ENTROPYWAVE
VIDEO COMPRESSION TECHNOLOGY

Recent Developments in Open Video Technology

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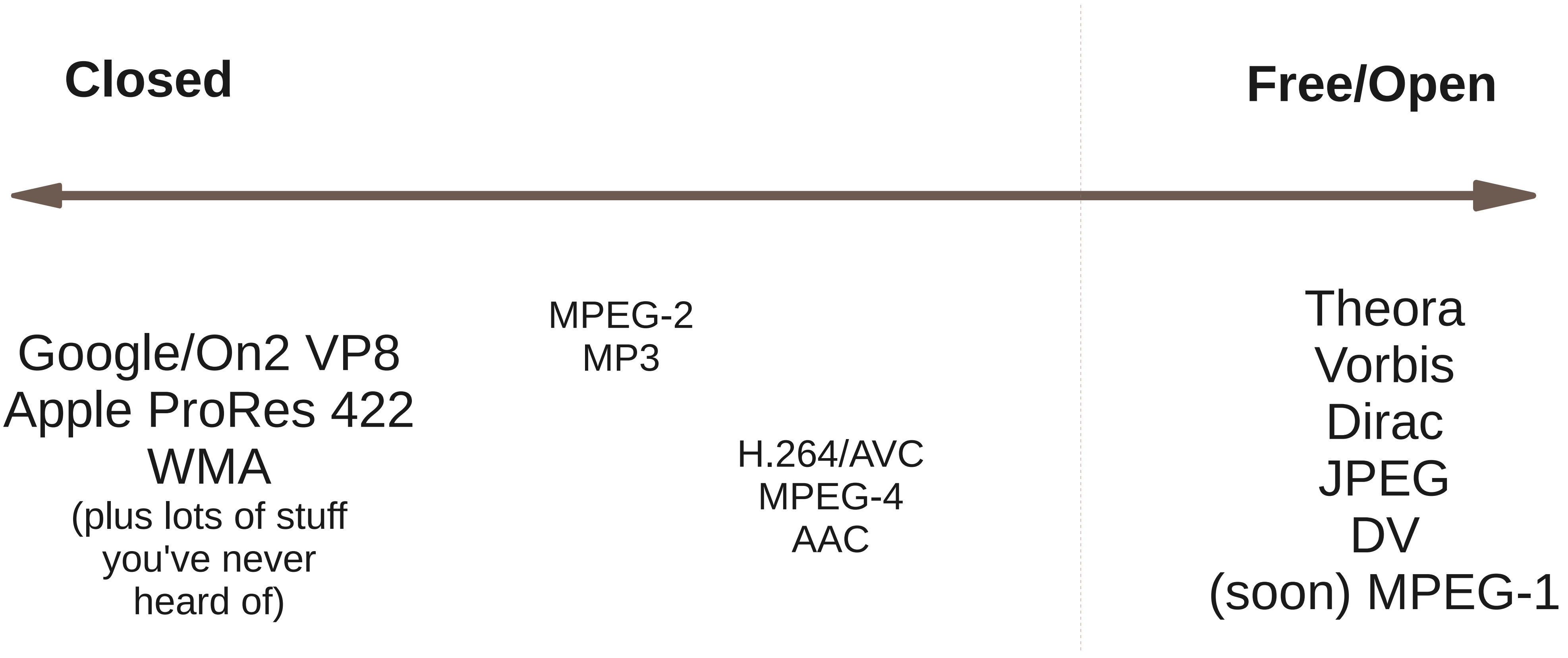
What is Open Video Technology?

What is Open Video Technology?

Video (and audio) compression and streaming methods, specifications, and software that are free to **use** in any way.

Open Video Technology

- FOSS-licensed software
- (preferably) free specifications
- no patents, or at least free licensing to all



Closed

Free/Open

Google/On2 VP8
Apple ProRes 422
WMA
(plus lots of stuff
you've never
heard of)

MPEG-2
MP3

H.264/AVC
MPEG-4
AAC

Theora
Vorbis
Dirac
JPEG
DV
(soon) MPEG-1

The Current Situation

- Industry converging around H.264/AAC
  - Provides revenue for large companies
  - Technology is good
  - Not too onerous for most people

Why? Network effect!

“We believe that it’s vital to the health of the web for people to approach video on the web the same way they do images: without needing proprietary plugins or paying license fees for restricted codecs, and with the ability to fully integrate into the rest of the page.”

Mike Shaver, Mozilla Corp

Alliance Urges Royalty-Free H.264 Video Standard

February 20, 2003

“The royalty-free profile will enable industry to bring an open, internationally standardized video codec to market quickly, without time-consuming and fractious licensing negotiations, and avoids the market risks associated with proprietary codecs. “

(Cisco Systems, Deutsche Telekom, Sun Microsystems, TANDBERG, ...)

How do we get network effects for open codecs?

Why use Open Video Tech?

- Product differentiation
- Contributes to a network effect that will ultimately provide everyone benefits
- No additional cost, so why not?
- No licensing fees!

Why not?

- Patent litigation fear (FUD)
- Not enough developer time/other priorities
- Tools aren't good enough

(give feedback to developers)

xiph.org

- Theora (implemented by libtheora-1.1)

  Video codec (2004)

- Vorbis (implemented by libvorbis, Tremor)

  Audio codec (2000)

- FLAC lossless audio codec

- Speex (implemented by libspeex)

  Speech codec (2003)

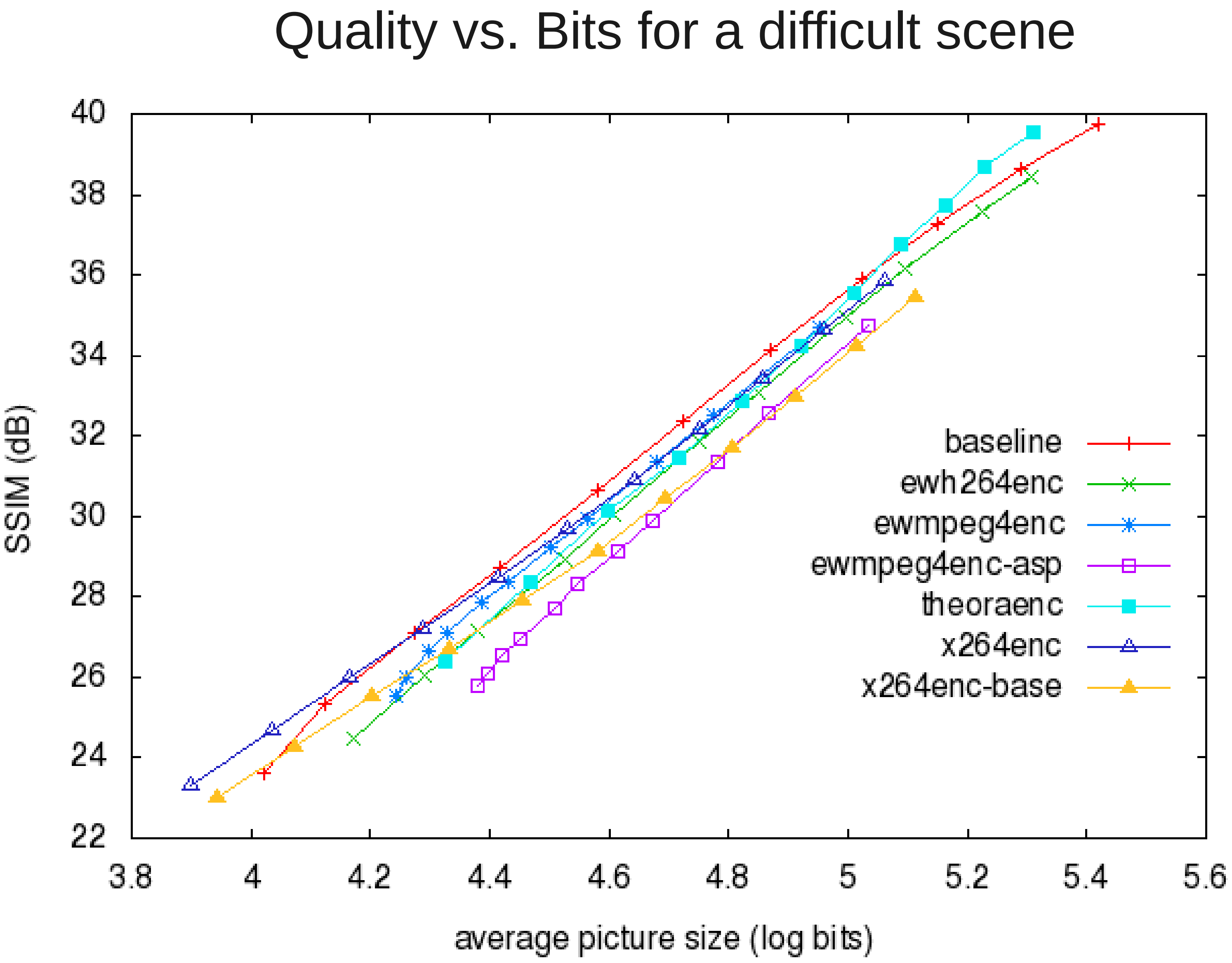
- CELT (in development)

  sub-20 ms latency audio codec

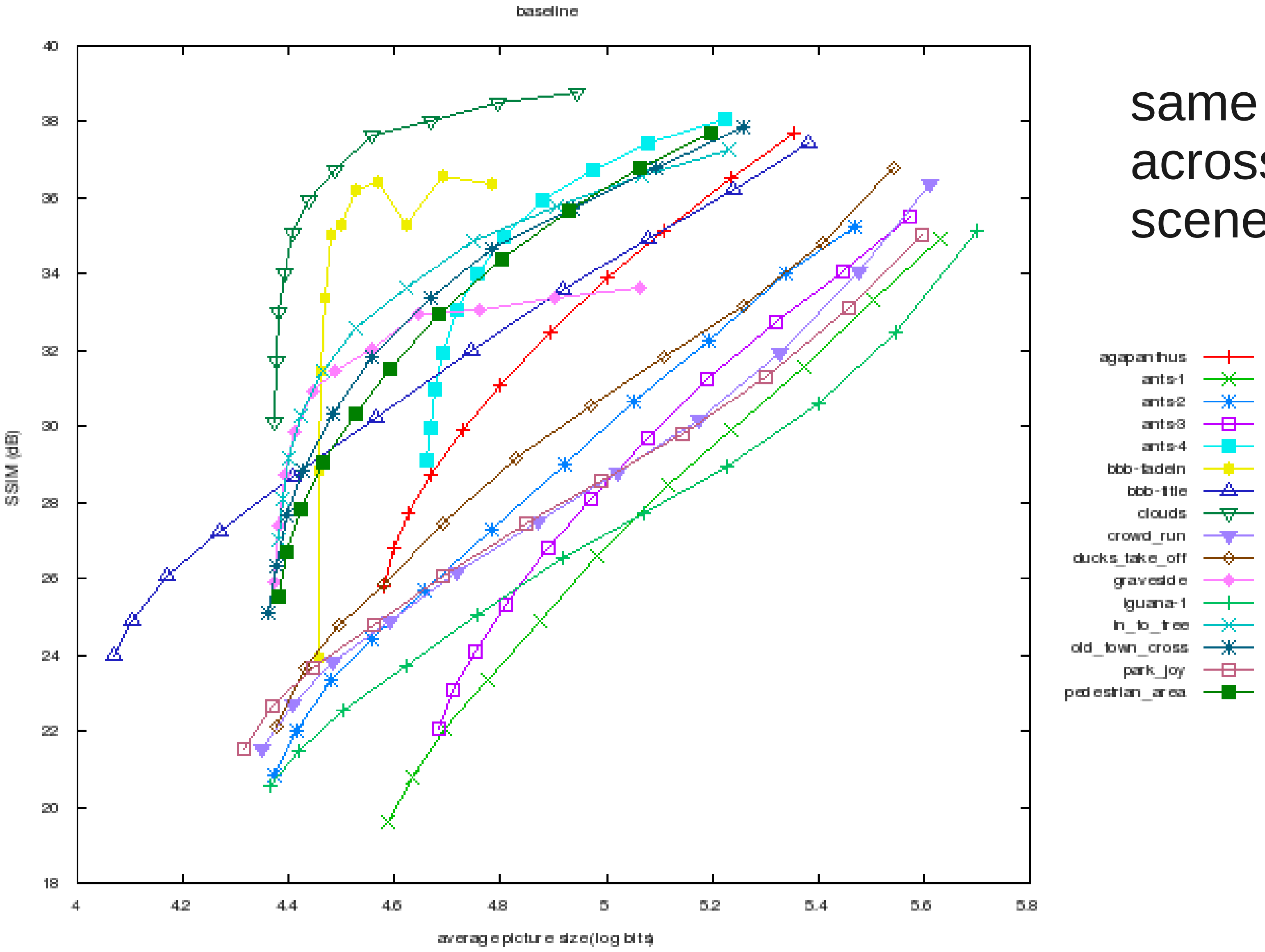
Status of Theora/Vorbis

- Integrated into GStreamer, VLC, FFmpeg, DirectShow, QuickTime
- Used by Firefox 3.5
- Theora has good compression efficiency and low CPU usage compared to other codecs
- Theora: lots of work on the encoder in past year

Encoder Efficiency

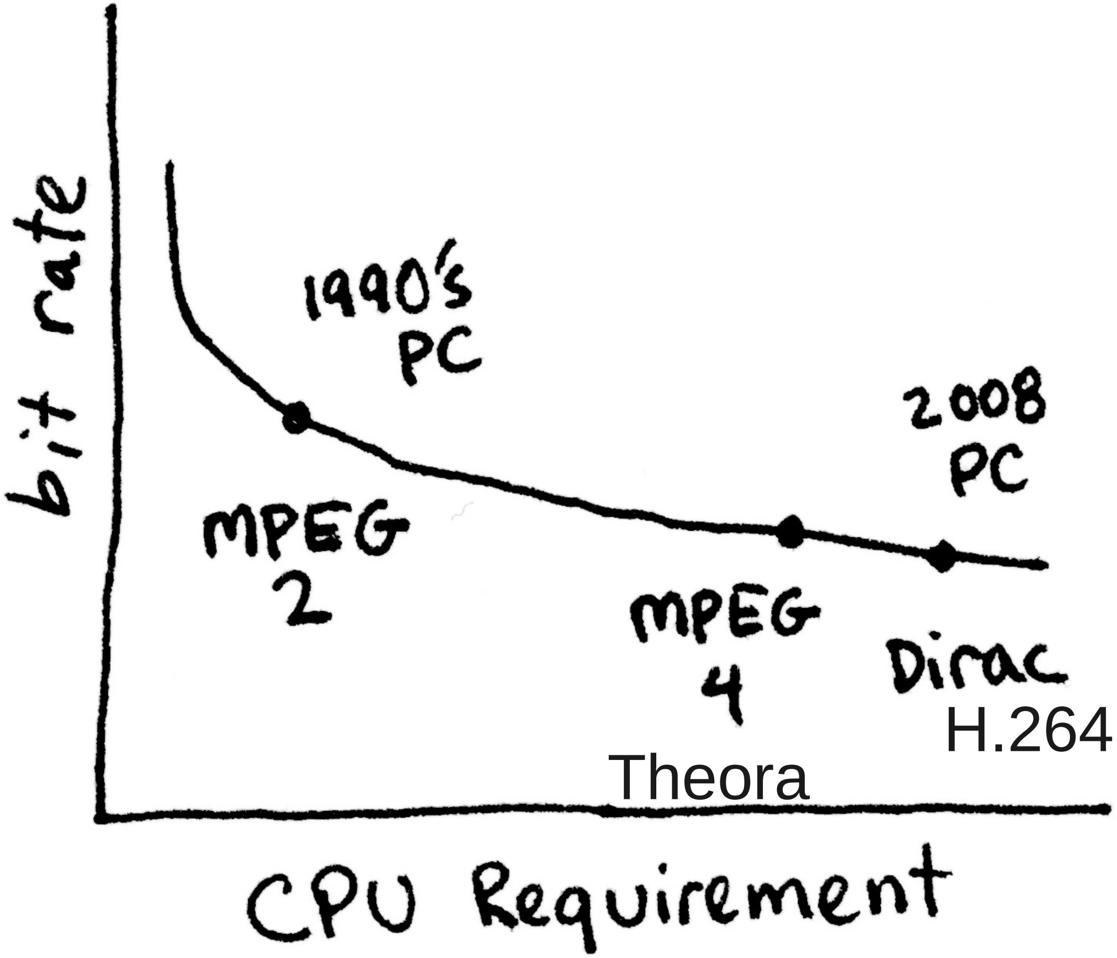


Encoder efficiency



same encoder, across many scenes

Efficiency vs. Complexity



“Theorarm” ARM/NEON optimization

- Recently released under BSD license
- SD decoding on Cortex-A8 at 500 Mhz
- Up to HD720 with hardware YCbCr->RGB conversion

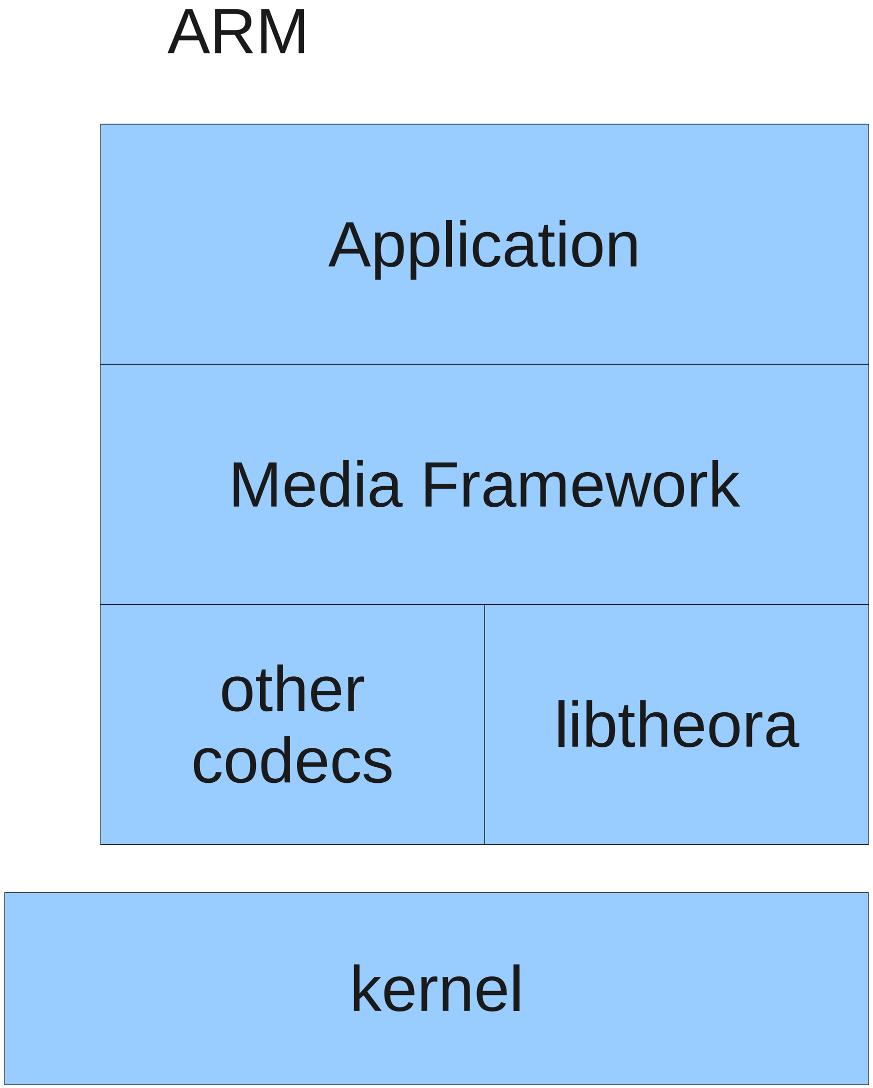
(Funded by Google)

“Leonora” TI c64x+ DSP optimization

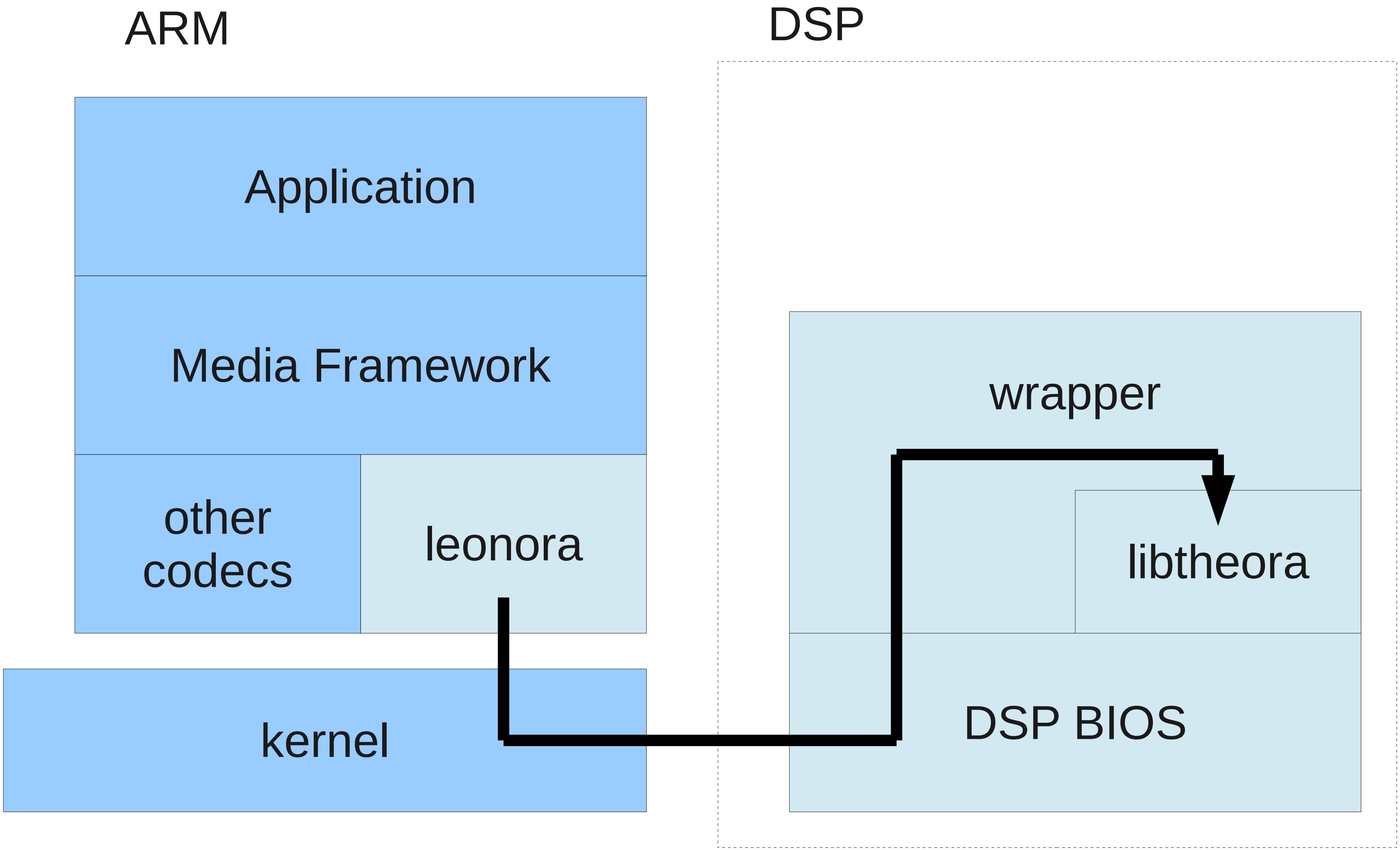
- A “hardware implementation” of Theora for OMAP3 (ARM Cortex-A8 + DSP)
- Replaces libtheora API calls with message passing to DSP
- more than SD decoding in real time
- lower power usage than theorarm

(Funded by Mozilla, demo tomorrow)

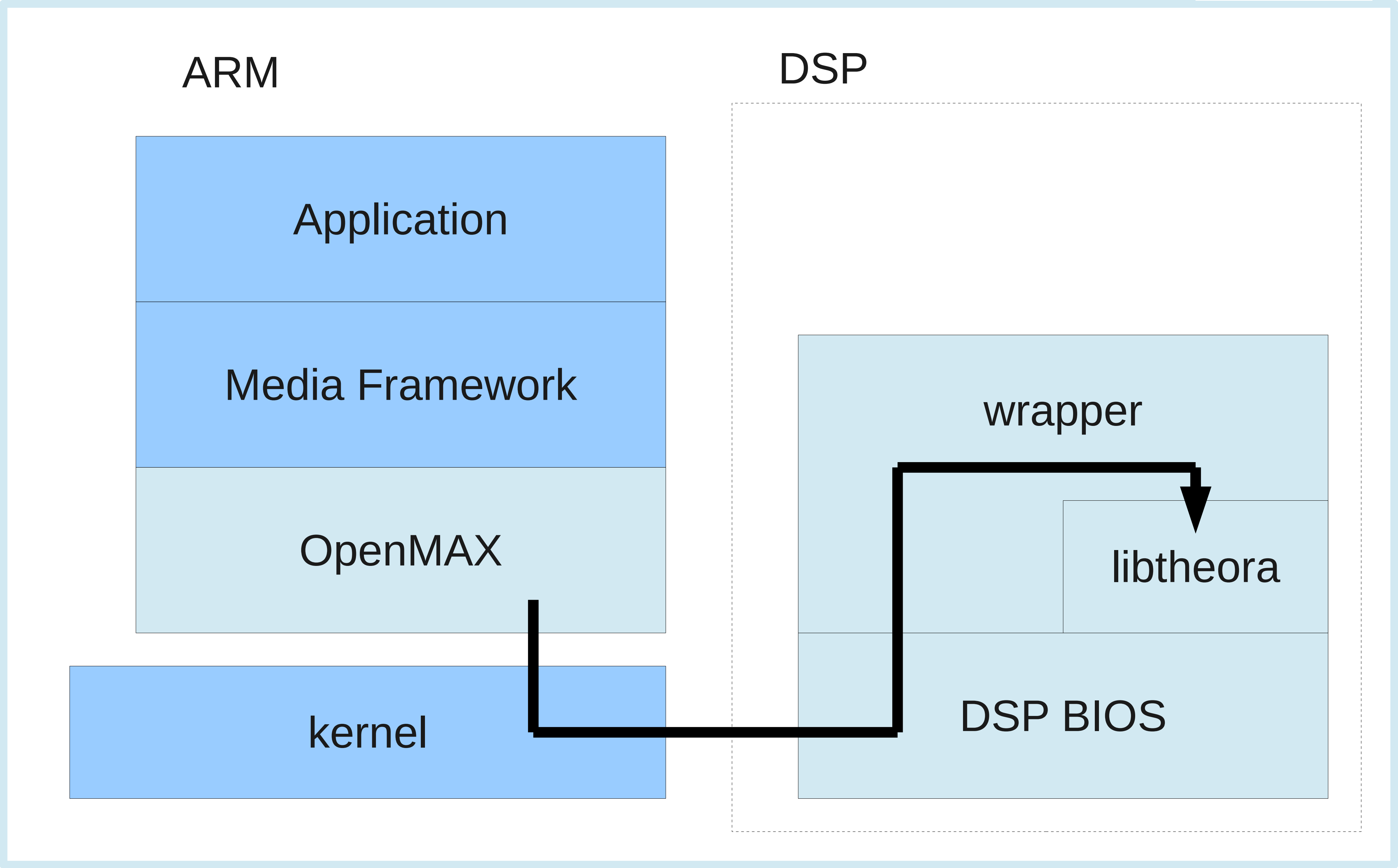
Leonora


ARM
Application
Media Framework
other codecs
libtheora
kernel

Leonora


ARM
DSP
Application
Media Framework
other codecs
leonora
kernel
wrapper
libtheora
DSP BIOS

Leonora



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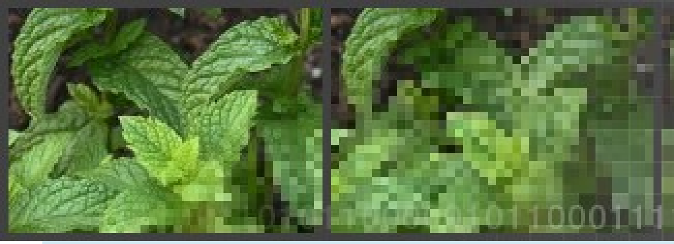

Dirac

- Created by BBC (2008)
- Parts standardized as SMPTE VC-2
- Really good compression efficiency (similar to H.264), high CPU usage (similar to H.264)
- Software implementation: “Schrödinger”
- Hardware implementation available (VC-2)

Schrödinger News

- Recently merged BBC's research branch and released 1.0.9
- Orc (OIL Runtime Compiler) creates SIMD code at runtime for encoding/decoding
- Orc's NEON backend to be relicensed as open source soon
- 640x360@30fps decoding on Cortex-A8

Checklist for Open Codecs

RTP	yes (except Dirac)
HTTP streaming	yes
Live streaming	yes
ARM optimization	yes
Acessibility	yes
Internationalization	yes
Integration with MPEG	not so much

Commercial Support

Collabora

ENTROPYWAVE
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FLUENDO

Vquence™
Social Video Intelligence

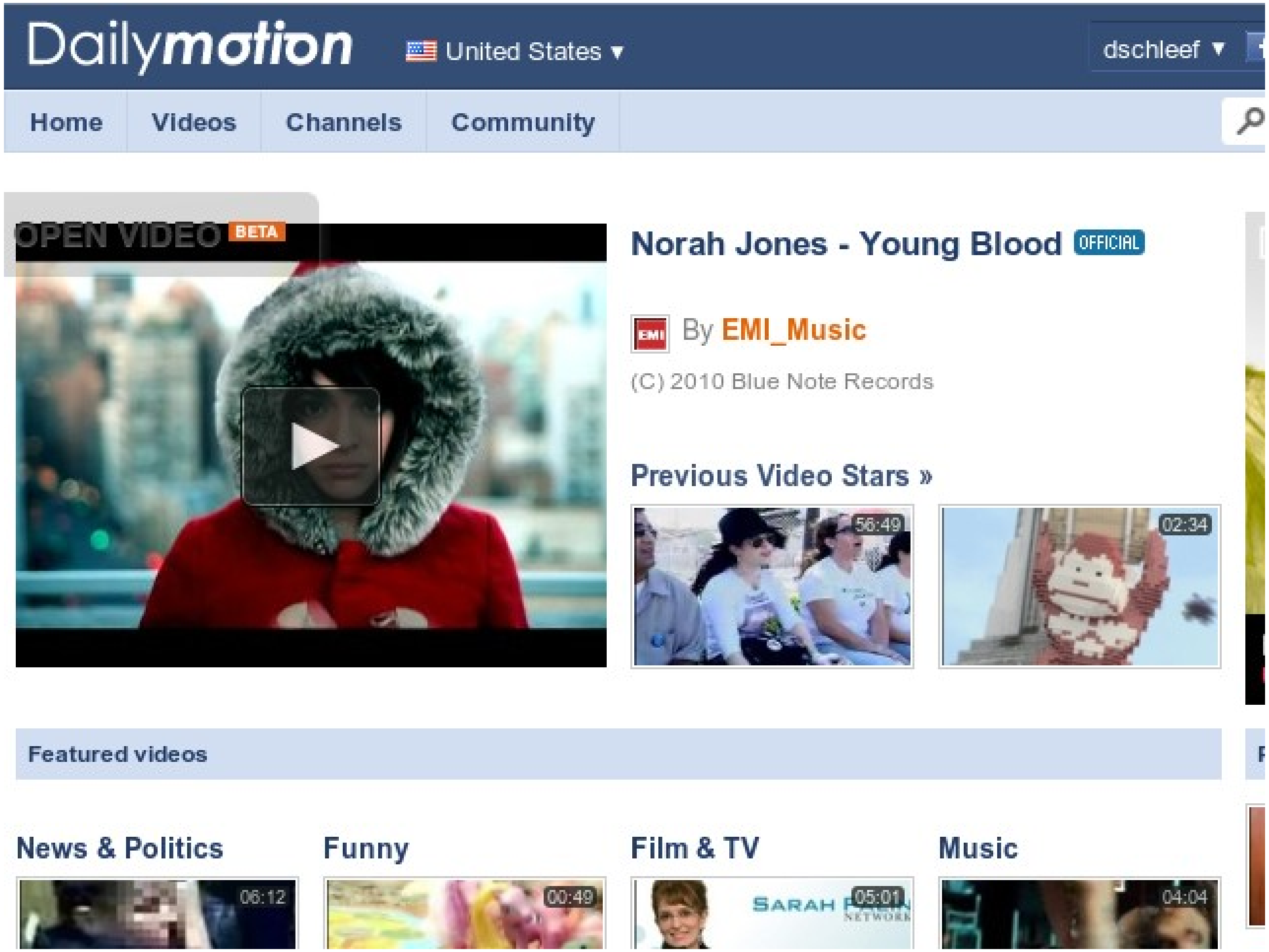
Kaltura
open source video

HTML5

Specifies <video> tag for embedding video in the web browser. No plugin necessary. Integrates with Javascript.

Theora could have been baseline codec, but various companies complained.

dailymotion.com uses HTML5



Integration

- Use a media framework
  - GStreamer
  - FFmpeg (enable libtheora, schroedinger, libvorbis)
  - VLC
- Use liboggplay
  - Simple, Xiph codecs only

What I do

- Build kernel from source
- Ängstrom online image builder (narcissus)
- Compile 25 media packages from source

  glib, libxml2, gstreamer, gst-plugins-base, libtheora, libvorbis, gst-plugins-good...
- Compile custom application
- Small script to build rootfs

Embedded GStreamer

- Configurable for light weight
- Plugin architecture allows for custom codecs
- OpenMAX plugins
- Many options for embedded video output
- Project goals: stability, extensibility, reliability

GStreamer negatives

- ~~Steep~~ Long learning curve
- Examples are obscurely hidden
- No GStreamer book
- No embedded distro that tracks GStreamer consistently

Thank you

Leonora demo tomorrow evening