In-Car Digital TV Framework

High performance transcoder & player frameworks for awesome rear seat entertainment

ittiam
THINK VIDEO

INTRODUCTION

Ittiam offers a complete Digital TV Framework that brings media encapsulated in the latest Digital TV broadcast standards to the automotive dashboard and rear seat. Our solution takes input from the TV tuner including video, audio, subtitle, EPG, and Teletext, and transcodes it on the automotive head unit for display by the Rear Seat Entertainment (RSE) units.

By connecting several software components including audio/video decoding, encoding and post processing, and control inputs, our transcoder and player frameworks deliver high performance audio and video playback.

SUMMARY

PRODUCT

▷ Transcoder framework that runs on Head Unit
▷ Player framework that runs on RSE unit

HIGHLIGHTS

▷ Supports an array of terrestrial broadcast standards
▷ Split HEVC decoder (ARM + EVE) on TI Jacinto6 platform
▷ Supports video overlay and blending
▷ Free from any open source code to enable proprietary implementations
▷ Supports HDCP 2.2 decryption/encryption
▷ Robust recovery mechanism for bit errors in input stream
▷ AV Synchronization fine-tuning

AVAILABILITY

Optimized for ARM based SoCs (TI J6) running Linux
▷ x86 based SoCs (Intel Apollo Lake) running Linux
▷ Portable on other SoCs and Operating Systems

OVERVIEW OF FEATURES

▷ Supports a wide range of terrestrial broadcast standards —
DVB-T / DVB-T2, SBTVD, T-DMB, ISDBT and ISDB-T 1seg

▷ Transcoder Input is a MPEG-2 TS stream; and output is an MPEG-2 TS stream containing H.264 video @ 720p30 and AAC audio

- Supports MPEG-2, H.264 / SL-H264, H.265 input video formats
- Supports MPEG 1/2 Layer I, MPEG-1/2 Layer II, MP3, AAC / HE-AAC/ SL-AAC, BSAC, MPEG Surround, Dolby AC3 and Dolby EAC3 input audio formats
- Supports dynamic switching between 1-seg and 12-seg ISDB-T streams

▷ Includes audio post-processing (down mix, volume control, sample rate converter); video post-processing (de-interlacing, scaling, blending/overlays); video settings (saturation, tone, contrast, brightness) and control inputs

▷ Supports dynamic selection of input streams from tuner

▷ Optimized for TI Jacinto-6 automotive SoC platform running Linux

▷ Uses hardware accelerated video codecs and hardware video processing units available on J6

▷ Supports software HEVC split decoder (ARM + EVE) on TI J6 platform, to enable support for latest DVB-T2 standard

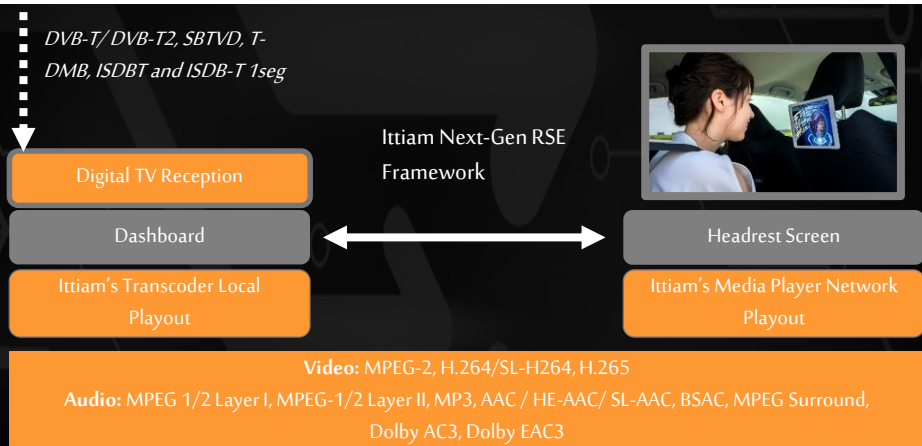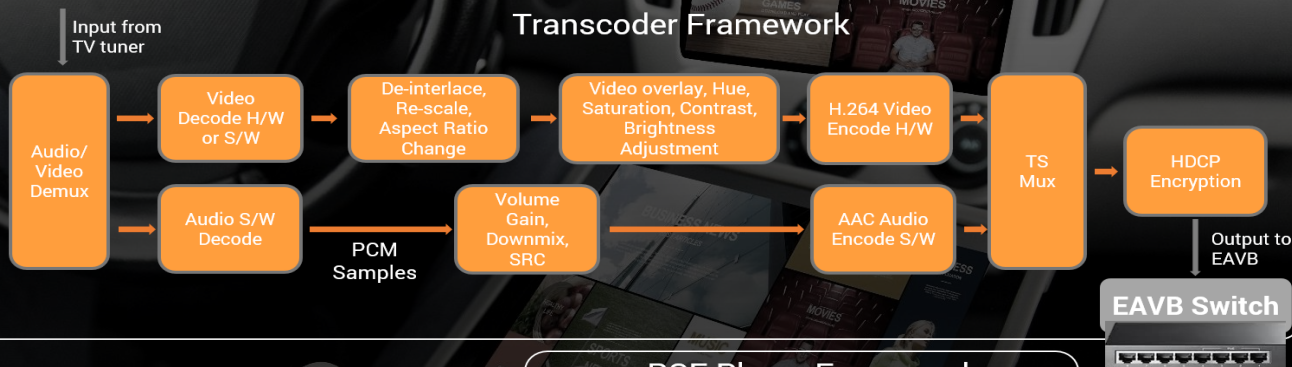## CASE STUDY

Leading European automotive OEM delivers next-gen rear seat entertainment by leveraging Ittiam's transcoder framework on TI J6 SoC. More

DVB-T/ DVB-T2, SBTVD, T-DMB, ISDBT and ISDB-T 1seg

Ittiam Next-Gen RSE Framework

| Digital TV Reception |
| Dashboard |
| Ittiam's Transcoder Local Playout |

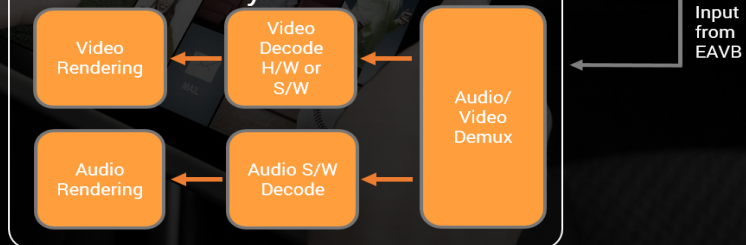| Headrest Screen |
| Ittiam's Media Player Network Playout |

Video: MPEG-2, H.264/SL-H264, H.265
Audio: MPEG 1/2 Layer I, MPEG-1/2 Layer II, MP3, AAC / HE-AAC/ SL-AAC, BSAC, MPEG Surround, Dolby AC3, Dolby EAC3

Transcoder Framework

Input from TV tuner → Audio/Video Demux → Video Decode H/W or S/W → De-interlace, Re-scale, Aspect Ratio Change → Video overlay, Hue, Saturation, Contrast, Brightness Adjustment → H.264 Video Encode H/W → TS Mux → HDCP Encryption → Output to EAVB

Audio/Video Demux → Audio S/W Decode → PCM Samples → Volume Gain, Downmix, SRC → AAC Audio Encode S/W → TS Mux

EAVB Switch

RSE Player Framework

Input from EAVB → Audio/Video Demux → Video Decode H/W or S/W → Video Rendering

Audio/Video Demux → Audio S/W Decode → Audio Rendering

STANDARD PACKAGE

▷ Transcoder framework — MPEG2-TS Demux, Audio/Video Decode, Audio/Video Processing, Audio/Video Encode, MPEG2-TS Mux
▷ Player framework — MPEG2-TS Demux, Audio/Video Decode, Audio/Video Render

OPTIONAL ADD-Ons

▷ HDCP 2.2 decryption of input MPEG2-TS stream (HDCP authentication need to be handled by IVI Vendor)*
▷ HDCP 2.2 encryption of output MPEG2-TS stream (HDCP authentication need to be handled by IVI Vendor)*
▷ Optional S/W HEVC decoder
▷ Optional S/W H264 decoder

HDCP device Keys have to be procured by the IVI Vendor from DCP LLC

PACKAGE CONTENTS

▷ Transcoder framework that runs on Head Unit
▷ Player framework that runs on RSE unit
▷ Documentation (User Guide & API Document)
▷ Performance & memory report
▷ Sample application for transcoder framework

TRANSCODER FRAMEWORK

A flow graph that connects the following software components:

▷ MPEG-2 TS Mux and Demux
▷ Audio/Video encoder and decoders; audio decoders optimized on ARM
▷ Video improvements; blending/overlay of RGBA image; video settings
▷ Audio processing (downmix, volume control, Sampling Rate Conversion)

Integrated with IVA-HD decoder/encoder on J6 SoC capable of

▷ Real time 1080p60 H.264 decode, HP/MP/BP profiles, levels 3.1–4.2
▷ Real time 1080p60 MPEG-2 decoder up to Main Profile @ High Level
▷ 720p30 H264 encoder, HP, Level 4.2

Error handling

▷ Handling of corrupt packets in the input stream
▷ Detection of lost & corrupt time stamps
▷ Time stamp regeneration to ensure improved AV sync

Support for multi-level logging; performance monitoring; latency measurement; and average/peak bitrate measurement

Free of Open Source components

RSE PLAYER FRAMEWORK

A flow graph that connects the following software components.

▷ MPEG-2 TS Demux
▷ Video decoder available in HW on the SoC
▷ Audio decoder optimized on ARM or x86
▷ Video and audio render using H/W support available on the SoC

For more information, explore our **Automotive Infotainment Solutions** or contact us at **mkt@ittiam.com**

ABOUT ITTIAM

Ittiam Systems is a trusted solutions provider to world leaders in multimedia, enabling next generation video experiences through its complete suite of intelligent video technologies, systems and solutions. Backed by its proven video expertise and insights, Ittiam's products deliver real intelligence to solve its customers' most complex technology challenges, empowering them to deliver high performance, efficient and reliable video products in rapid time. Ittiam's solutions are at the heart of millions of lifestyle products that drive mobility, content access, networking and sharing.