HKG18-217: OpenCDM/CDMi (Multi DRM) work with WPE & Chromium

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Overview

● This session will provide an overview of Linaro OpenCDM & CDMi work with WPE, Chromium browsers and multiDRM solution using OPTEE decryption on HiKey OpenEmbedded build.

● The focus will be about the addition of WPE browser support to existing Linaro CDM/CDMi and it's validation with different DRMs like ClearKey, PlayReady and Widevine on RDK Client image (Morty based) with Westeros Wayland Compositor and WPE.
Quick Recap

- **RDK (Reference Design Kit)**
  
  It’s complete set of software components, tools and documentation that aid faster development of standard Linux based set-top boxes to the market. It is a pre-integrated, modular, open-source software distribution that provides a common framework for powering customer-premises equipment (CPE) such as set-top boxes. Code repo - [https://github.com/rdkcmf](https://github.com/rdkcmf)

- **Westeros Wayland Compositor**
  
  It’s a simple light-weight, opensource Wayland compositor designed to be suitable for embedded systems. It supports normal, nested, and embedded wayland compositing. Code repo - [https://github.com/rdkcmf/westeros](https://github.com/rdkcmf/westeros).

- **WPE Browser**
  
  WPE (WebPlatform for Embedded) is Metrological’s port of standard Webkit with support for wayland display protocol. It supports video, graphics & web content rendering using GStreamer & Webkit framework. Code repo - [https://github.com/Metrological/WebKitForWayland](https://github.com/Metrological/WebKitForWayland)
OpenCDM

- OpenCDM is a Content Decryption Module developed according to W3C EME specification to be used with HTML5 based browser environments and DRM ecosystems.
- OpenCDM is built with a modular concept in mind to be easily extensible with different browsers.
- It provides common CDM & mediaengine APIs to be invoked by browser glue layer.
- Fraunhofer FOKUS developed Open Content Decryption Module (OCDM) & Open Content Decryption Module interface (CDMi) is common reference.
OpenCDM plugin

Divided into three layers: **browser glue, core and communication**. Allowing other browsers or RPC mechanisms to be easily added. LHG supports Chromium and WPE (used in Comcast RDK).

OpenCDMi

- OpenCDMi is a Content Decryption Module Interface, which contains most CDM logic and is a c++ wrapper for the embedded platform DRM.
- This implementation enables DRM interoperability by providing common RPC interfaces to OpenCDM, thereby decoupling DRM dependency from the browser.
- OpenCDM uses the operating system's native RPC mechanisms to forward EME calls to the CDMi, which routes it to DRM.
- Furthermore, the media sample transmission between a browser decoupled media engine and the CDMi can be secured via a DRM-specific authenticated interface.
CDMi Service

[1] Note: Currently different key systems are selected at compile time via autotools
--enable-playready or --enable-aes-ta.

Encrypted playback flow

![Diagram showing the encrypted playback flow with EME Application, Browser, Browser Glue, OpenCDM, CDM, MediaEngine, ClearKey, PlayReady, Wivedine, and CDMiService connected by RPC.]
Multi DRM & OPTEE

- DRM is a system used to protect the content according to the constraints associated with the specific content from basic protection through token based secure authentication or simple AES encryption of the video to sophisticated license exchange and policy management.

- Types of DRM
  - ClearKey
  - Microsoft PlayReady
  - Wividene

- OP-TEE (Open Portable Trusted Execution Environment) is designed primarily to rely on the ARM TrustZone(R) technology as the underlying hardware isolation mechanism. However, it has been structured to be compatible with any isolation technology suitable for the TEE concept and goals.
Multiple CDM & CDMi

- Different forks of OpenCDM & CDMi are used with different browsers and DRMs support implementing different EME versions.
- Linaro CDM & CDMi has Chromium browser, ClearKey and PlayReady DRM support with OPTEE.
- WPE/RDK CDM & CDMi (Restricted) has WPE browser, different DRMs but without OPTEE.

<table>
<thead>
<tr>
<th>CDM/Feature</th>
<th>Browser support</th>
<th>DRM support</th>
<th>CDMi License</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linaro CDM &amp; CDMi</td>
<td>Chromium &amp; WPE</td>
<td>ClearKey (Open), PlayReady (Licensed)</td>
<td>Open</td>
</tr>
<tr>
<td>WPE/RDK CDM &amp; CDMi</td>
<td>WPE</td>
<td>Restricted</td>
<td>Restricted</td>
</tr>
</tbody>
</table>
Linaro CDM & CDMi

- Linaro CDM & CDMi as single upstream going forward with missing browsers and DRMs implementing latest W3C EME.
  - [https://github.com/linaro-home/open-content-decryption-module](https://github.com/linaro-home/open-content-decryption-module)
  - [https://github.com/linaro-home/open-content-decryption-module-cdm-mi/](https://github.com/linaro-home/open-content-decryption-module-cdm-mi/)

- Added WPE browser support to Linaro CDM in addition to existing Chromium browser. It’s validated using ClearKey content playback on WPE both with OPTEE aes and non secure SSL decryption.
WPE support on Linaro CDM & CDMi

- Added WPE browser glue under src/browser.
- EME implementation for CDM & MediaEngine APIs.
- RPC unification between CDM & CDMi.
- Linaro CDM & CDMi changes
  - https://github.com/linaro-home/open-content-decryption-module/pull/4
  - https://github.com/linaro-home/open-content-decryption-module-cdmi/pull/8
- ClearKey with OPTEE decryption on WPE stable -
  https://github.com/WebPlatformForEmbedded/WPEWebKit/pull/435
- 32bit OPTEE-OS changes -
  https://git.linaro.org/openembedded%2Fmeta-linaro.git/commit/?id=d73e794ce7e7ebb1cc5bf495a52a72b26fb118250
Current & Future

- Validated with ClearKey playback using both SSL & OPTEE AES decryption.
- Regression tested on existing Chromium support.
- Validation of MS PlayReady v3.3 on WPE is in progress.
- Wivevine support to CDMi and syncing with latest EME in pipeline, thereby making Linaro CDM/CDMi as single CDM/CDMi across system.

- Reference platforms
  - HiKey (only secure decryption)
  - Poplar (fully secure media path in future..)
  - i.MX 8M board (maybe).
Thank You

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