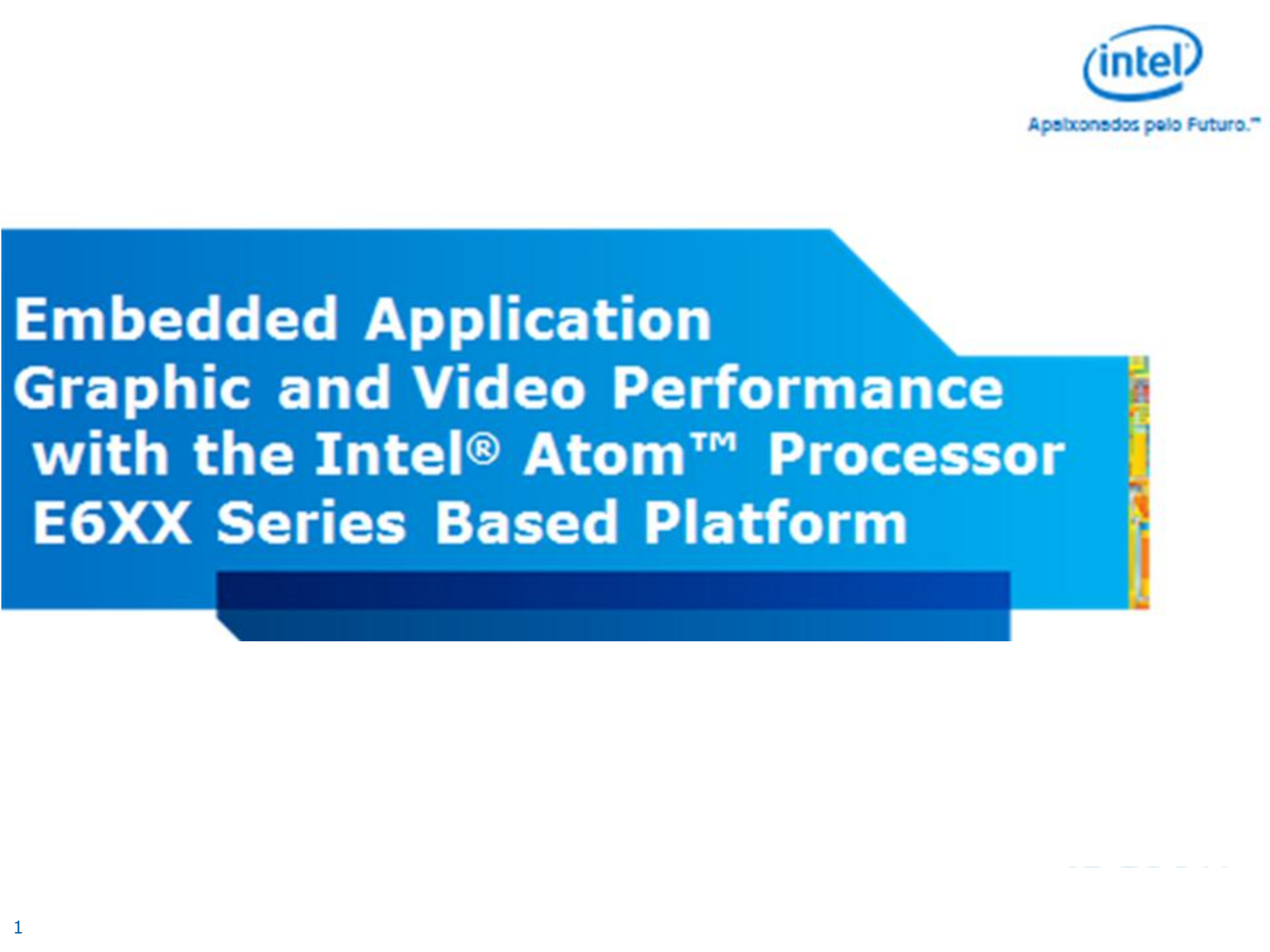
intel
Apaixonados pelo Futuro.™
Embedded Application
Graphic and Video Performance
with the Intel® Atom™ Processor
E6XX Series Based Platform

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Rev. 5/9/11

Agenda

- Background
- Video Encode Capability of the Intel® Atom™ Processor E6XX Series
- Fedora* Software Stack for Hardware Accelerated Video Encode
  - GStreamer*
  - VAAPI
  - Video Plug-in
  - Intel® Embedded Media and Graphics Driver (Intel® EMGD)
  - Fedora Video Encode SW Stack (Camera / Video Memory)
  - Color Space Conversion
  - Video Encode Performance
- A Peek Into the Lab
  - Operating System Environment
  - Lab Session
- Summary

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Background

Video Recording is required by many embedded segments including:

IVI, Medical, Military, Energy, Media Processing, DSS, Media Phone and Retail

Intel® Atom™ Processor E6XX Series

- Dedicated hardware for real time video encode/decode
- Low power consumption
- Support for open source multimedia software stacks

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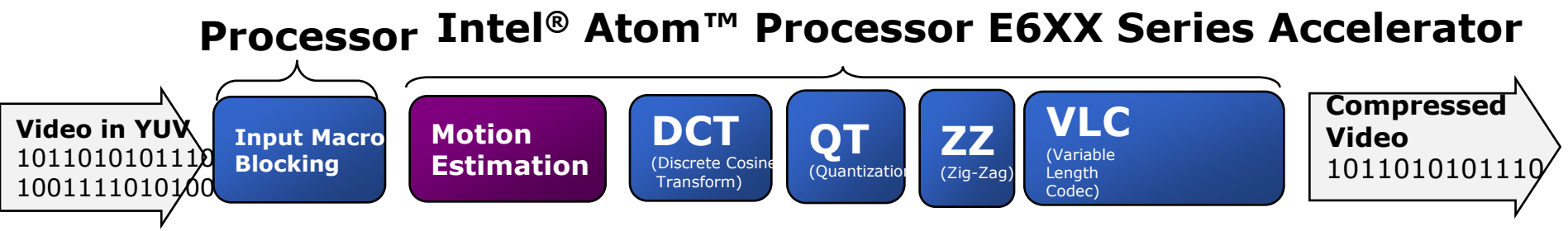
Video Encode Capability

Video Encode Entry Points:



Codec	Profile	Highest Level Support	Note
H.264	Baseline profile	L3.1 (14M bps)	Support in Linux*
MPEG-4	Simple profile	L5 (8M bps)	Support in Linux

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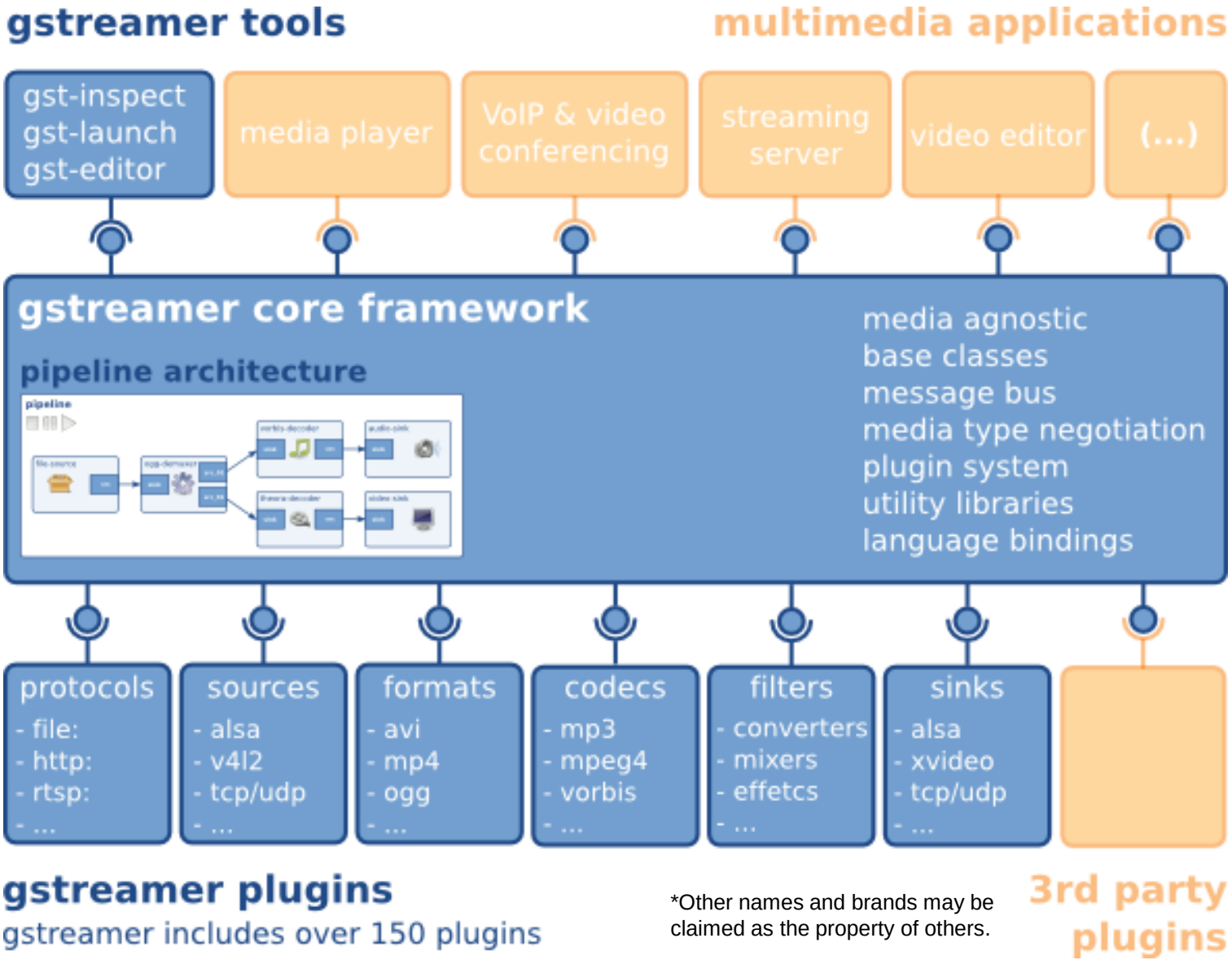
GStreamer*

http://www.gstreamer.net/



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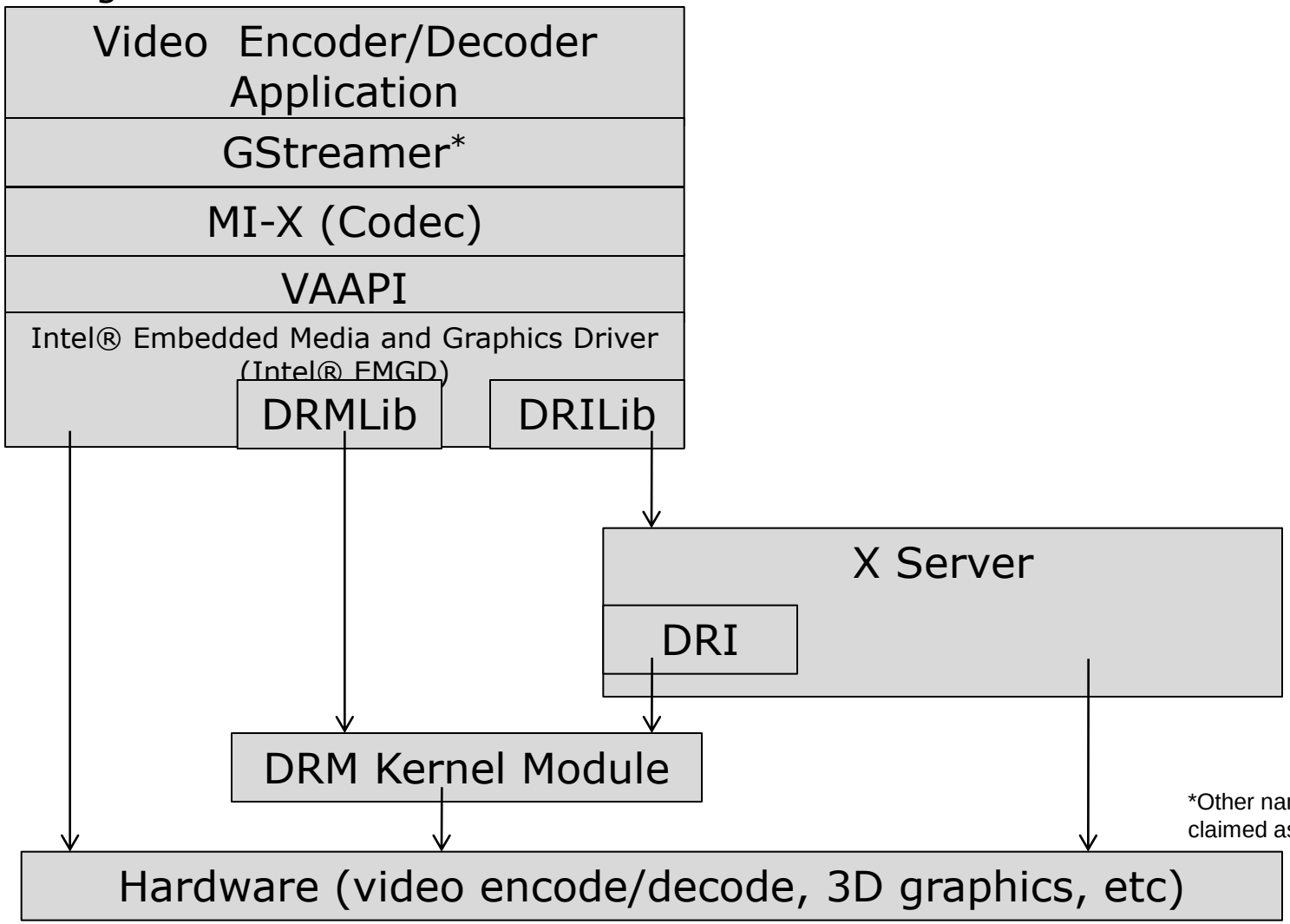
VAAPI

VAAPI - http://www.freedesktop.org/wiki/Software/vaapi Scheme to pass various types of data buffers from application/codec to graphics processing unit for decoding.



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Video Plug-in

GStreamer* Video Plug-in Examples

- **filesrc** (Read source from File)
- **v4l24src** (Capture video from Camera)
- **xvimagesrc** (Capture video from Video Memory)
- **MixVideoEncoder** (Hardware accelerated encoder)
- **x264enc** (Software encoder)
- **ffmpegcolorspace** (Color space conversion)
- **avimux** (Mux audio and video into AVI stream)
- **MixVideoSink**. (Video output)
- **Filesink** (File storage)

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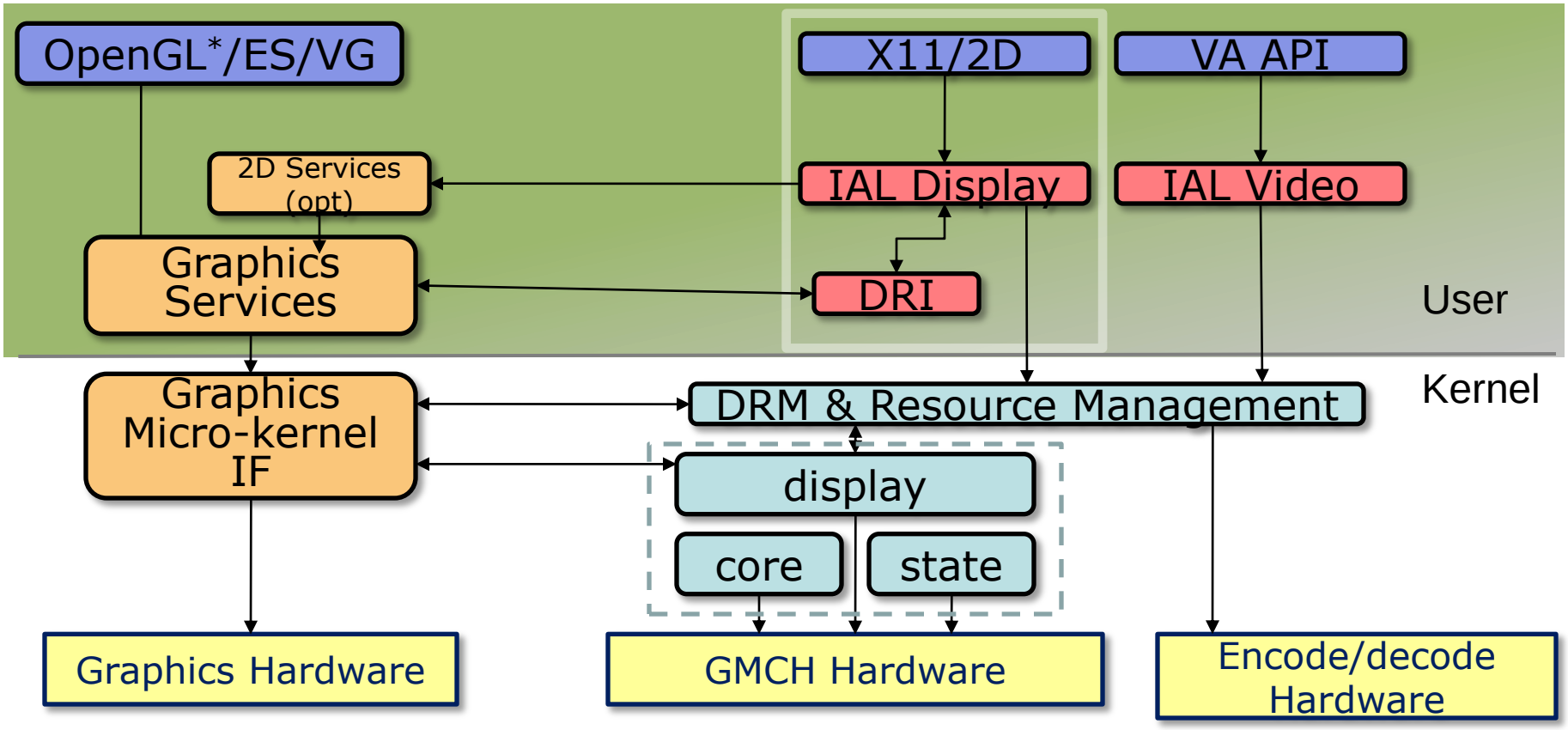
Intel® Embedded Media and Graphics Driver (Intel® EMGD)

Intel® Embedded Media and Graphics Driver (Intel® EMGD) http://edc.intel.com/Software/Downloads/EMGD/ acts as a liaison between the Intel® Atom™ processor E6XX series display/decode hardware and VAAPI.



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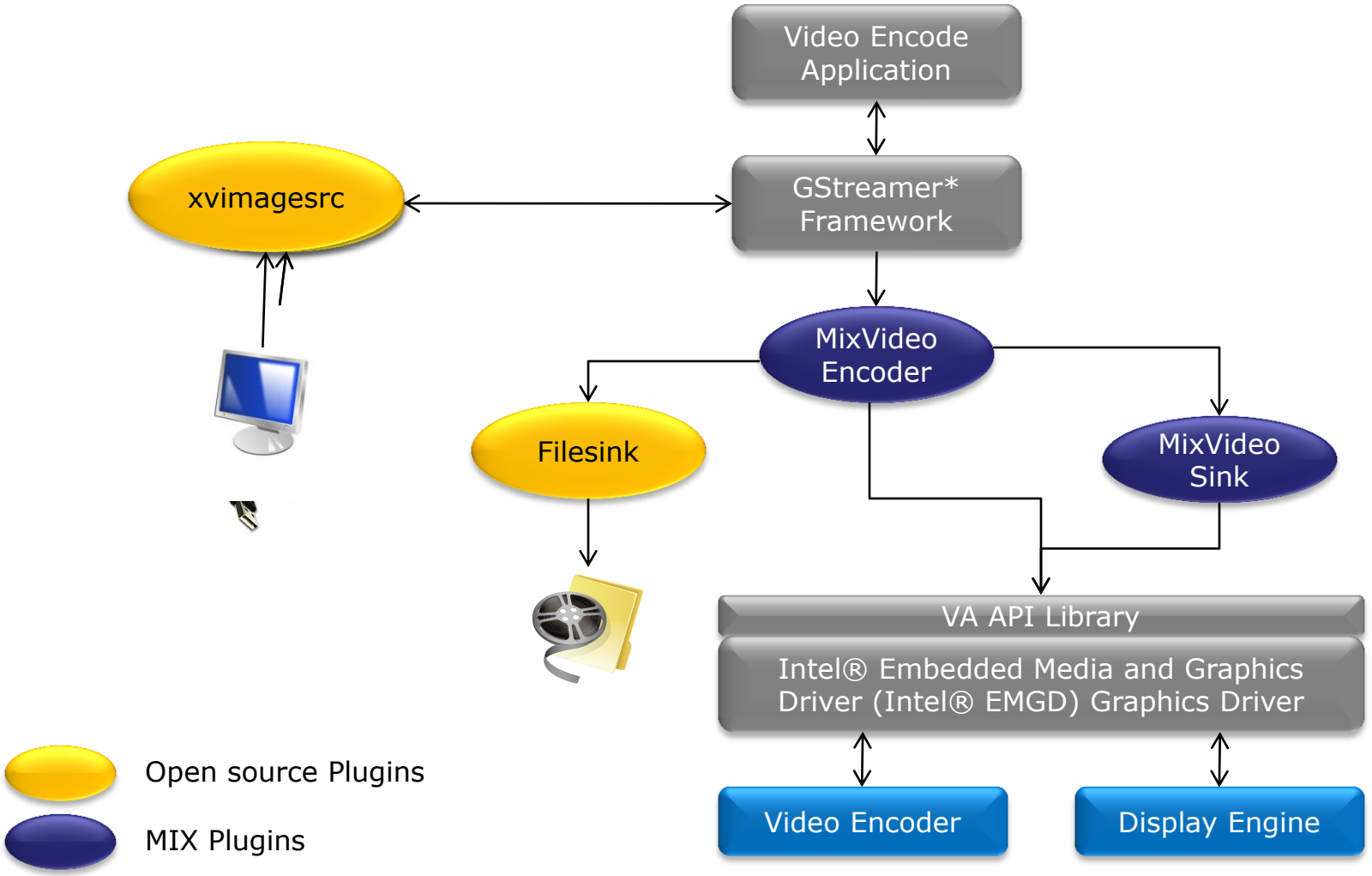
Fedora* Video Encode SW Stack (Camera)



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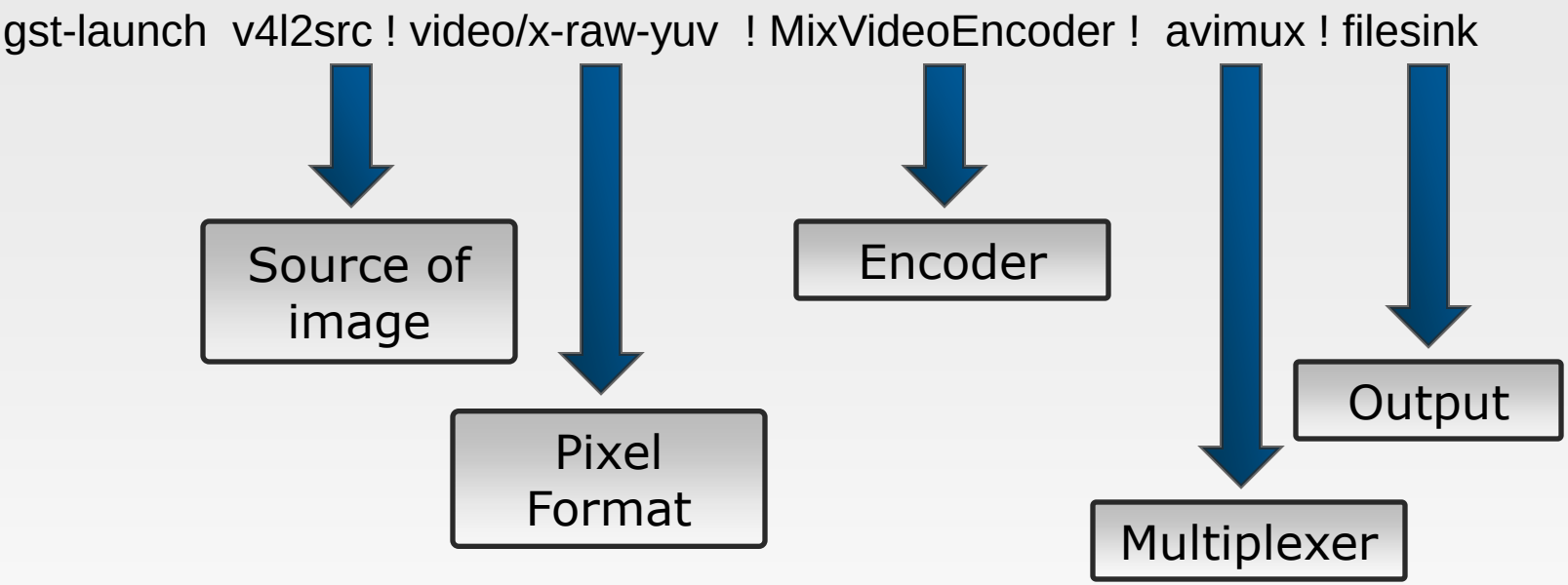
Intel® Embedded Media and Graphics Driver (Intel® EMGD)

GStreamer* Pipeline



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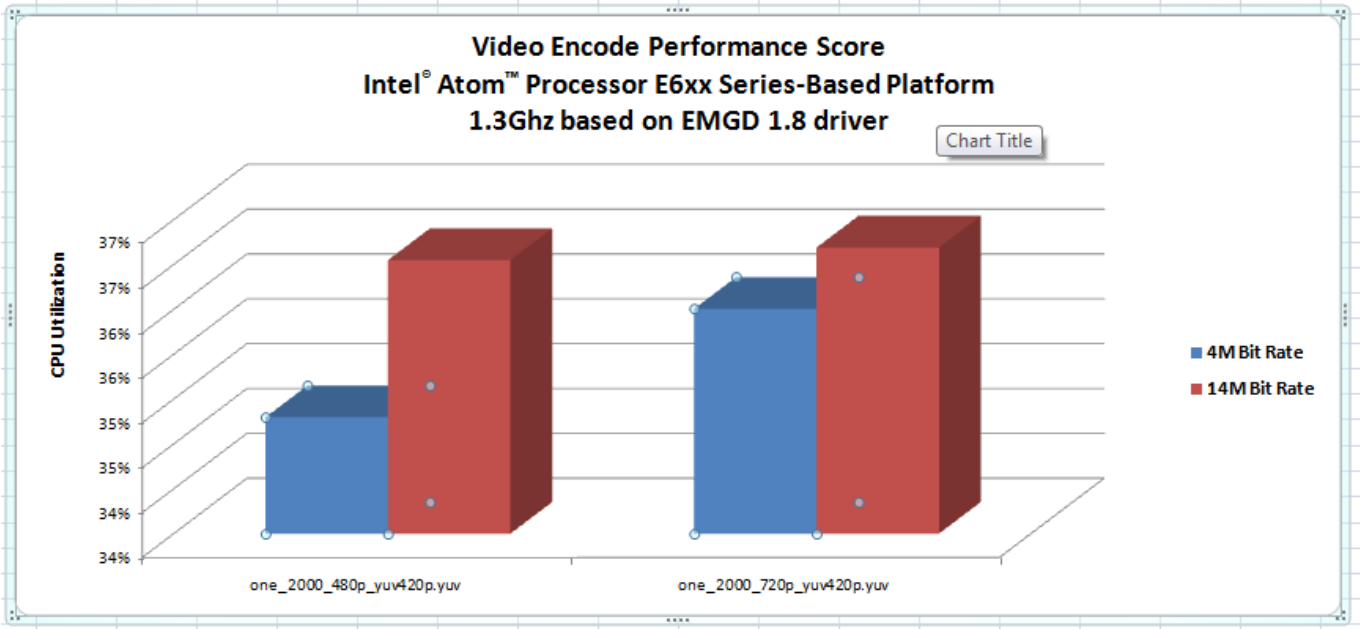
Color Space Conversion

Video Encoder and Video Decoder only produces video in planar YUV 4:2:0 format

- Camera-in is usually in packed YUV 4:2:2 format. It must be converted to planar YUV 4:2:0. This task is done internally in Graphics Driver.
- Video memory design for RGB format. It must be converted to planar YUV 4:2:0. This task is done through FFMPEGCOLORSPACE plug-in.

Intel® Atom™ Processor E6xx Series Video Encode Performance



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What's Next? A Peek Into the Demo.

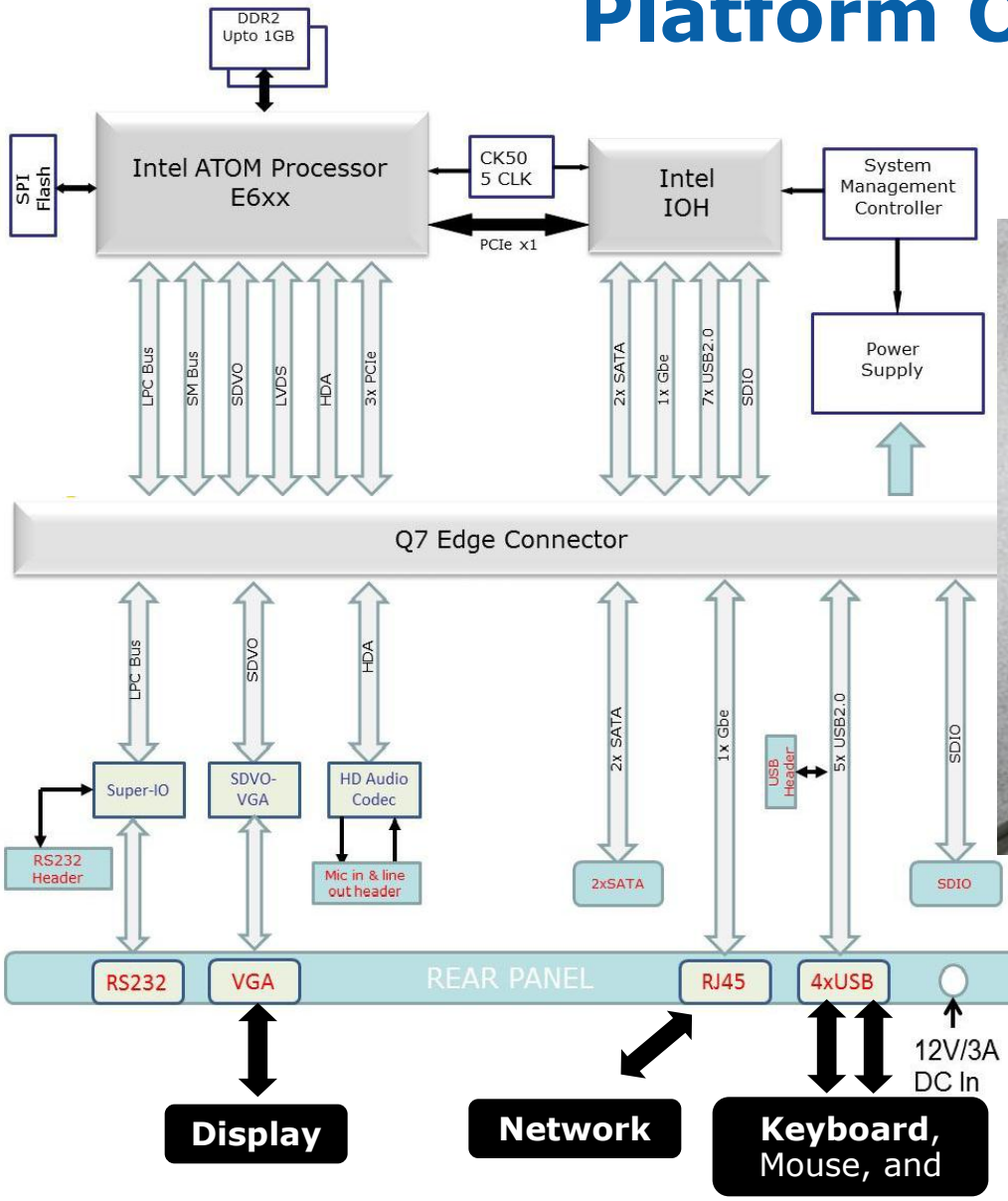
Setup your own platform and experience benefits of hardware accelerated video recording on the Intel® Atom™ processor E6XX series-based platform.

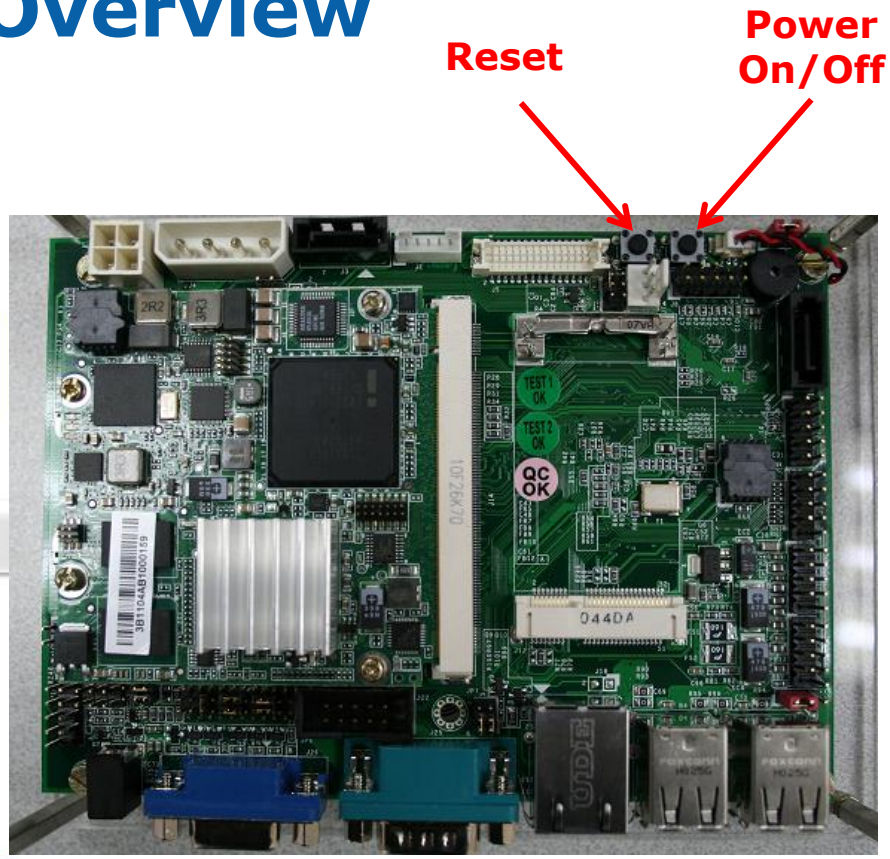
Note: Fedora*, Gstreamer* and the Mplayer* are already installed.

Steps:

1. Install Driver, VAAPI and development headers
2. Install required Gstreamer Video Plug-ins
3. Run Gstreamer inspect and Vainfo to verify supported Plug-ins
4. Compare Hardware Accelerated Video Encoding (with USB Camera) to Software based Video Encoding (with USB Camera)
5. Compare Hardware Accelerated Video Encoding (Video Memory) to Software based Video Encoding (Video Memory)
6. Use mplayer(Hardware Accelerated Video Decoder) to decode the video

Intel® Atom™ Processor E6xx Series-Based Platform Overview





NOTE: Actual lab hardware may be different

Operating System Environment

For your convenience, the following installer files will be present on your system (/home/inforce/lab):

1. Gstreamer* installer
2. Plug-ins
3. Driver Installer
4. Xorg configuration file
5. Demo script

TIPS:

1. Open source tools like MediaInfo or FormatFactory are good tools to analyze Media Files
2. Analyzing Media Files help you make sure that you have correct audio/video plug-ins installed on your system and that hardware is capable of processing those media files

Lab Session

- Refer to the lab instructions located in the system folder: /home/inforce/lab

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Summary

The Intel® Atom™ processor E6xx series-based platform provides great flexibility to users to enjoy smooth video recording through GStreamer* framework:

- No video stuttering, no frame drops
- Lower CPU utilization, responsive system, headroom for additional tasks

*Other names and brands may be claimed as the property of others.

References

- **GStreamer*: http://www.gstreamer.net/**
- **Intel® Embedded Design Center: http://edc.intel.com/**
- **Intel® Embedded Media and Graphics Driver (Intel® EMGD) web site: http://edc.intel.com/Software/Downloads/EMGD**
- **Embedded Linux* for Intel® Processors: http://www.timesys.com/supported/processors/intel**
- **VAAPI: http://www.freedesktop.org/wiki/Software/vaapi**
- **White papers:**
  - **Using Gstreamer for hardware accelerated video decoding on Intel Atom™ Processor E6xx series: http://download.intel.com/design/intarch/PAPERS/324294.pdf**
  - **Video Encoding Accelerator Solution for Intel Atom Processor E6xx Series: http://download.intel.com/design/intarch/PAPERS/324328.pdf**

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Q&A