Enriching and fulfilling experience to Eyes & Ears- Tizen Multimedia
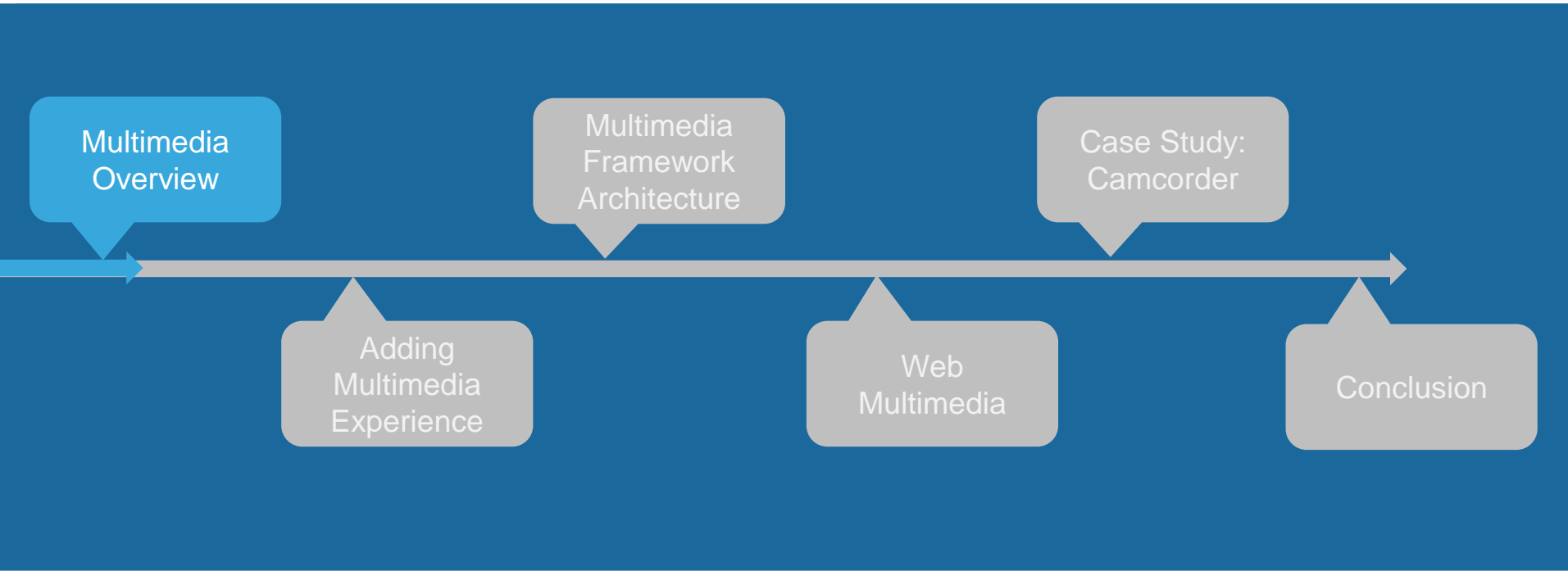
Rajaram Naganur
Ruchika Saxena

TIZEN
DEVELOPER SUMMIT
2015 BENGALURU
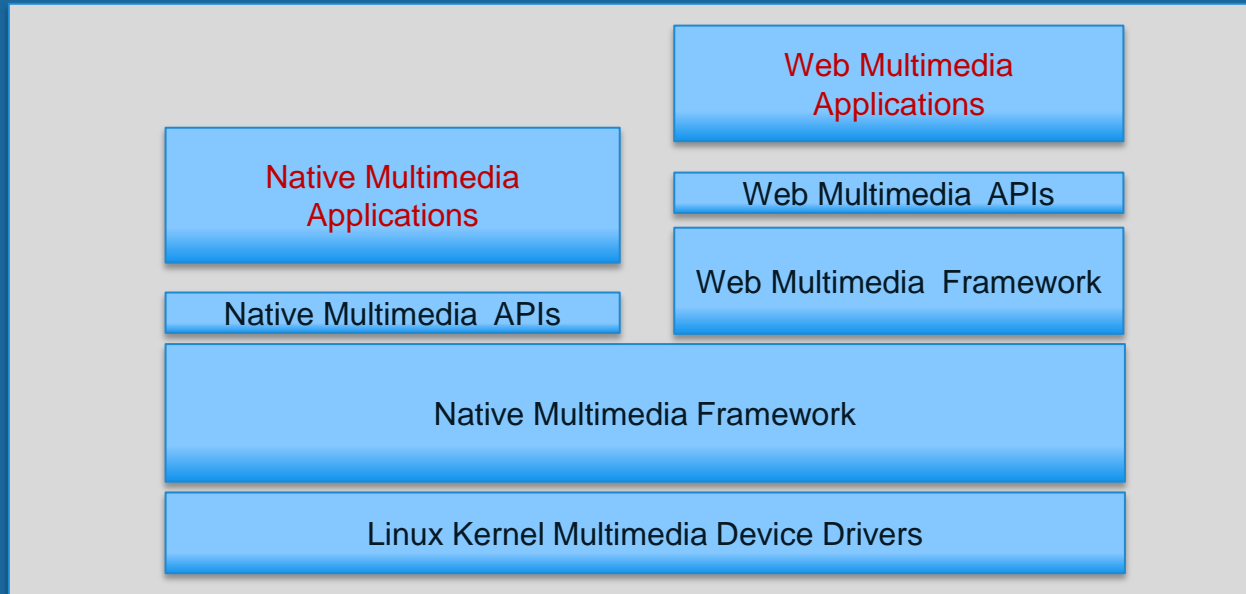JULY 30-31, THE RITZ-CARLTON

Progression

Multimedia Overview

Adding Multimedia Experience

Multimedia Framework Architecture

Web Multimedia

Case Study: Camcorder

Conclusion

TIZEN™ DEVELOPER SUMMIT 2015 BENGALURU

Multimedia Overview

Native Application   **Web Application**

Open AL

gstreamer

OpenMAX

Pulse Audio

ALSA

TIZEN DEVELOPER SUMMIT 2015 BENGALURU

Multimedia Overview

Architecture

Web Multimedia Applications

Native Multimedia Applications

Web Multimedia APIs

Web Multimedia Framework

Native Multimedia APIs

Native Multimedia Framework

Linux Kernel Multimedia Device Drivers

Progression

Multimedia Overview

Adding Multimedia Experience

Multimedia Framework Architecture

Web Multimedia

Case Study: Camcorder

Conclusion

TIZEN DEVELOPER SUMMIT 2015 BENGALURU

Adding Multimedia Experience (APIs)

API Common Usage

Know Privileges & header file
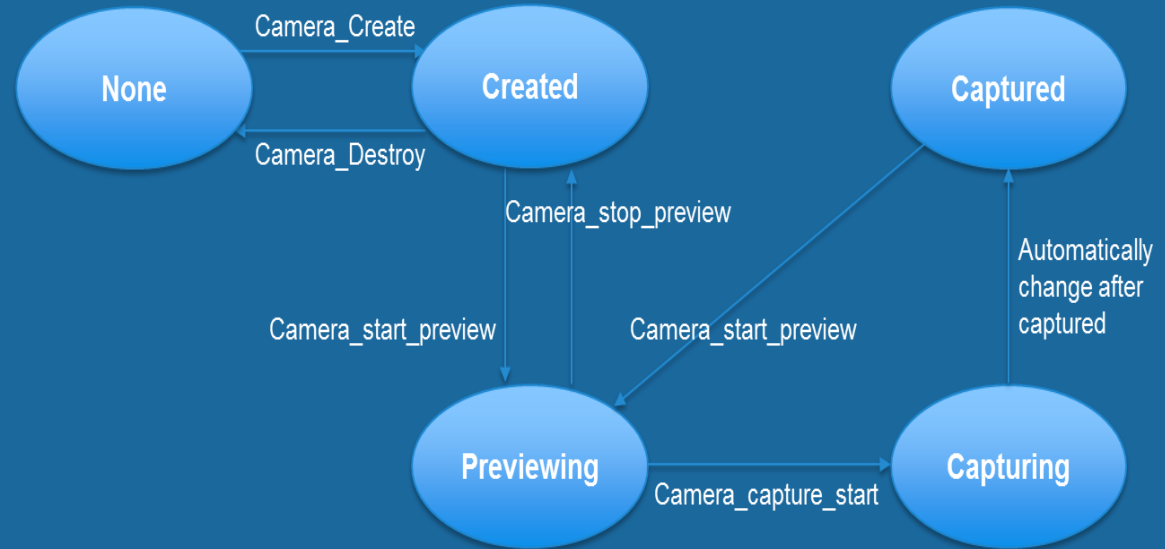
Common Usage
    Create & Destroy
    Prepare & Unprepare
    Start & Stop
    Get, Set & Unset

Call Back Functions
    Handle These:
        Errors & Interruptions
    Information:
        Change in State, Data Packets

Example State Transition

None → Camera_Create → Created
Created → Camera_Destroy → None
Created → Camera_stop_preview / Camera_start_preview → Previewing
Previewing → Camera_start_preview → Captured
Previewing → Camera_capture_start → Capturing
Capturing → Automatically change after captured → Captured

Adding Multimedia Experience (APIs)

Recorder | Player | Utilities

Preview & Capture

- Multi Shot
- Face Detect
- HDR
- Scene
- Theatre

Setting

- Focus
- ISO
- Flash
- Cloud
- Location
- Day
- Effects
- Auto WB
- Zoom
- Exposure

Applications

My Secret Portion

Photo Effects

Camera Ace

Watcher

Instagram

Dubsmash

TIZEN DEVELOPER SUMMIT 2015 BENGALURU

Adding Multimedia Experience (APIs)

Camera | **Recorder** | Player | Utilities

Video Recorder

MP4, 3GP

Bit Rate

Recording Motion
     (Slow, Fast)

Resolution

Orientation

Audio Recorder

M4A & AMR

Sample Rate

Channels (Mono, Stereo)

Recording Time/Size

Audio Stream CB

Applications

Spy Cam: AV Recorder

Limit Recording

Time Lapse Record

TIZEN™ DEVELOPER SUMMIT 2015 BENGALURU

Adding Multimedia Experience (APIs)

Camera   Recorder   **Player**   Utilities

Player

- Sound Type
- User Agent & Cookies
- Audio Latency
- Display
- Seek, Loop
- Subtitle
- Play Rate & Capture

Music

- Sound Type
- Equalizer
- Metadata
  ex: Album, Genre, Album Art
- Sampling rate, Channels
- MP3, AAC, WMA, M4A, 3GA, WAV and AMR

Applications

Player (Video & Music)

M3U Play

TED Talks

MX Player

Create Thumbnail

Fast & Slow video Browsing

TIZEN™ DEVELOPER SUMMIT 2015 BENGALURU

Adding Multimedia Experience (APIs)

Camera **Recorder** **Player** **Utilities**

Image

Encode & Decode

Rotation

Crop

Resize

Color Space
Conversion

HW Acceleration

Video

Transcoding

MPEG4, H264, H263
AAC, AMR NB
3GP, MP4

fps & Resolution

Direct Video (HW & SW)
and Audio Codec

Applications

Editors AVI

Photo Effects

Collage Art

MP3 Cutter

Real-time Communication

TIZEN DEVELOPER SUMMIT 2015 BENGALURU

Adding Multimedia Experience (APIs)

FM Radio

- Scan
- Tune
- Seek Up/Down
- Play
- volume control

Audio IO

- Record Raw PCM
- Play Raw PCM
- Buffer size
- Channels, sample size, sample rate

Tone Player

Play DTMF

Call supervisory

Proprietary tones

Start, Stop, Duration

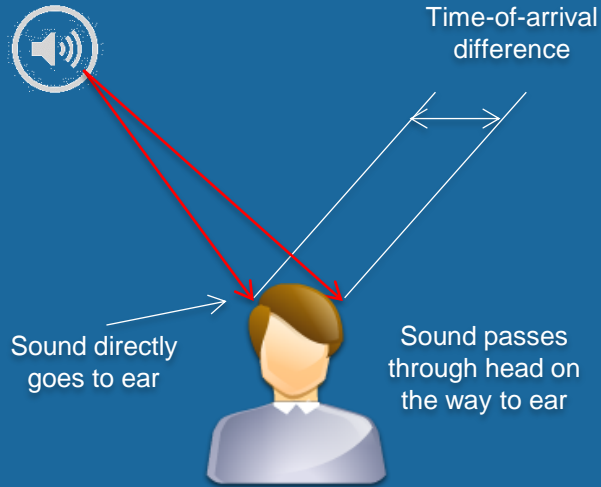## WAV Player

Play Waveform Audio file

Format: WAV, OGG

Play, Pause, Stop

TIZEN DEVELOPER SUMMIT 2015 BENGALURU

Adding Multimedia Experience (APIs)

Open AL Sound Manager

Time-of-arrival difference

Sound directly goes to ear

Sound passes through head on the way to ear

Play 3D Audio

Auditory Cues

Doppler Effect

HRTF
Head Related Transfer Function

Context

Source2
Buffer2

Source Play

Set Source

Set Listener

Source1

Buffer1

Listener

TIZEN DEVELOPER SUMMIT 2015 BENGALURU

Adding Multimedia Experience (APIs)

| Audio | Open AL | **Sound Manager** |

Multiple sources, single sink

Single source, multiple sinks

1. Speaker
Play via speaker

2. Connect Ear-jack
Play via Ear-jack?

3. Connect Bluetooth
Play via BT Headphone?

4. Remove Bluetooth Headphone
Play via Ear-jack?

TIZEN™ DEVELOPER SUMMIT 2015 BENGALURU

Adding Multimedia Experience (APIs)

Audio   **Open AL**   **Sound Manager**

Audio role (ringtone)
Focus change callback

Audio role (media)
Focus change callback

Request focus
Acquire focus
Start playback

Incoming Call

Request focus
Acquire focus
Release focus

Release focus
Pause

End Call

Acquire focus
Resume play

Audio Stream Focus*
Collaborative approach to acquire, release, handle focus loss

Volume Control
Get/set output volumes
Volume changed notification

*Feature planned in Tizen 3.0

TIZEN™ DEVELOPER SUMMIT 2015 BENGALURU

Progression

Multimedia Framework Architecture

Architecture

Player FW Streaming FW	Camera FW Recorder FW	WiFi Miracast	Audio FW	Media Content FW	Media Editing FW

GStreamer	Pulse Audio
Plugins	Plugins

Muxer / Demuxer	Video Audio Codecs	FFMPEG	ALSA	Image Codec

TIZEN™ DEVELOPER SUMMIT 2015 BENGALURU

Multimedia Framework Architecture

Formats Supported

Type	List
Audio Codec (Decoder)	AAC, MP3, WMA7/8, AMR, LPCM
Video Codec (Decoder)	H.263, MPEG-4, H.264
Audio Codec (Encoder)	AMR-NB
Video Codec (Encoder)	H.263, MPEG-4
Container Format	MP4, 3GP, AVI, WMV, ASF, MKV, TS MP3, AAC, AMR, AC3, WMA, OGG, WAV
Streaming Supported	HTTP, HTTP Live Streaming, HTTP Progressive, RTSP

TIZEN DEVELOPER SUMMIT 2015 BENGALURU

Multimedia Framework Architecture

GStreamer Architecture

GStreamer

Pipeline

Src Plug-in

Filter Plug-in

Sink Plug-in

Filter Plugin
Processing data

Source Plugin
Generates data

Sink Plugin
Rendering data

Plug-in Pool

. . . .

Pads
Element's Interfaces
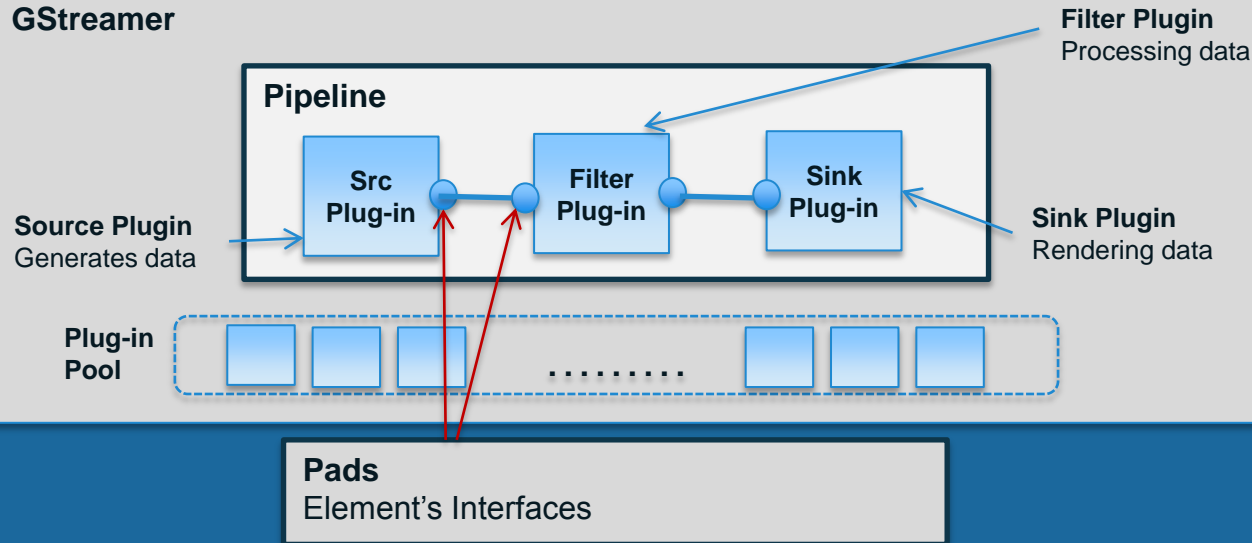
gstreamer

Multiplatform

Pipeline Architecture

Intelligent Plugin Architecture
Dynamic Load
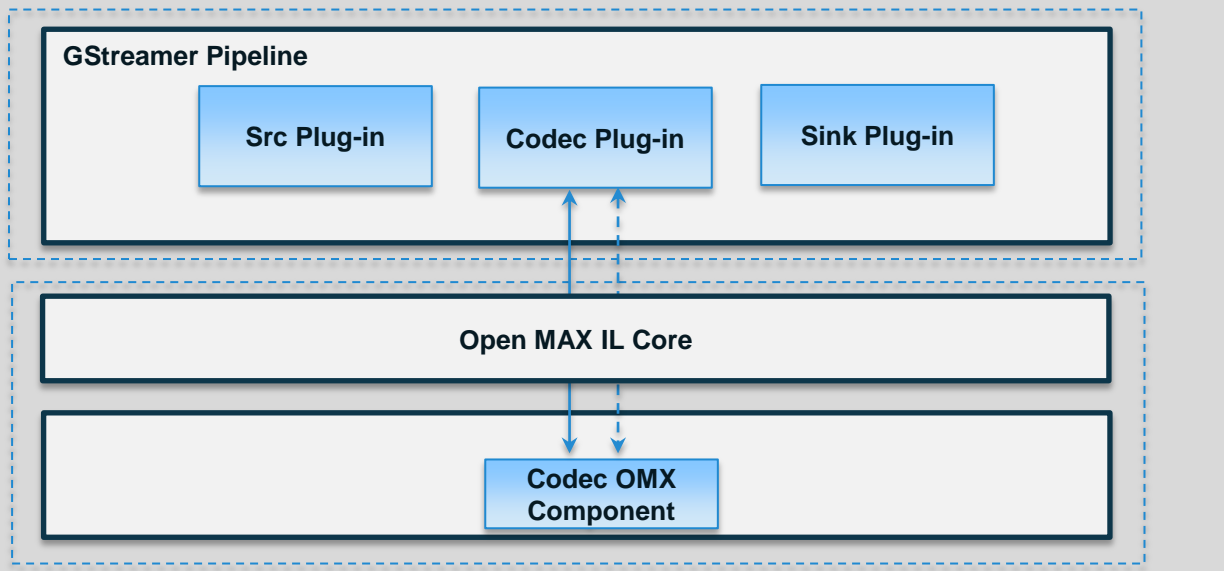Capability
Element Interfaces

More than 250 plugins

http://gstreamer.freedesktop.org/

TIZEN DEVELOPER SUMMIT 2015 BENGALURU

Multimedia Framework Architecture

GStreamer OMX Plugin Architecture

GStreamer Pipeline

| Src Plug-in | Codec Plug-in | Sink Plug-in |

Open MAX IL Core

Codec OMX Component

Ready OMX GStreamer plugin

No Integration Effort to use Open MAX compliant HW codec

Multimedia Framework Architecture

WiFi Miracast

Display seamlessly multimedia content on big screens

UIBC
User Interface Back Channel

Multimedia Framework Architecture

Applications

| Media Player | System Sound | Game Sound | Camera Shutter | Ringtone | Alarm | ETC ··· |

Audio Core APIs

| Player | Audio IO | OpenAL | Sound Manager |

Audiosrc / audio sink

Audio FW

Bluetooth FW

PulseAudio
Audio HAL
ALSA

PulseAudio

| ALSA module Source/sink | BlueZ module Source/sink |

Audio HAL

ALSA/Tiny ALSA

BlueZ

Audio plug-in

BlueZ Audio IPC
(Unix Domain Socket)

TIZEN™ DEVELOPER SUMMIT 2015 BENGALURU

Multimedia Framework Architecture

Media Player	System Sound	Game Sound	Camera Shutter	Ringtone	Alarm

Sink Input #0	Sink Input #1	Sink Input #5	Sink Input #2	Sink Input #3	Sink Input #4

Pulse Audio

Policy module

**ALSA module
Sink #0
<Default Sink>**

Speaker

Basic interaction between PA clients (Apps) and PA Server

Pulse Audio

Sound Server

Software mixing of multiple audio
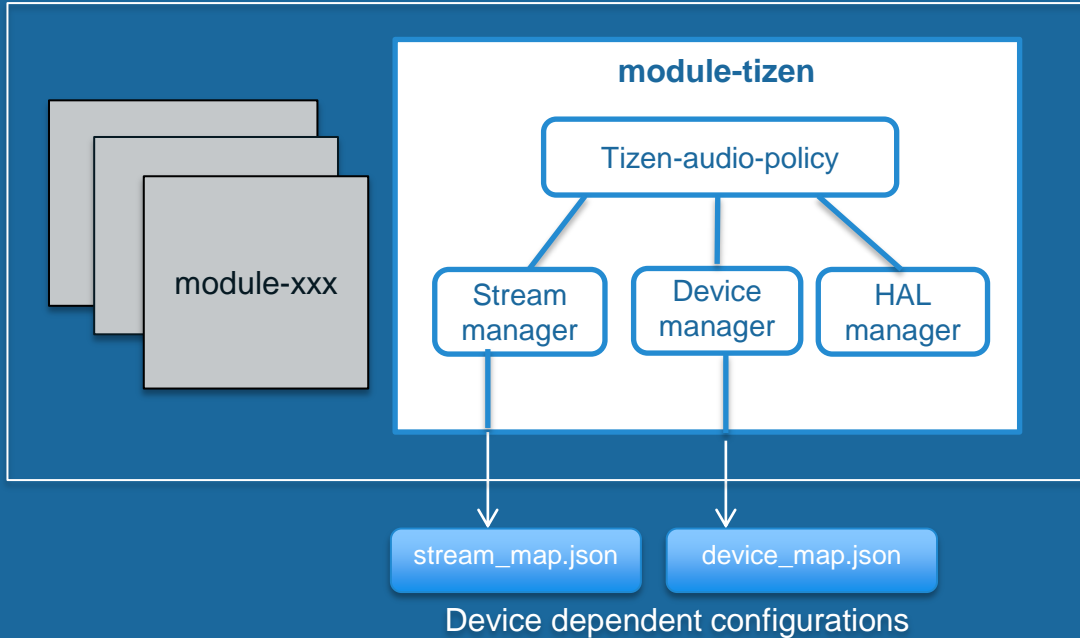
Plugin architecture

Low & accurate latency

Multimedia Framework Architecture

module-tizen

Tizen-audio-policy

Stream manager

Device manager

HAL manager

module-xxx

stream_map.json

device_map.json

Device dependent configurations

Pulse Audio

Extensions on Tizen*

Stream Manager

Device Manager

HAL Manager

*Feature planned in Tizen 3.0

TIZEN™ DEVELOPER SUMMIT 2015 BENGALURU

Multimedia Framework Architecture

Apps

Sound server(PulseAudio)

alsa-lib

Sound driver devices(/dev)

Linux Kernel

Sound drivers

Hardware

control   PCM   **alsa-lib**
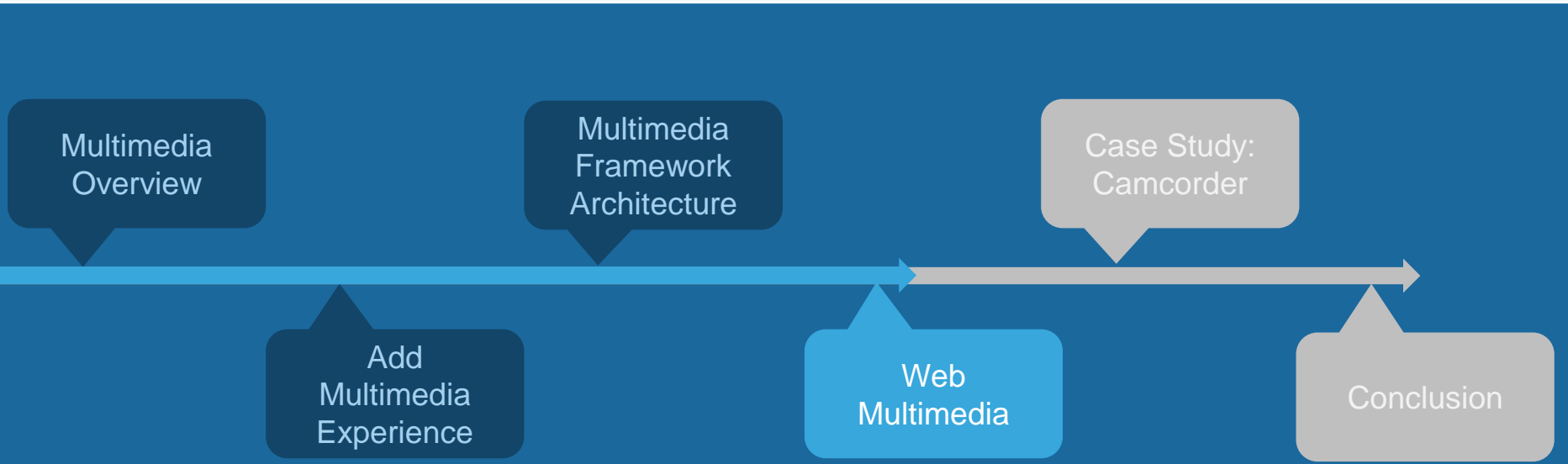
mixer

playback   capture

ALSA

Unified audio interface
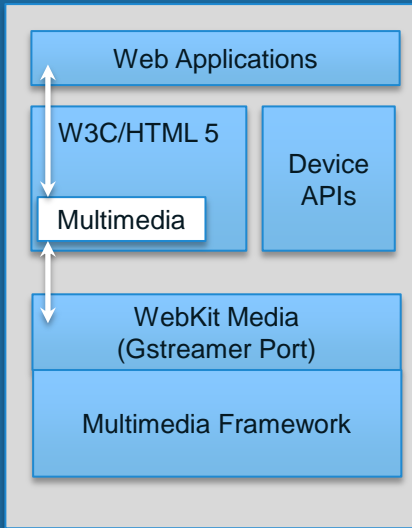
Sound device drivers APIs

PCM interface

Volume control

Progression

Multimedia Overview

Multimedia Framework Architecture

Case Study: Camcorder

Add Multimedia Experience

Web Multimedia

Conclusion

TIZEN™ DEVELOPER SUMMIT 2015 BENGALURU

Web Multimedia

Architecture

- Web Applications
- W3C/HTML 5
- Multimedia
- Device APIs
- WebKit Media (Gstreamer Port)
- Multimedia Framework

Features

Audio & Video Element *

Get User Media *

Web Audio * & Web Speech *

Device APIs to launch:
Music Player, Video Player, Image Viewer

FM Radio, Control Playback

* Reference & Limitations:
https://developer.tizen.org/dev-guide/2.3.0/org.tizen.web.apireference/html/w3c_api/w3c_api_m.html
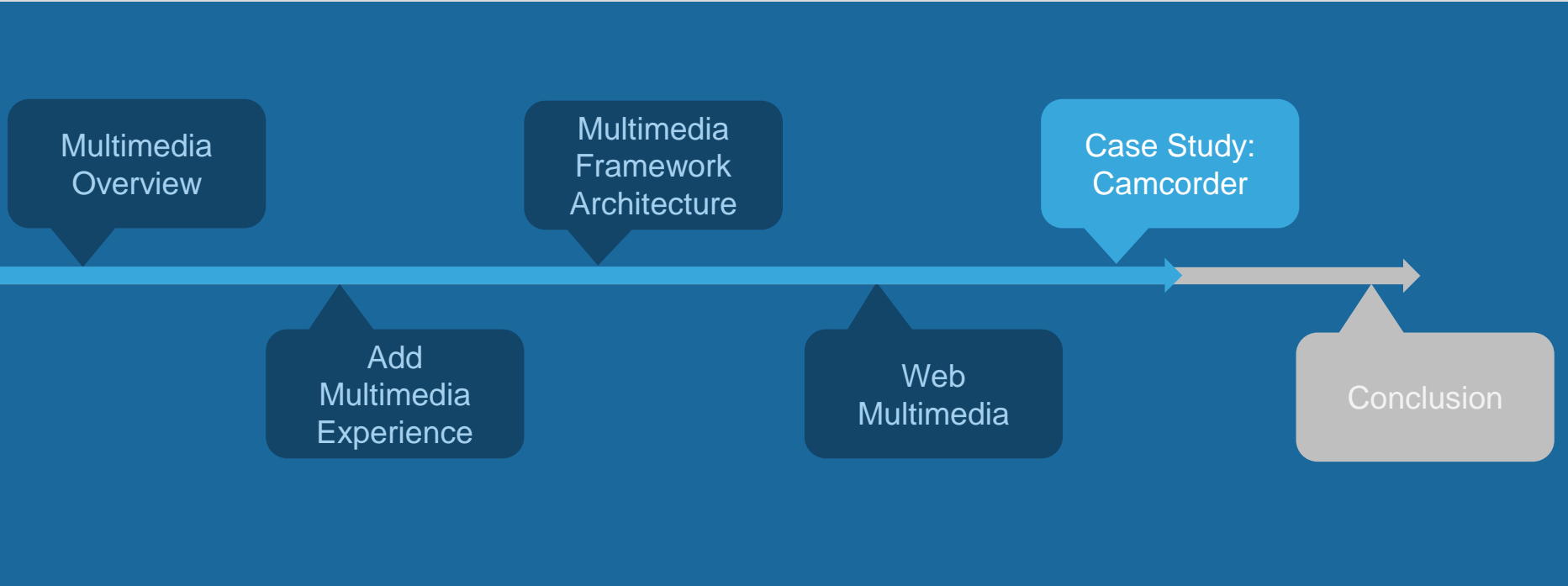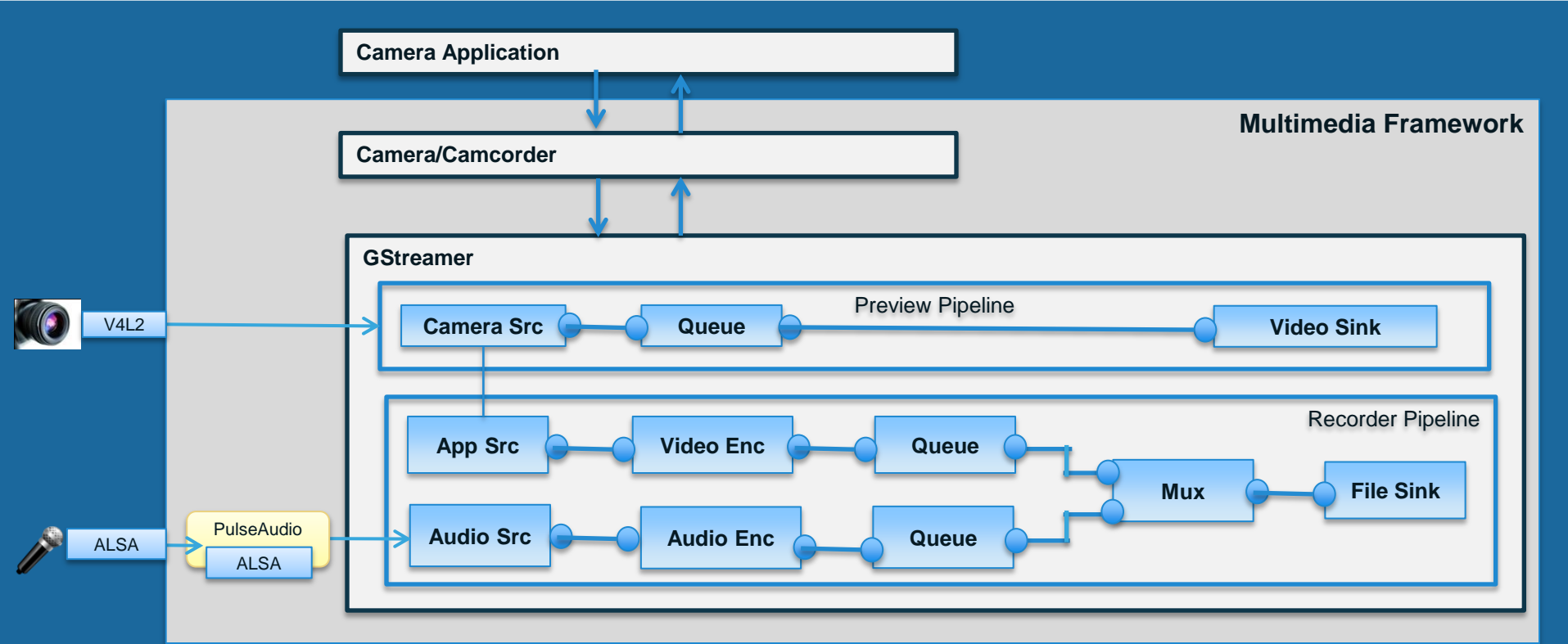
Applications

Hungama

Box TV

nexGTV

MP3 Cutter

TIZEN™ DEVELOPER SUMMIT 2015 BENGALURU

Progression

Multimedia Overview

Add Multimedia Experience

Multimedia Framework Architecture

Web Multimedia

Case Study: Camcorder

Conclusion

Case Study: Camcorder

Progression

Multimedia Overview

Add Multimedia Experience

Multimedia Framework Architecture

Web Multimedia

Case Study: Camcorder

Conclusion

TIZEN™ DEVELOPER SUMMIT 2015 BENGALURU

Conclusion

Easy effective way of developing Multimedia apps

Device manufacturer friendly, Plugin based Multimedia framework

Thank You