Multimedia Framework Overview

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Multimedia FW provides

- **Multimedia APIs for increasing developer productivity**
  - Player, Camera APIs etc.
- **Plug-in Architecture using GStreamer & PulseAudio**
  - Reduce the integration costs into various kind of targets
- **Multiple-Format Codec**
  - Support the various codecs, parser, demuxer & muxer as Plug-in structure
  - Support OpenMax IL architecture
  % You don’t need to transcode your video/audio file

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Multimedia FW : Main Features

- **High Quality Video Playback**
  - Support various kind of Multimedia Streaming
  - Support HTML5 Video and embedded playback in Web Browser
  - High Quality Playback with HW codec & Render optimization

- **High Quality & High Speed Camera/Recorder**
  - High Quality Image capture & Video Recording : Full HD(1080P)
  - Support various kind of shot mode
  - Zero Shutter lag, Shot-to-Shot Delay Optimization

- **WiFi Miracast**
  - Screen & Audio on the Source Device is mirrored on the Sink Device

- **Media Contents Handling**
  - Manage Content list and metadata (Video/Audio/Image and Other Files)
  - Provide the thumbnail, EXIF & MP3 ID3 tag information
  - Support Audio / Video Content Trans-coding
Multimedia FW : Architecture

- **Player/Streaming FW**: Local Playback, Various kind of Streaming playback (HTTP, HLS, Smooth etc)
- **Camera/Recorder FW**: Various Shot, Full HD Recording, Audio Recording
- **Audio FW**: Audio Playback/Capture, Sound Path Control, Audio Session Manager
- **WiFi Miracast FW**: Screen Mirroring
- **Media Content FW**: Multimedia Content list and Metadata management
- **Media Editing FW**: Content Trans-code, Content Metadata Extracting and Writing
You can make various Multimedia Applications by using Multimedia APIs EX) Video/Streaming/Music Player, Camera - Voice Recorder, Call / Video Call, Gallery - etc.
Core Component : GStreamer

– GStreamer
  – Pipeline-based Multimedia Framework / Plug-in architecture

[ GStreamer Pipeline Sample ]
Core Component: PulseAudio

- **PulseAudio**
  - Software mixing of multiple audio streams and Plug-in architecture
  - *All sound will be played/captured via PulseAudio Server*
Core Component : GstOpenMax

- **OpenMax IL is supported for using HW Codec**
  - **GStreamer Plug-in will communicate with OpenMAX IL Component**

![Diagram showing GStreamer Pipeline and OpenMAX IL Core](image-url)
Core Component : GstOpenMax

- Using OMX IL on GStreamer
  - GstOpenMax is used for supporting HW Codec
  - Example) In Player pipeline

![Pipeline Diagram]

- Core Component: GstOpenMax
- Using OMX IL on GStreamer
- GstOpenMax is used for supporting HW Codec
- Example: In Player pipeline
High Quality Video Playback

- Supports High Quality Video Playback based on Plug-in Architecture
  - Play almost every media formats without transcoding
  - Rich media support for Browser and web applications
  - Support embedded video rendering for various type of graphic surfaces

**Codecs, Demuxers & DRMs**
- H.264
- HEVC
- Microsoft PlayReady®
- MP4
- DivX
- UHD
- gstreamer

**Rich Web Media Support**
- HTML5 Video
- YouTube
- TED
- mpeg-DASH

**Video Rendering on Any Surface**
- Video animation effects
Core Component: Player / Streaming FW

- Provides functions for a multimedia application to implement playback of media contents.
  - Support various file format/Subtitle (SRT, SMI, SUB)
  - HTTP Streaming, HLS (HTTP Live Streaming), RTP/RTSP Streaming, Progressive Download (File/URI) etc.

Multimedia Framework (FW):

- **Player Pipeline**:
  - Source → Demux → Audio Decoder → Video Decoder → Text Decoder → Audio Filter → Video Filter → Text Filter
  - Queue

- **Feeding**:
  - File source
  - HTTP source
  - RTP source
  - App source

- **Parsing**:
  - MP4 demux
  - MKV demux
  - HLS demux
  - Multiqueue

- **Decoding**:
  - H.264 decoder
  - HEVC decoder
  - AAC decoder
  - MP3 decoder

- **Filtering**:
  - Audio effect
  - Audio HA
  - Pango markup
  - Volume

- **Synchronizing**:
  - Video sink
  - PulseAudio sink
  - PulseAudio sink

Music / Video Player Application
Rich Camera & Audio

- **High Quality & High Speed Camera**
  - High Resolution Recording & Zero Shutter Lag
  - Pluggable architecture makes easy to apply the audio and the video effect
  - Support various kind of shot modes

- **Provide Rich Experience with the Audio Accessory**
  - Audio Dock, HDMI, USB Audio 5.1ch, Bluetooth Headset, etc.
Core Component: Camera / Recorder FW

- Captures various media types like still image, audio/video frame from mic/camera device
  - **Capture**: single/multi shot / **Recorder**: Video/Audio recording, Audio Recording
Core Component : Audio FW

- **Audio IO**
  - Capture or Playback PCM

- **OpenAL**
  - Open Audio Library, Low latency audio playback especially for the game

- **PulseAudio**
  - All sound will be played via PulseAudio Server
Screen Mirroring & Media Content

- **Support Standard WiFi Miracast**
  - Seamlessly displaying multimedia between devices without cables

- **Support Media Content FW & Editing FW**
  - Scanning Contents, Extracting Metadata and store metadata information by DB
  - Easy to Make User Created Contents
Core Component: WiFi Miracast

- Screen on the Source Device is mirrored on the Sink Device
- Support Source & Sink Function

Source Device

Miracast Server

Sink Device

Pipeline

Video Src
queue
Video Enc
TS Mux
RTP Pay
RTP bin
UDP Sink

Audio Src
queue
Audio Enc

Video Sink
queue
H264 Parse
TS Demux
RTP Depay
WFD Src

Audio Sink
queue
AAC Parse

UDP
TCP
RTP
Client port

TCP
UDP
Server port
Core Component: Media Content FW

- Manage the Content list and Metadata by DB
  - Scanning Contents
  - Extract Content Metadata and store it in Media DB
  1. Manage ID3 Tag / Exif info, Thumbnail and User created metadata etc
  - Support Content browsing and Search

[Content Browsing] [Content Metadata] [User created metadata] [Content Search]
Core Component: Media Editing FW

- **Transcoder**
  - Audio Video Content Container format, Codec Format, Scaling, Frame rate Converting Support, Content Trim Support

- **Metadata Editor**
  - ID3 Tag Extracting / Writing, Video Metadata and Frame Extract

- **Image Util**
  - Image Crop, Resize, Rotate, Color Space Convert Support

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<tr>
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<td>AVI</td>
</tr>
<tr>
<td>Video</td>
<td>H.264</td>
</tr>
<tr>
<td>Audio</td>
<td>MP3</td>
</tr>
<tr>
<td>Resolution</td>
<td>1080*1902</td>
</tr>
<tr>
<td></td>
<td>MP4</td>
</tr>
<tr>
<td></td>
<td>MPEG-4</td>
</tr>
<tr>
<td></td>
<td>AAC</td>
</tr>
<tr>
<td></td>
<td>640*480</td>
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[Video Content Transcoding] [Video Content Frame Extract & Resize] [ID3 Tag Extract]
Case Study
Hight Quality Video – Zero Copy

- Memory handling mechanism for Zero Copy in Video playback
  - Use DMAbuff for handling Video data

Video Decoding (normal)

Video Decoding (zero-copy)

- Use DMAbuff for handling Video data
Rich Web Media Support

- Whole native media supports are integrated into Webkit
  - Webkit uses GStreamer elements from Plug-In Pool

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Tizen Multimedia FW for Mirroring (1/2)

- Support WiFi Miracast Source & Sink with various mode

  Mirroring – Actual displayed images of WiFi Miracast source device

  Mirroring (Video Only mode) – Just Video images of WiFi Miracast source device

  Control by UIBC
Tizen Multimedia FW for Mirroring (2/2)

- Pipeline of WiFi Miracast Source
Tizen Multimedia FW on Wearable Devices

- Standalone Music Player
- Standalone Camera, Video Player
- Audio Scenario for S Voice, Voice Control and Call
- Media Content for multi-lingual Localized Sorting
Conclusion

- Multimedia FW for Multi-Devices

Tizen Multimedia FW is still developing