RDK/WPE Port on DragonBoard 410C

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Introduction

- RDK mediaclient port with Westeros wayland compositor and WPE browser on DragonBoard 410c.

- RDK - Reference Design Kit.

- Westeros - Wayland compositor.

- WPE - Webkit for Wayland browser.

- Porting on DragonBoard 410c.

RDK (Reference Design Kit)

- RDK (Reference Design Kit) is a 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, open-source software distribution that provides a common framework for powering customer-premises equipment (CPE) such as set-top boxes.

- RDK being modular, uses Yocto build system and can be configurable to meet the requirements of different type boxes like QAM/IP/hybrid(QAM+IP) and different configurations like Media server/client.

- RDK supports all common media features like live playback, live streaming, DVR playback, TSB playback and live/DVR streaming playback using RDK MediaFramework.

- RDK supports web/graphics user applications using WPE browser.

- RDK opensource components - https://github.com/rdkcmf.
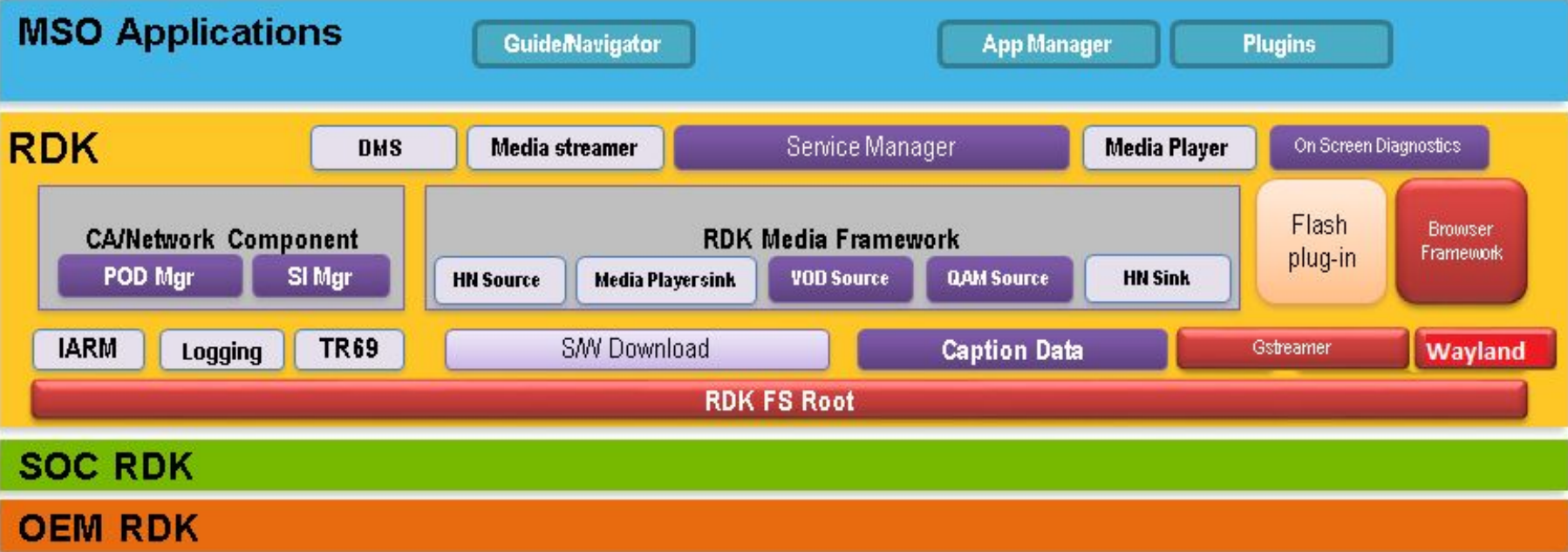
RDK Architecture

RDK (Reference Design Kit)

- Windowing Framework - Wayland (Previously Qt/Webkit)
  -Westeros Compositor

- Browser Framework - WPE

- Graphics Engine - OpenGL/ES
  –Support for hardware acceleration.

- Media Framework - RMF based on GStreamer
  –Support for hardware acceleration.
  –Application layer interface for media operations.

- Systemd services for startup and run-time orchestration of resident processes and functionality.

Westeros - Wayland compositor

- Westeros is a simple light-weight, opensource Wayland compositor designed to be suitable for embedded systems. It supports normal, nested, and embedded wayland compositing. A normal compositor displays its composited output to the screen, while a nested compositor sends its composited output to another compositor as a client surface.

- Can be ported onto new platform by implementing westeros-soc which provides westeros-gl using EGL/GLES support and westeros-sink using hardware acceleration.

- Westeros-gl should provide native window support. While westeros-sink should provide video renderer on that platform.

- Westeros_test is a sample application for validating the compositor.

- Code repo - https://github.com/rdkcmf/westeros.

- https://code.rdkcentral.com/r/#/admin/projects/components/opensource/westeros.

- Reference platforms - Rpi, HiKey and Dragonboard410c.

RDK Media Framework

- RMF (RDK Media Framework) is loosely based on Gstreamer, but with a level of abstraction to define generic source, sink and filter elements.
- Implementations for various sources (e.g. DVR source, QAM source, HNsource, etc), sinks (e.g. DVR Sink, Hnsink, MediaPlayerSink), and transformers (e.g. Transcoder) by extending generic source, sink and filter.
- RMF integration with the hardware is strictly based on Gstreamer SoC plugins through playersinkbin, which is bin element consists of demux, audio & video pipeline.
- Here the use case is mediaclient & gstreamer command to validate media client functionality - gst-launch-1.0 souphttpsrc location=<URL> ! playersinkbin
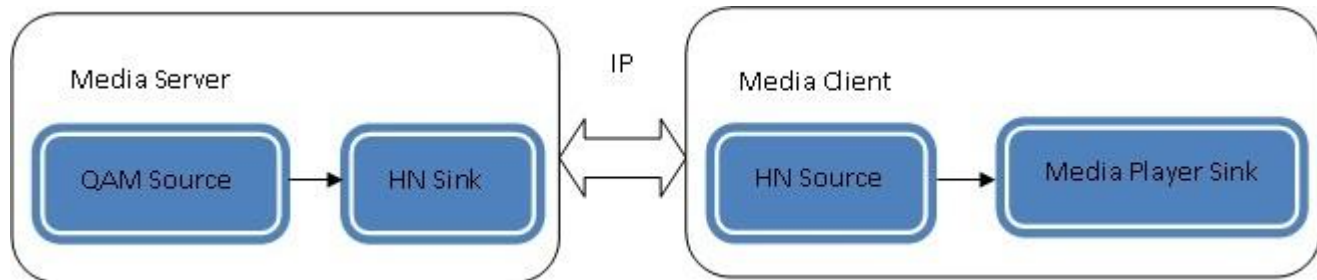
WPE Browser

- WPE(WebPlatform for Embedded) is Metrological's port of standard Webkit with support for wayland display protocol. WPE could run in any HW that has a good EGL and OpenGL ES 2 support and basic GStreamer integration.
- Code repo - https://github.com/Metrological/WebKitForWayland
- WPE browser with westeros backend can be ported by integrating wayland-egl support.
- WPE browser media support can be ported by integrating gstreamer plugins with Webkit Mediaplayer.
- https://github.com/WebPlatformForEmbedded/meta-wpe

Porting

- Westeros compositor
  - Westeros-gl implementation with drm/kms support. It provides the native window support using GBM.

- Mediaclient playback (RMF)
  - Ported playersinkbin plugin to make use of QCOM Venus video decoder acceleration using upstream v4l2videodec.

  - Making playersinkbin use zero copy/dmabuf video path available on the platform.

Porting

- WPE browser
  - Implemented offscreen egl target for westeros backend only for mesa.

  - Implemented db410csink plugin to enable WPE mediaplayer/playbin fully exercise the optimized video path.

  - Implement video resizing support using GstVideoOverlay interface of glimagesink.

Issues/Challenges

- Migration to Morty & kernel v4.9.
- V4l2videoXdec artifacts issue with 4.9 kernel.
- Adv7511 audio issue with non PCM_FMTBIT_S16_LE format.
- Gstreamer 1.4.4 to 1.10.0 - RDK gst plugins updated with upstream v4l2 plugin and 1.10 changes.
- Westeros graphics tearing issue - changed drm buffering & pagefliping logic.
- Optimized dmabuf path available only for v4l2dec <-> glimagesink, but WPE media player uses playbin - implemented new gst plugin.
- Glimagesink(wayland) resizing issue - GstvideoOverlay.
- Gstreamer colorimetry bug on 1.10.

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Thank You

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