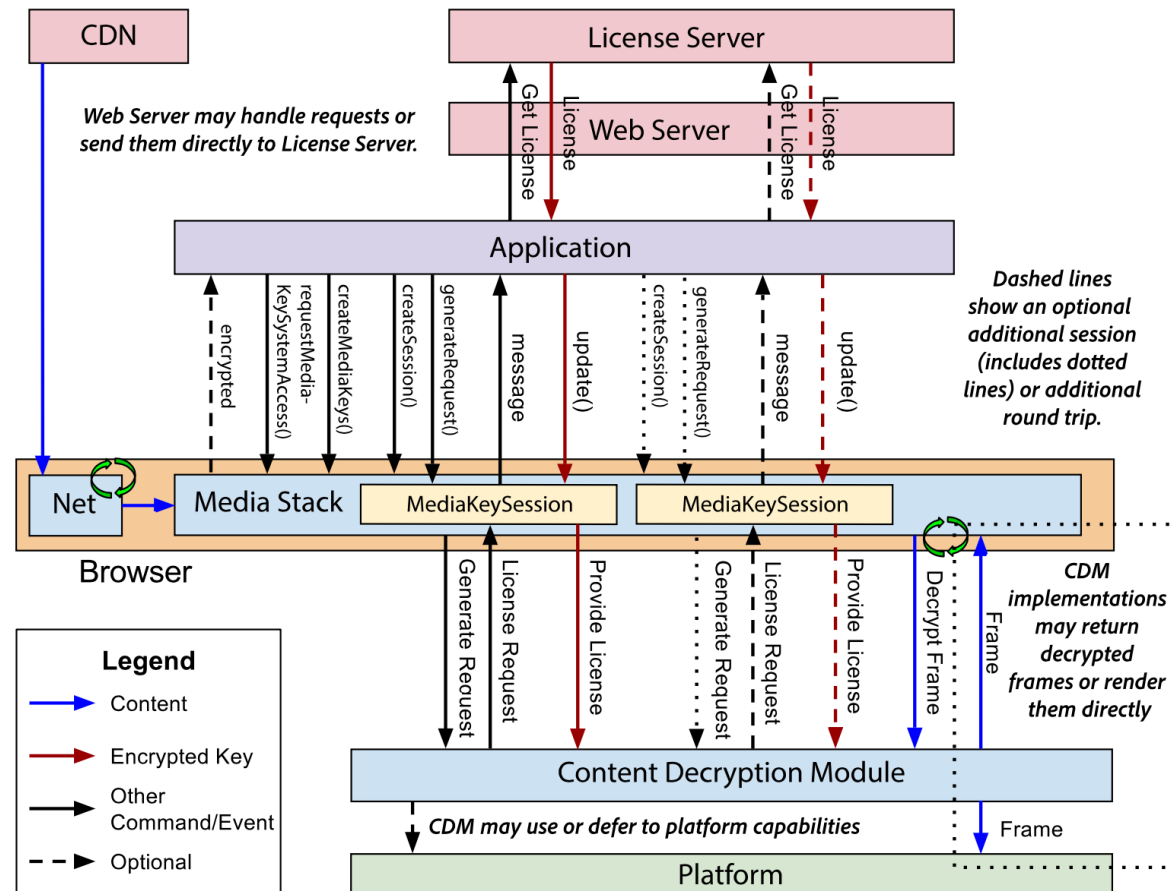


Source: <http://blogs.windows.com/msedgedev/2015/07/02/moving-to-html5-premium-media/>

HBBTV 2.0 MEDIA OVERVIEW

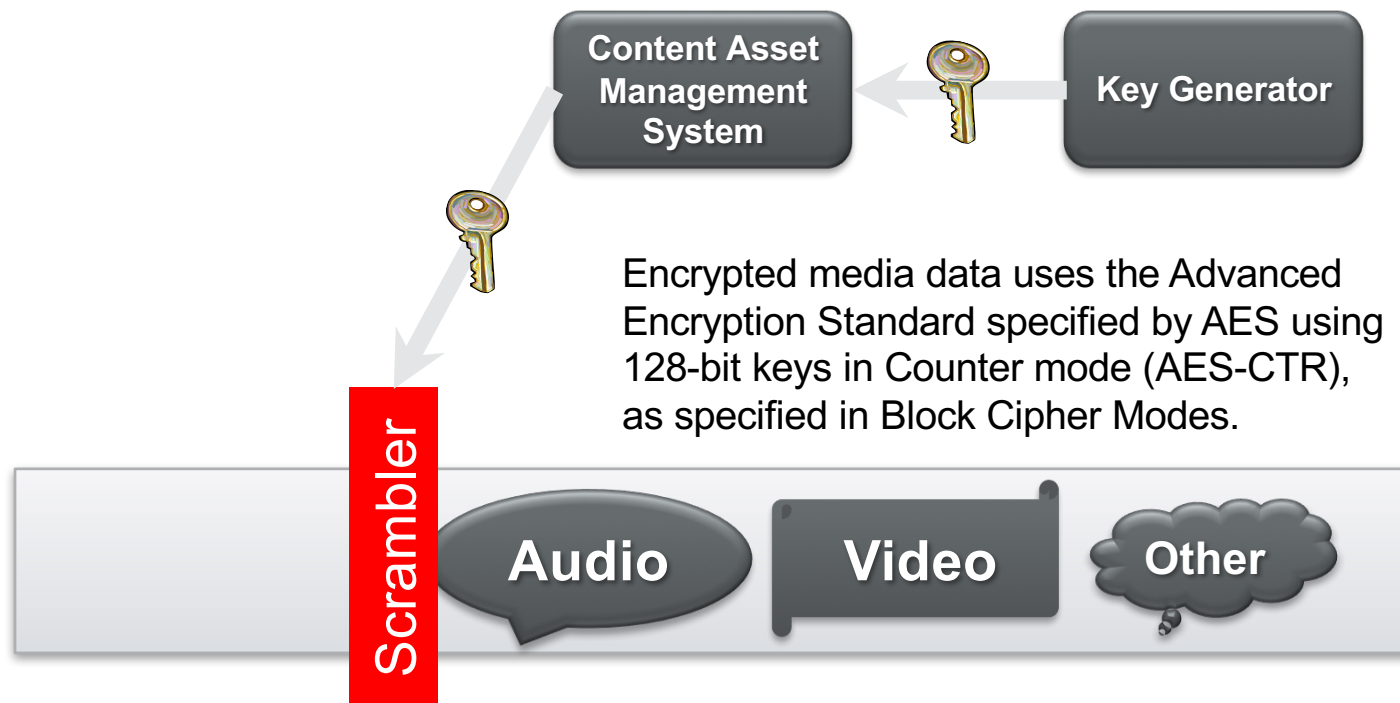
- HTML5 <video>
- DVB-DASH (TS 103 285) includes update to 2nd edition ISO 23009-1 (MPEG-DASH)
 - mainly „ISOBMFF Live Profile“
 - Similar constraints as HbbTV 1.5 (max MPD size, #representations etc.)
 - Latest A/V codecs, e.g. HEVC for UHD TV
 - Ad-Insertion using DASH events and multiple video objects
- Subtitles: EBU-TT-D (EBU Tech 3381)
- Companion Screen: Media Synchronisation
- 2.0.1 supports EME

W3C ENCRYPTED MEDIA EXTENSIONS

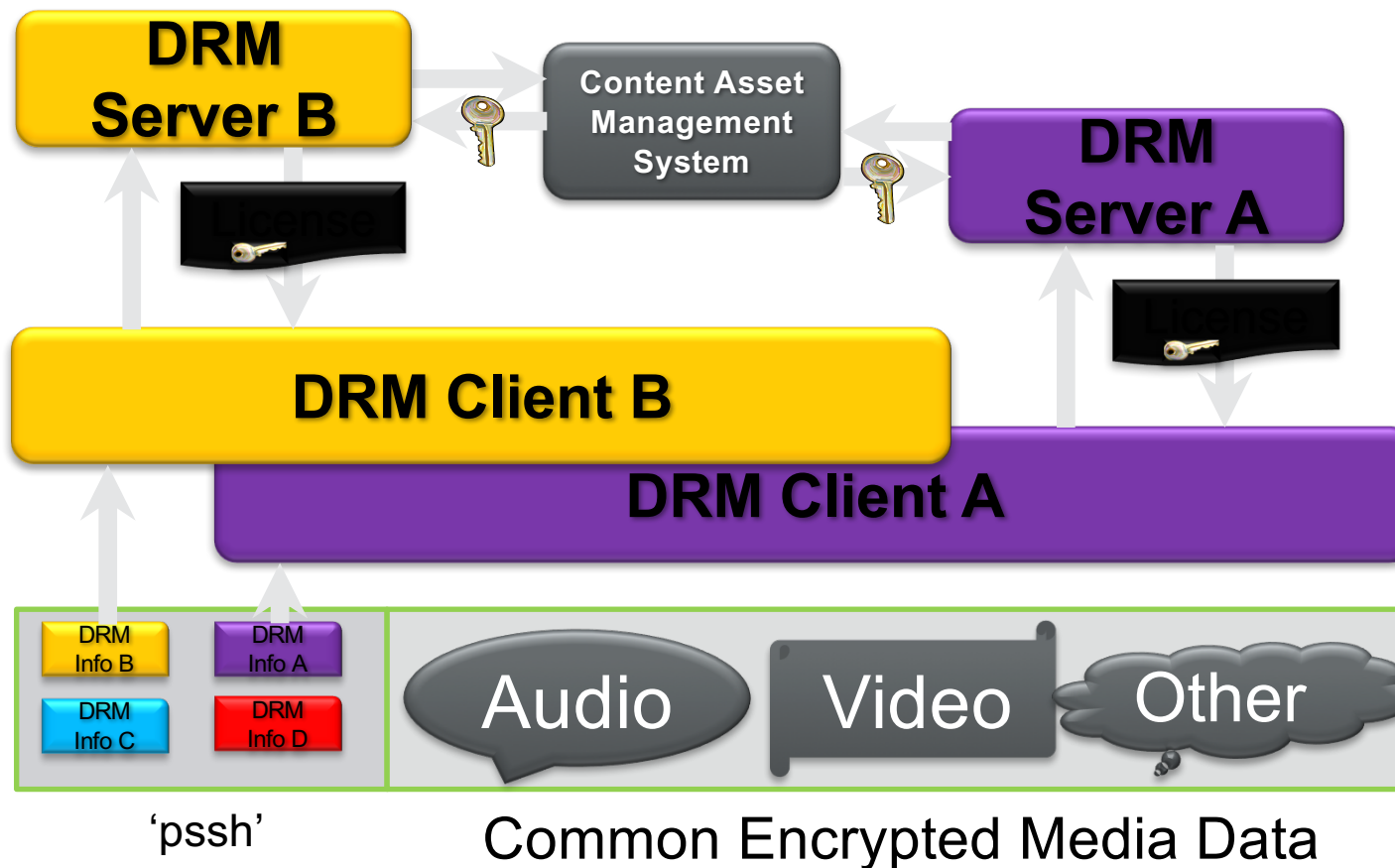


<https://w3c.github.io/encrypted-media/>

CENC ENCRYPTION



CENC – MULTI-DRM FOR DASH



DASH-IF CPIX

CONTENT PROTECTION INFORMATION EXCHANGE FORMAT

- Aims to standardize the way entities involved in the content creation workflow exchange protection information
 - Entities depend on existing headend,
 - for example: Packager, Encryptor, DRM License server, MPD generator etc.
- CPIX document contains keys and DRM policy information
- Latest published version 2.0 is in community review
- Compatible with DASH and HLS

3. DRM support Overview

DRM SUPPORT ON DESKTOP WEB BROWSER

Desktop Browser	Platform	EME/CDM	Flash Player/ Primetime	NPAPI/ Silverlight 5
Chrome	Win	Widevine	(Yes)	No
	OSX		(Yes)	No
	Linux		(Yes)	No
Firefox	Win	Widevine, Adobe	Yes	Yes
	OSX		Yes	Yes
	Linux		(Yes)	Yes
Safari	> OSX Yosemite	(Fairplay)	Yes	Yes
	< OSX Yosemite	No	Yes	Yes
IE/Edge	< Win 7	No	Yes	Yes
	Win 10	PlayReady	Yes	No

DRM SUPPORT ON MOBILE

Mobile Platform	HTML5	Native App / DRM
iOS	No MSE/EME HLS (AES-128 CBC) via <video>	Native SDK and WebView: FairPlay
		3rd Party Player SDKs – almost any DRM/Streaming is possible (PlayReady, Widevine, Verimatrix, VisualOn, Authentec, Castlabs, Discretix, Irdeto, NDS, Saffron, etc.)
Android	MSE/EME	Native + Android SDK (MediaDRM APIs) - (Widevine + OMA v2)
		Native + WebView with Widevine
		3rd Party Player SDKs - almost any DRM is possible; any streaming format
Windows 10 Mobile	MSE/EME	WebViews/Hosted Web Apps with PlayReady

DRM SUPPORT ON TV/ GAME COSOLES

Platform	MSE/EME (DASH)	DRM
HbbTV 1.5/2.0	No 2.0.1 supports EME	TNT 2.0: Marlin/ PlayReady
Smart TV Alliance	optional	PlayReady (conditional-mandatory)/ Widevine (optional); Smooth (mandatory), DASH (optional)
Samsung (SDK 1.4)	Yes	PlayReady, Widevine, Verimatrix; DASH, HLS, Smooth
FireTV	No	VisualOn SDK + PlayReady (TrustZone); HLS/ DASH/ Smooth

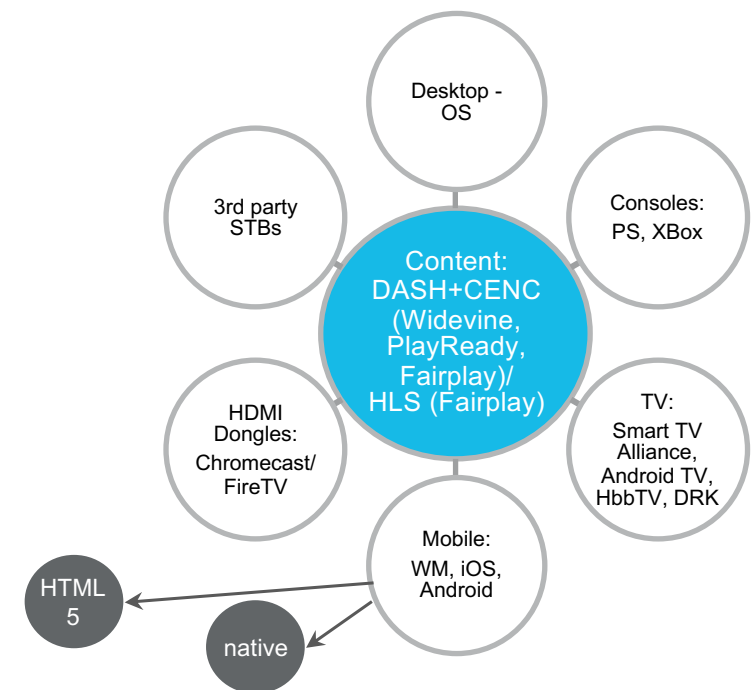
Chromecast	Yes	Dash + PlayReady/ Widevine; Smooth + PlayReady HLS + AES
AppleTV	No	HLS + Fairplay
RDK	Yes (OCDM)	PlayReady, Adobe Access
AndroidTV	For Google devices – see Android mobile, difference only in Security Levels	

Platform	Web Browser (MSE/EME)	Native DRM
XBox	Yes (as Win10 Hosted App)	PlayReady
PS	No	PlayReady(?), Marlin

STREAMING FORMAT FROM DRM PERSPECTIVE

How can we address different devices classes today?

- What's on the market?
 - SmoothStreaming, HDS
 - HLS + Fairplay
 - DASH + CENC
- Can we choose one technology?
 - No, it is not possible to address the variety of different device classes with one streaming standard.
- With the support of both streaming formats **HLS + Fairplay and DASH + CENC (Widevine, PlayReady)**
all the device classes available on the market can be addressed



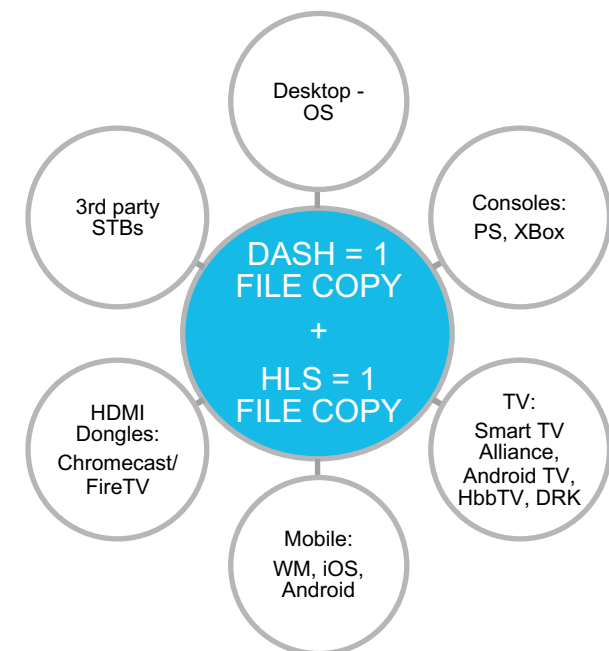
HOW MANY PHYSICAL FILE COPIES?

DASH and HLS

Streaming	File Format	Encryption
DASH	ISOBMFF	'cenc' (AES-CTR)

Streaming	File Format	Encryption
HLS	MPEG2TS	Sample-AES (AES-CBC)
HLS	ISOBMFF	'cbcs' (AES-CBC)

- Summary
 - 2 physical files encrypted with AES-CTR and AES-CBC
 - If only 1 encryption scheme
→ CDN cache efficiency



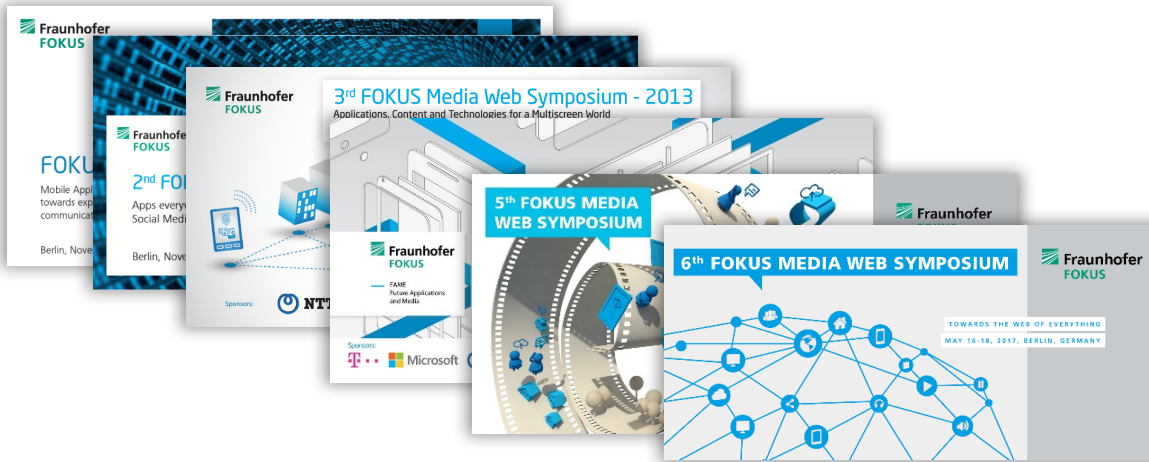
OUTLOOK

- Content Providers need to support Multi-DRM
- Continuing plugin (Flash, Silverlight) deprecation by browser vendors
 - => MSE/EME W3C Recommendation by the end of 2016
- HbbTV 2.0.1 EME support
- DASH-IF CPIX
 - => standardized DRM backend interfaces
- Enhanced Content Protection for UHD
 - => DRM security levels are important
- CMAF & WAVE
 - => Web app & video ecosystem interoperability
 - => upcoming streaming standard



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May 16-18, 2017, Berlin



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THANKS FOR YOUR ATTENTION