RDK on 96Boards

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RDK - General Introduction

- RDK (Reference Design Kit) is a complete set of software components, tools and documentation that help in the development of the software stack for set-top box based on the standard Linux operating system.

- RDK uses Yocto build system and it’s modular, configurable to meet the requirements of QAM, IP and hybrid(QAM+IP) type boxes and Media server/client configurations.

- RDK supports main media features like live playback, live streaming, DVR playback, TSB playback and live/DVR streaming playback.

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

- 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.
RDK Architecture

MSO Applications
- Guide/Navigator
- App Manager
- Plugins

RDK
- DMS
- Media streamer
- Service Manager
- Media Player
- On Screen Diagnostics

CA/Network Component
- POD Mgr
- SI Mgr

RDK Media Framework
- HN Source
- Media Player sink
- VOD Source
- QAM Source
- HN Sink

IARM
- Logging
- TR69

SMV Download
- Caption Data
- Gstreamer
- Wayland

RDK FS Root

SOC RDK

OEM RDK

Region/MSO Customization
- Open Source
- Third party components
- RDK Provided
Porting RDK

- Media playback - Gstreamer SoC plugins integration into RMF.

- Westeros compositor - EGL/GLES support integration.

- WPE browser - Webkit for wayland client on Westeros compositor with graphics support and gstreamer integration.
Porting RDK - RMF

- 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
Porting RDK - Westeros

- **Westeros - Wayland compositor**
  Westeros is a light-weight, opensource Wayland compositor based on Wayland protocol and is designed to be suitable for embedded system. It supports the creation of normal, nested, and embedded wayland compositors. 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 and westeros-sink using EGL/GLES support.
- Westeros-gl should provide native window support if eglGetdisplay doesn’t for default display. While westeros-sink should video rendering on that platform.
- Westeros_test is a sample application for validating the compositor.

- **Code repo**
  [https://github.com/rdkcmf/westeros](https://github.com/rdkcmf/westeros)  
  [https://code.rdkcentral.com/#/admin/projects/compone nts/opensource/westeros](https://code.rdkcentral.com/#/admin/projects/compone nts/opensource/westeros)
Porting RDK - WPE

- WPE is Metrological’s port of standard Webkit with support for wayland display protocol.
  - [https://github.com/Metrological/WebKitForWayland](https://github.com/Metrological/WebKitForWayland)
- WPE 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.
96Boards - ported

- HiKey
- Dragonboard DB410c
- Dragonboard DB820c (planned)
Porting on HiKey

- RDK Mediaclient image on HiKey.
- Yocto 2.1/Krogoth branch is used.
- Meta-rdk is a DISTRO layer itself, but it’s not fully migrated to 2.1
- Set DEFAULTTUNE to "armv7athf"

- Preferred provider for egl/gles libraries
  - Graphics support is provided by ARM MALI 450 userland.

- Preferred provider for playersinkbin
  - No hardware video acceleration is available.
HiKey Challenges

- Issues/Challenges faced
  - Migration issues like gstreamer introspection, lighttpd & WPE dependency.
  - DRM support for Westeros porting on HiKey.
  - Video positioning issue with WPE browser.
  - Performance issue with media playback.
Porting on Dragonboard410c

- RDK Mediaclient image on DB410c.
- Yocto 2.1/Krogoth branch is used.
- Meta-rdk is a DISTRO layer itself.
- Set DEFAULTTUNE to "armv7athf-neon"

- Preferred provider for egl/gles libraries
  - Graphics support is provided by Mesa/freedreno driver.

- Preferred provider for playersinkbin
  - RMF integration with V4L2 hardware video acceleration by using gst V4L2 plugin in playersinkbin.
DB410c Challenges

- Issues/Challenges faced
  - Migration issues like gstreamer introspection, lighttpd & WPE dependency.
  - DRM support for Westeros porting on DB410c.
  - Playersinkbin using v4l2 video acceleration.
  - V4l2 compatibility issue with gst 1.4.4.
  - WPE had porting issues with Mesa egl backend.
  - Implemented offscreen egl target for westeros only for mesa.
  - Playback issue with Webkit Media player.
  - Video positioning issue with glimagesink.
Thank You

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