DRM/KMS, FB and V4L2: How to Select a Graphics and Video API

Embedded Linux Conference Europe 2012

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Personal opinion

Flame war possible
Handle with care

Disclaimer

IDEAS ON BOARD

Problem Definition

IDEAS ON BOARD

Problem Definition

display / graphics / video

format
memory / deep pipeline
device / CPU

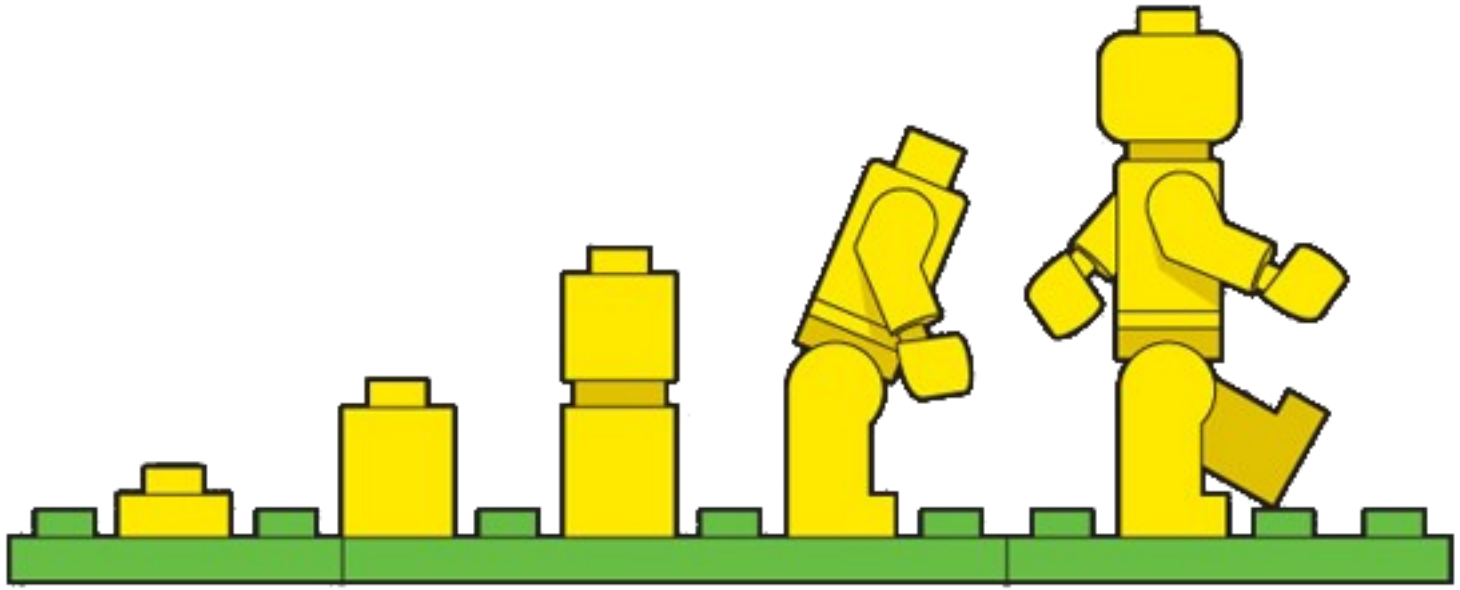
rotation
scaling
composing

X11
Wayland
DirectFB
Raw API

Problem - Stack

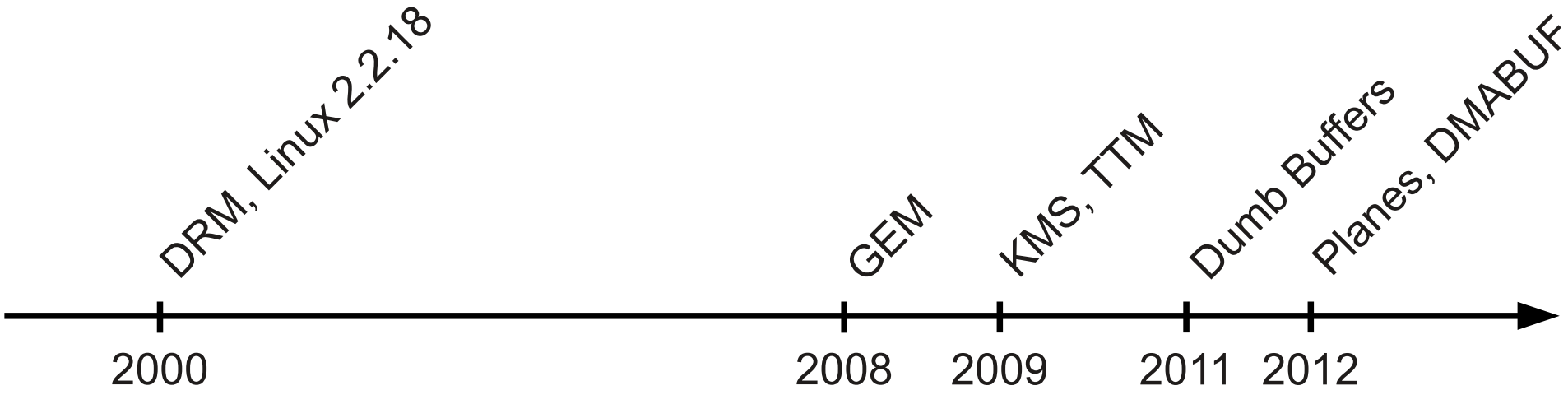
DRM
FBDEV
V4L2

Problem - API

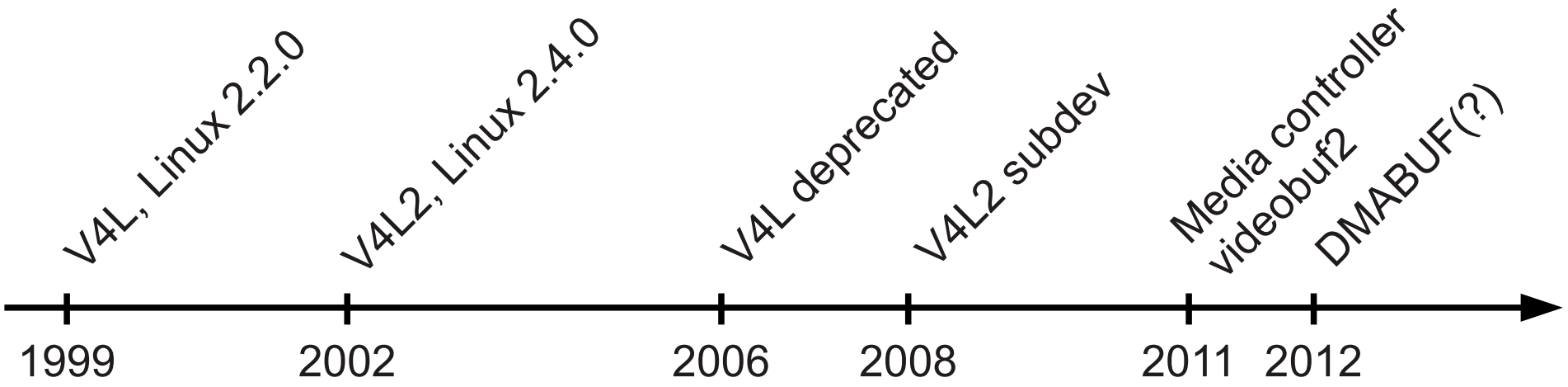


IDEAS ON BOARD

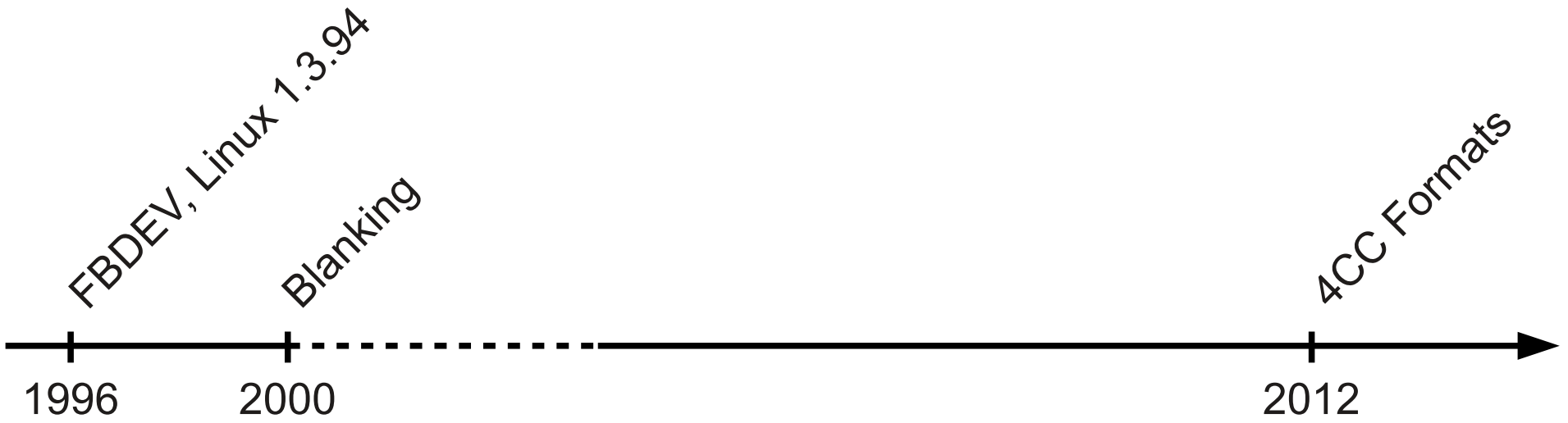
Origins



Origins – DRM/KMS



Origins – V4L2



Origins – FBDEV

IT TOOK A LOT OF WORK, BUT THIS LATEST LINUX PATCH ENABLES SUPPORT FOR MACHINES WITH 4,096 CPUs, UP FROM THE OLD LIMIT OF 1,024.
DO YOU HAVE SUPPORT FOR SMOOTH FULL-SCREEN FLASH VIDEO YET?
NO, BUT WHO USES THAT?

IDEAS
ON BOARD

Features

	DRM	FB	V4L2
Dynamic Allocation	Yes	No	Yes
Multiple Buffers	Yes	panning	Yes
Import	dmabuf	No	userptr
Export	dmabuf mmap	mmap	mmap

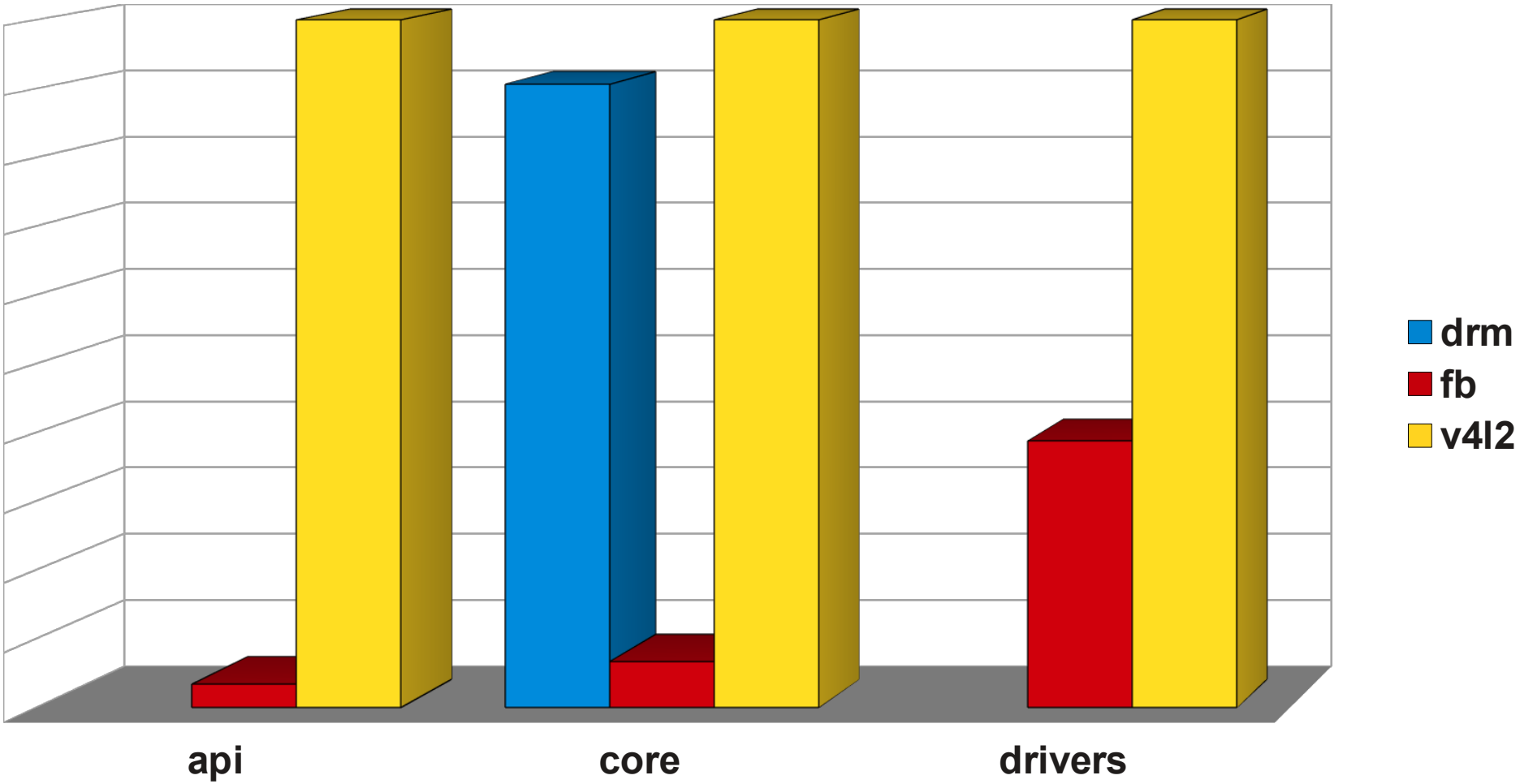
Memory Management

	DRM	FB	V4L2
Formats	4CC	RGB 4CC	4CC
Enumeration	Planes	No	Yes
Negotiation	No	No	Yes
Atomicity	Yes	No	No

Mode Setting

	DRM	FB	V4L2
Overlays	Yes	No	Yes
Rotation	Yes	No	Yes
Scaling	Yes	No	Yes
Cropping/Panning	Yes	Yes	Yes

Transformations



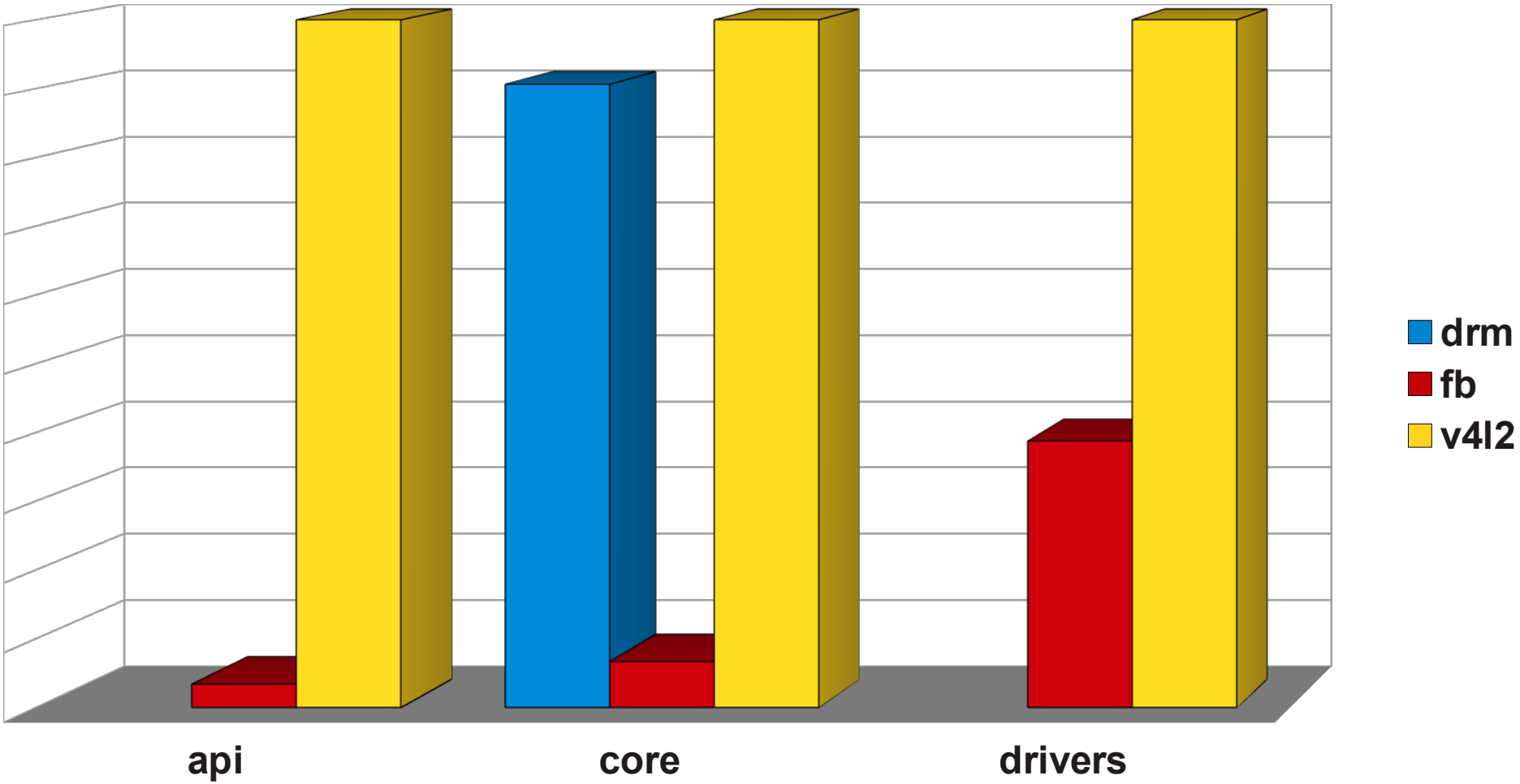
Documentation

“ The DRM core exports several interfaces to applications, generally intended to be used through corresponding libdrm wrapper functions. In addition, drivers export device-specific interfaces for use by userspace drivers & device-aware applications through ioctls and sysfs files.

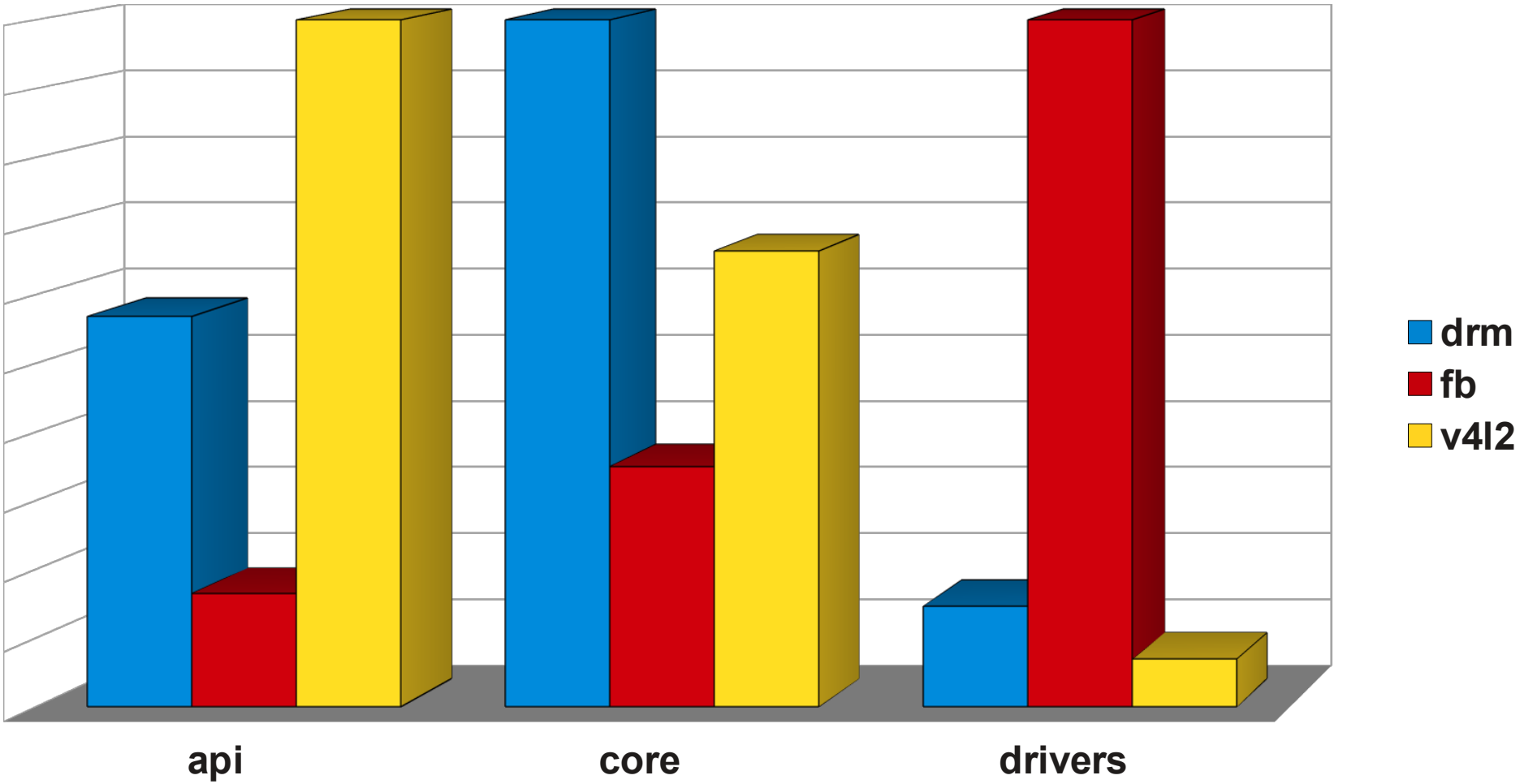
External interfaces include: memory mapping, context management, DMA operations, AGP management, vblank control, fence management, memory management, and output management.

Cover generic ioctls and sysfs layout here. We only need high-level info, since man pages should cover the rest. ”

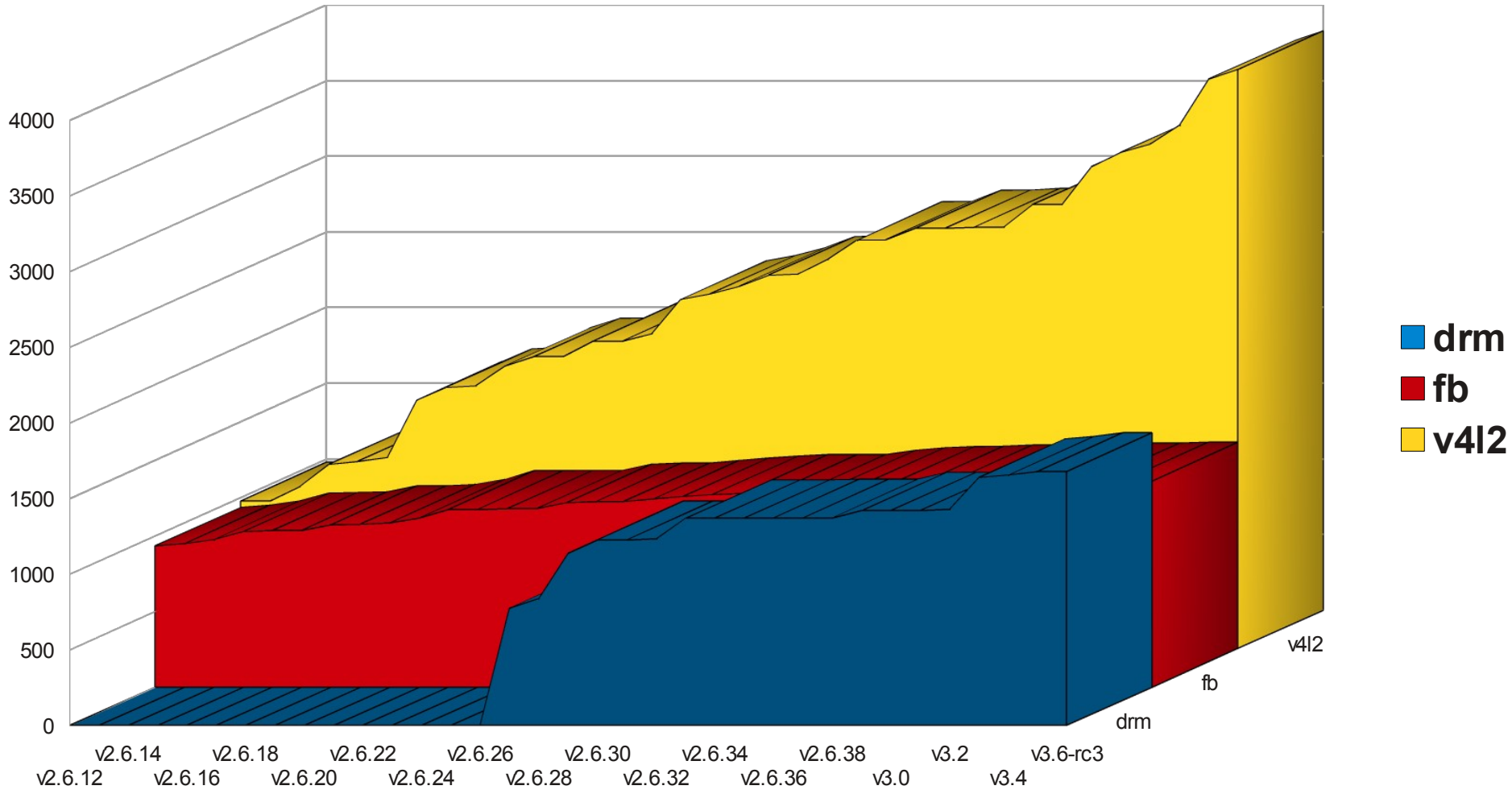
DRM API Documentation



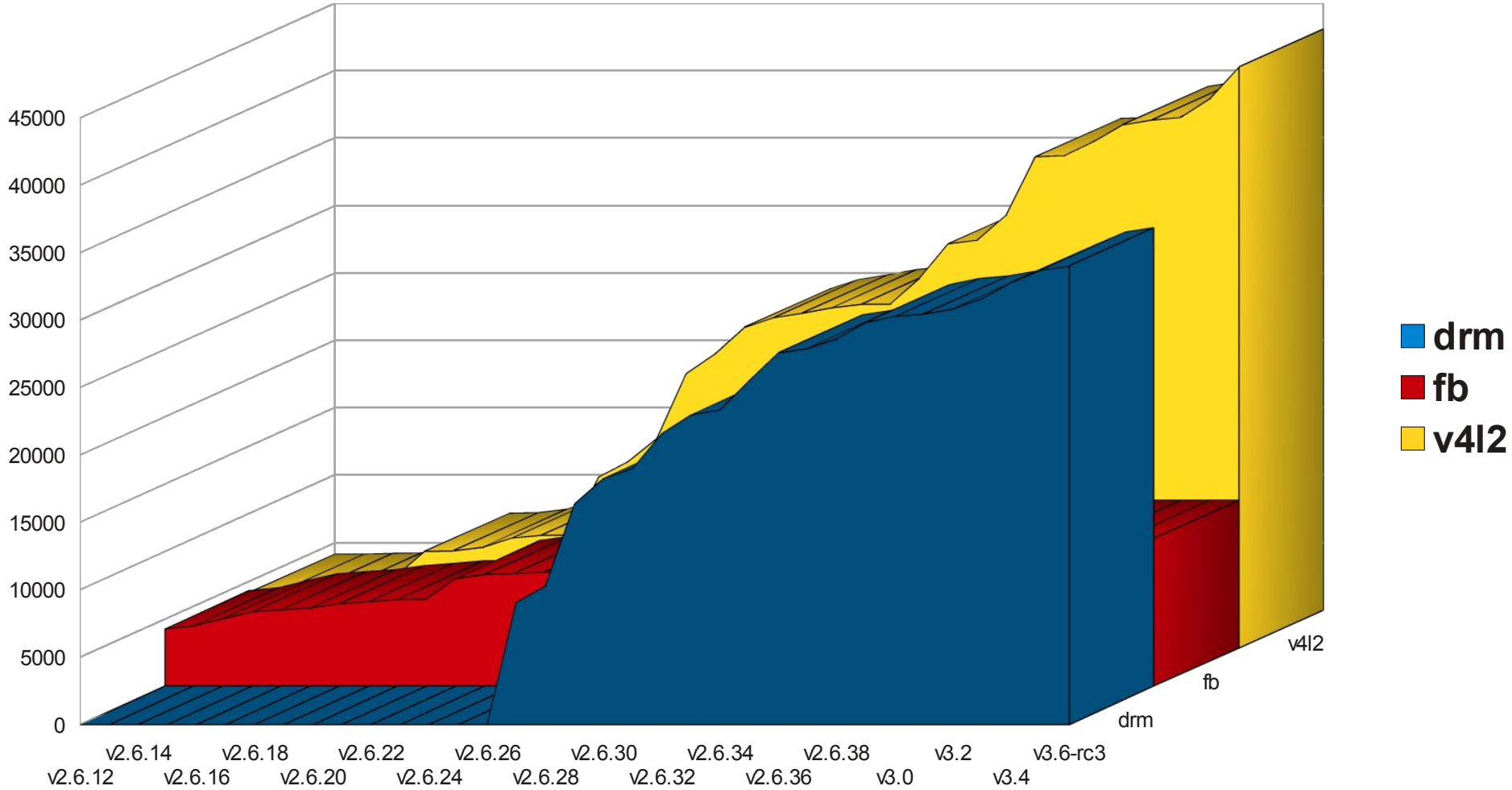
Documentation



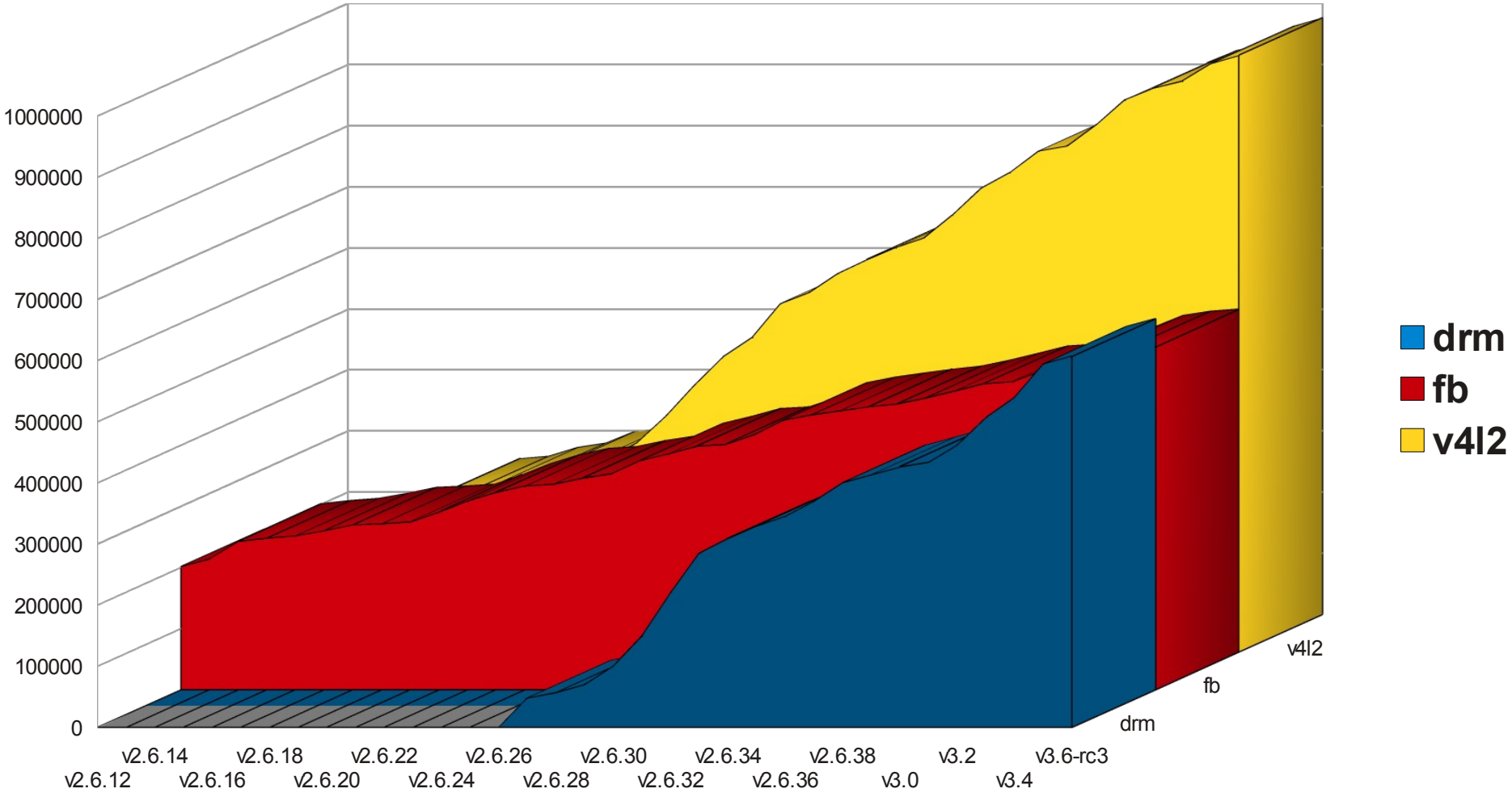
Code Size



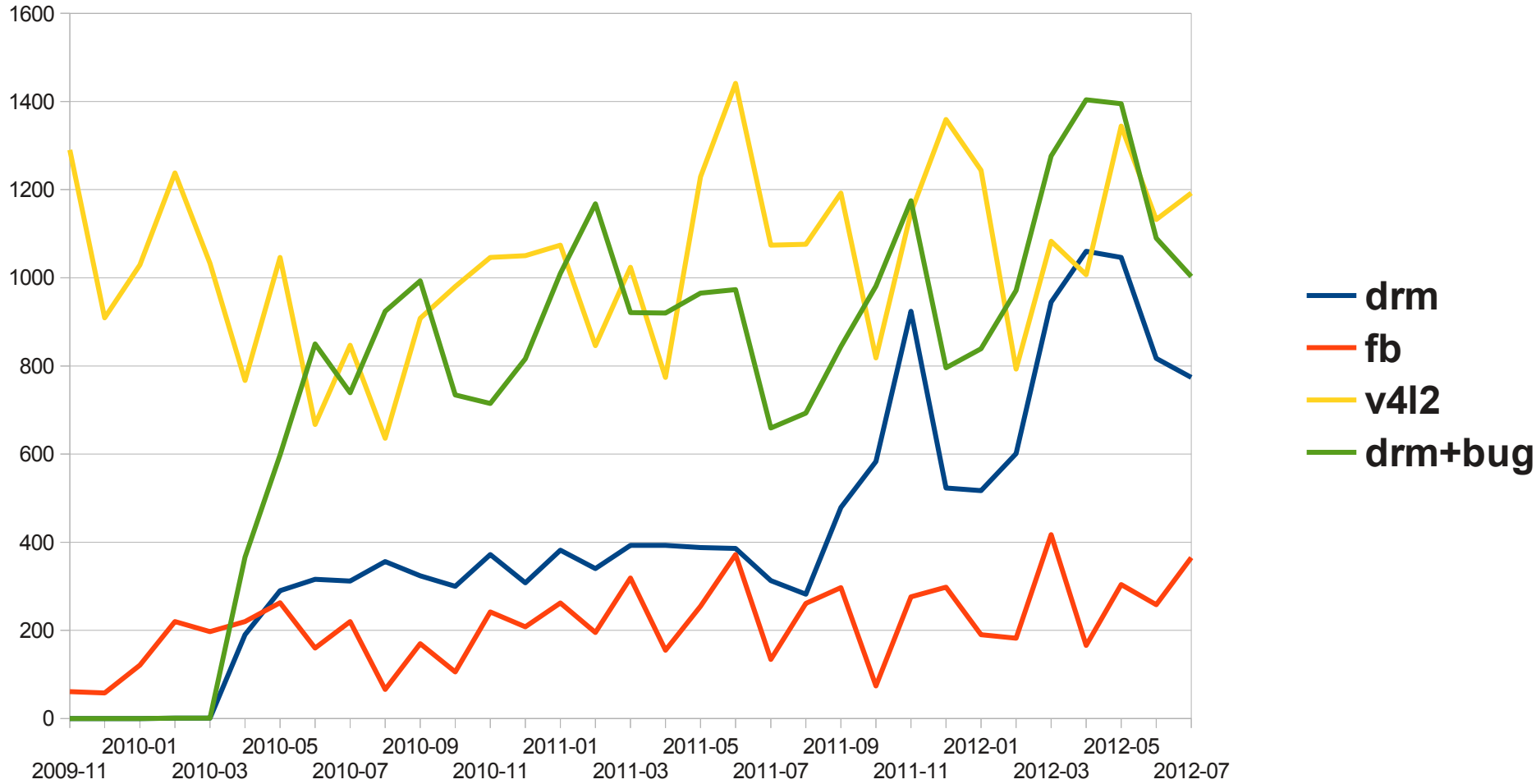
Cumulative Changes - API



Cumulative Changes - Core



Cumulative Changes - Drivers



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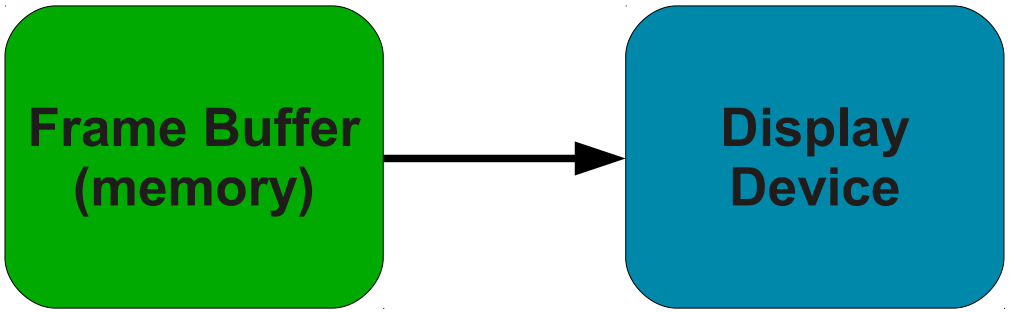
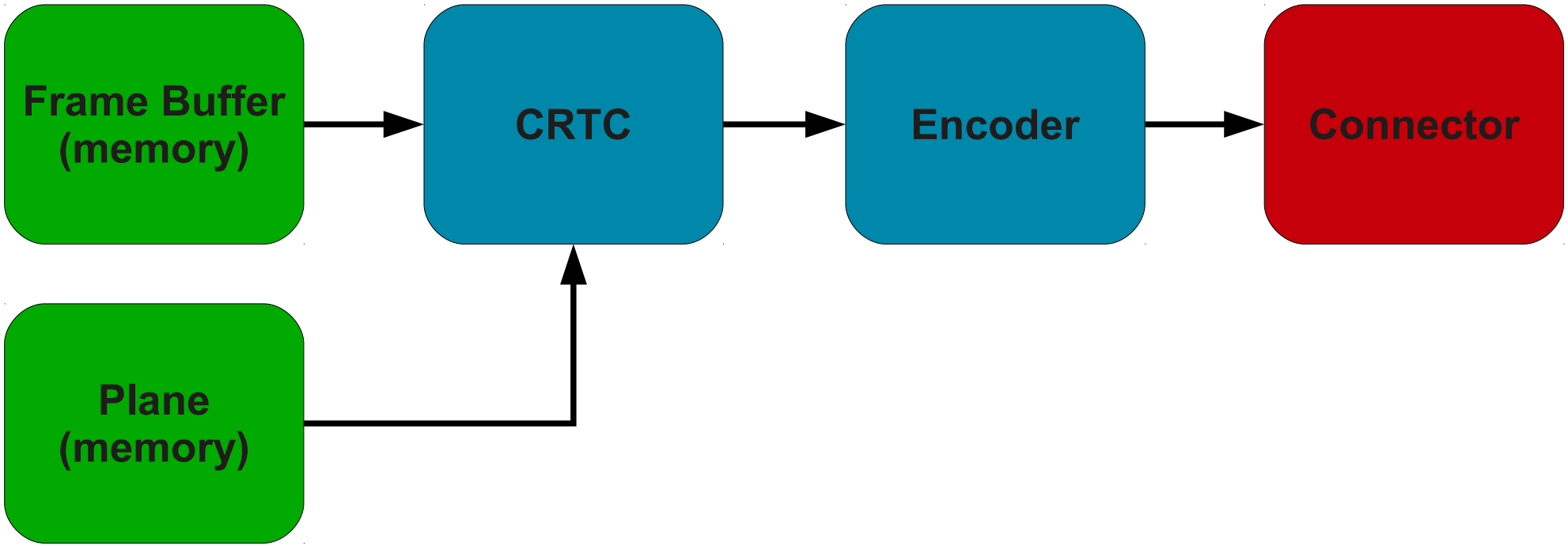
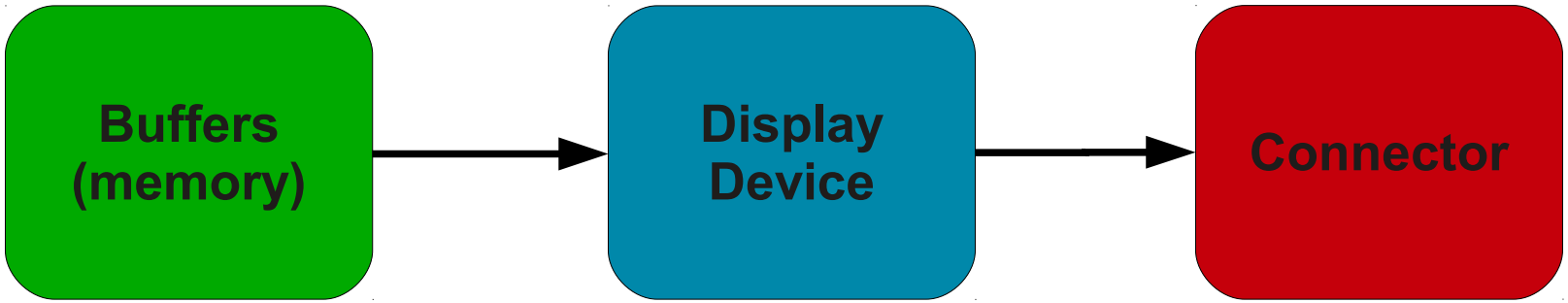
Mailing List Traffic



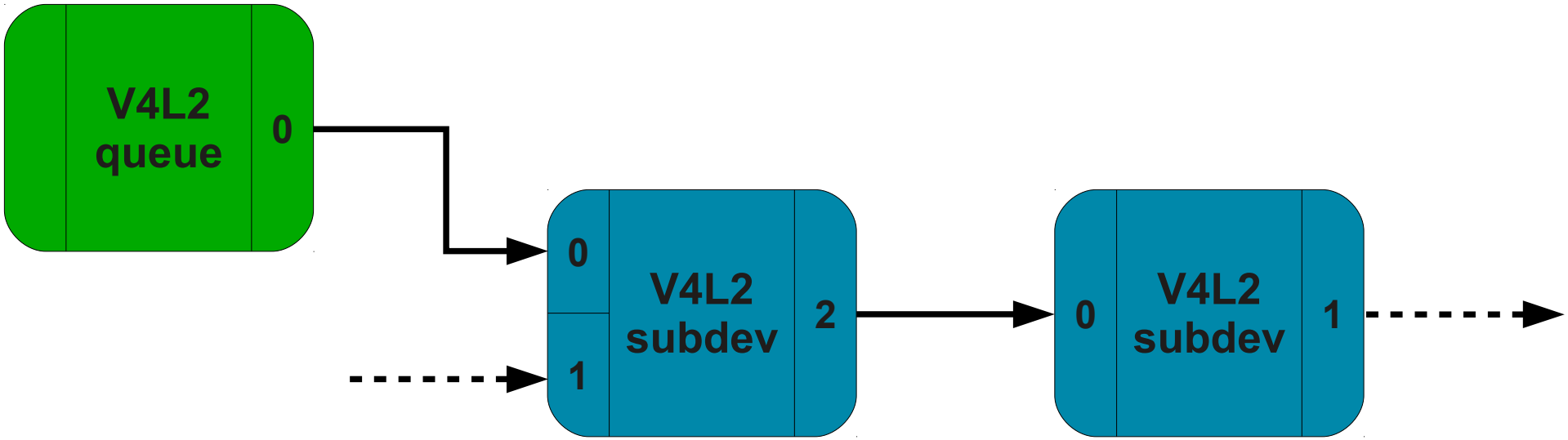
Device Model – FBDEV



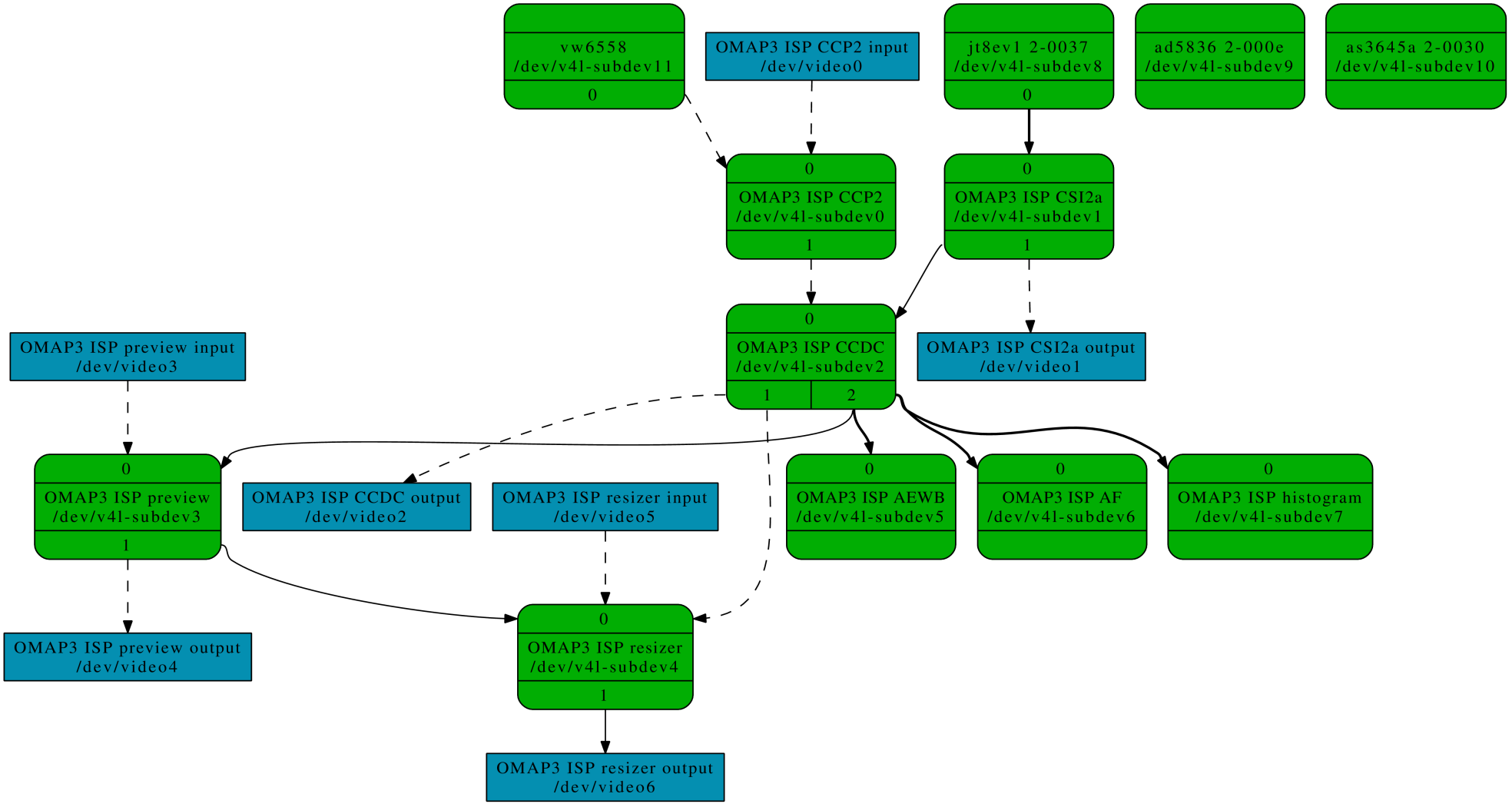
Device Model – DRM/KMS



Device Model – V4L2



Device Model – V4L2/MC



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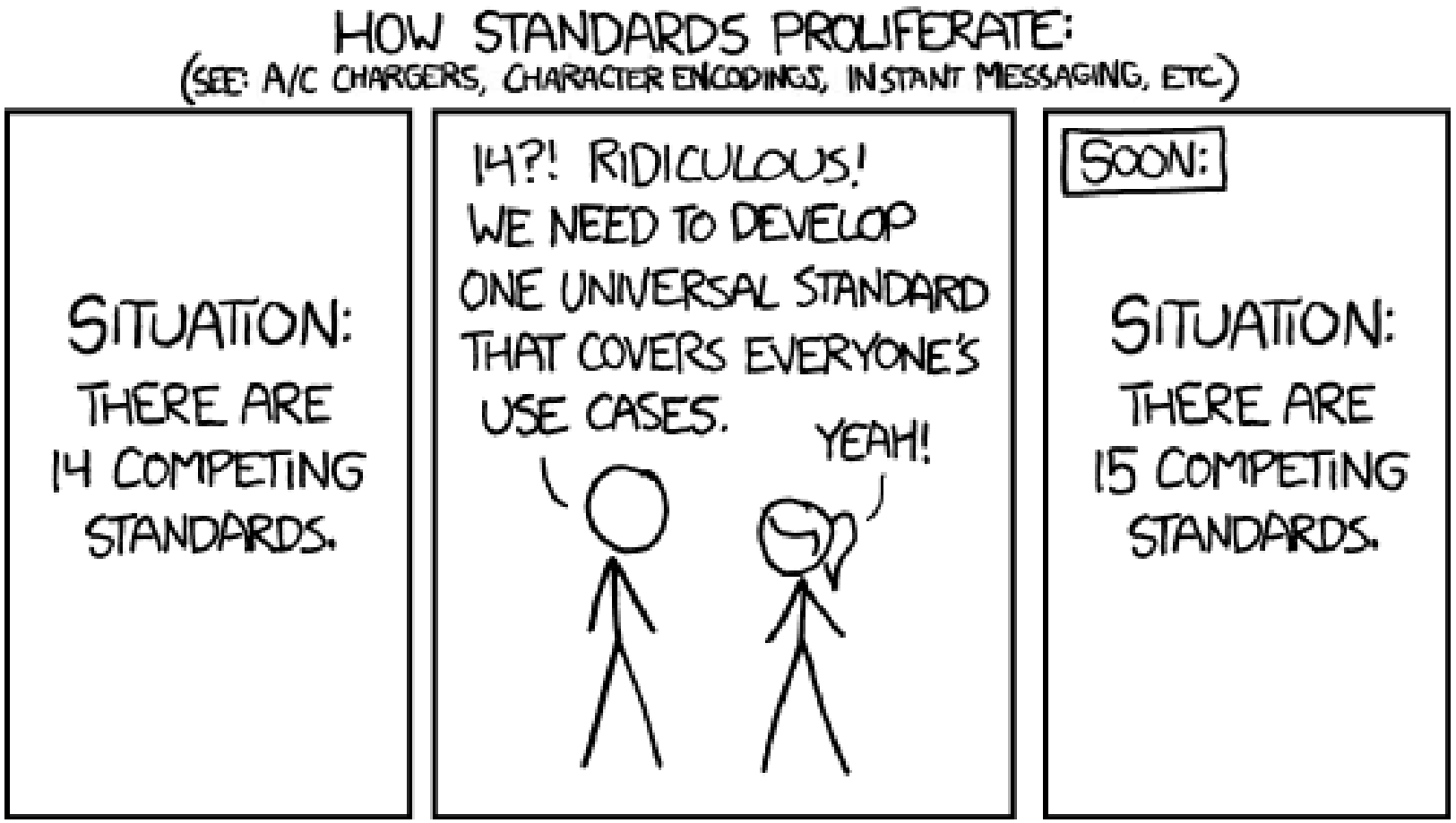
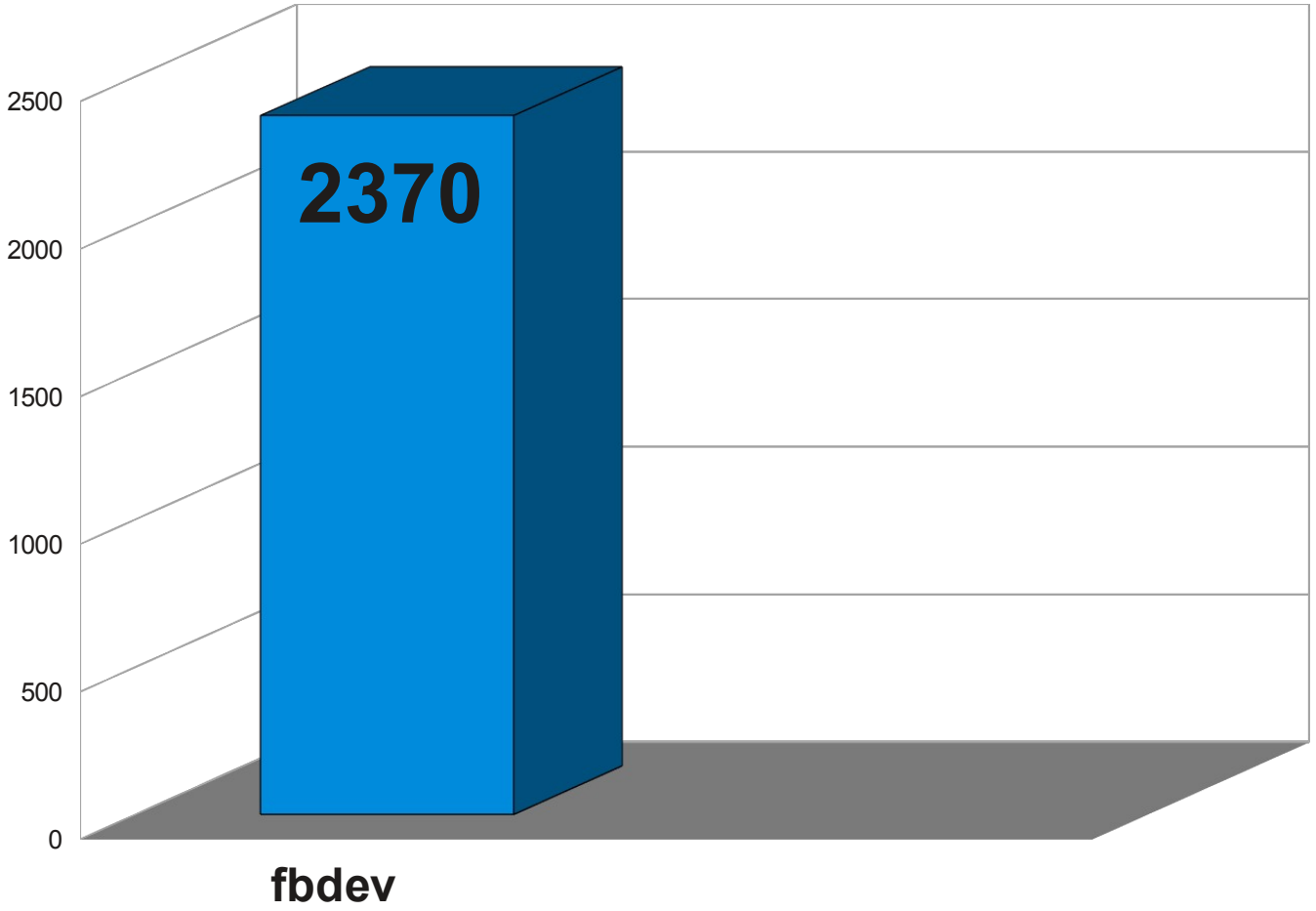
Device Model – V4L2/MC

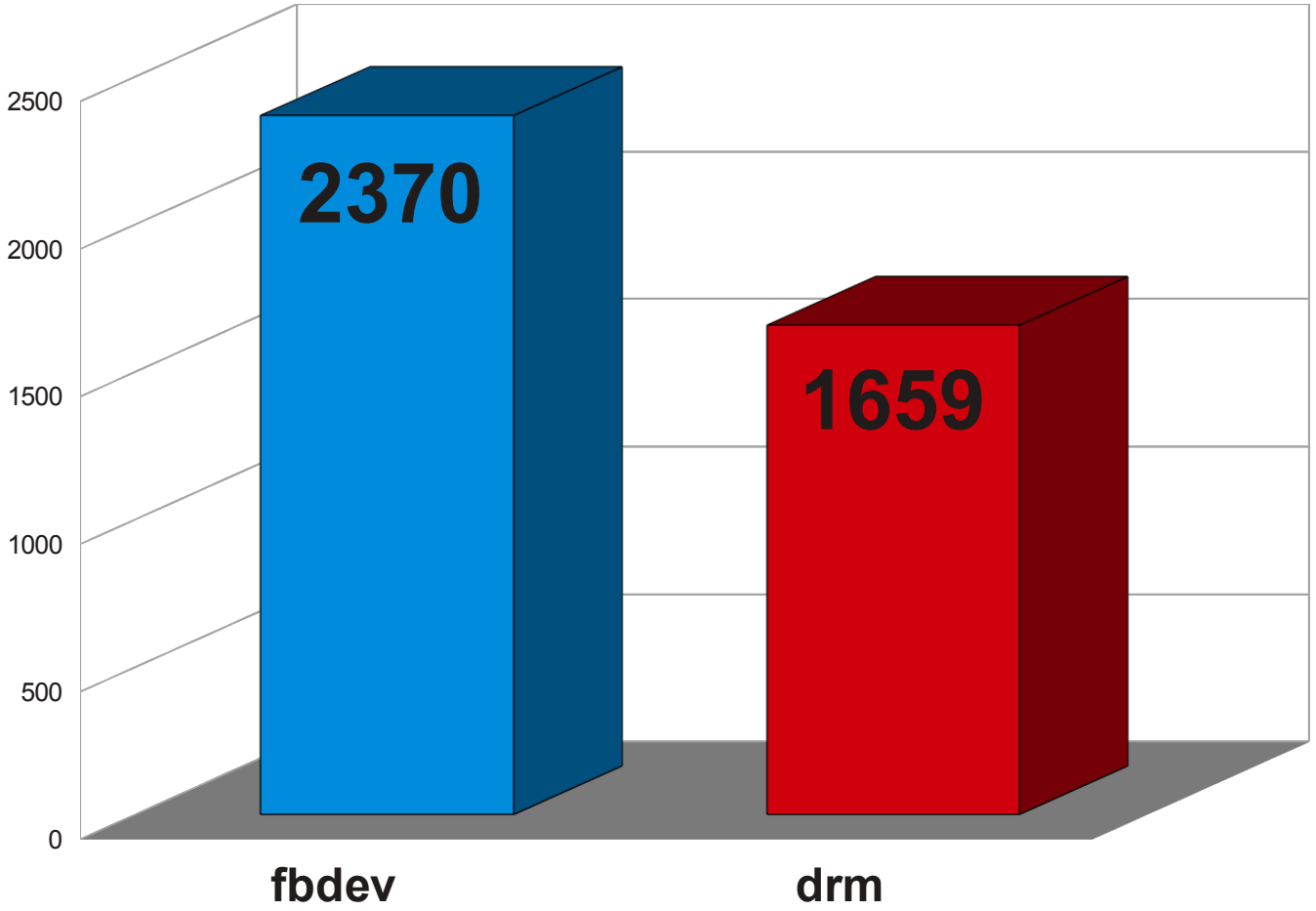


IDEAS ON BOARD

Use Cases



FB vs. DRM - sloccount



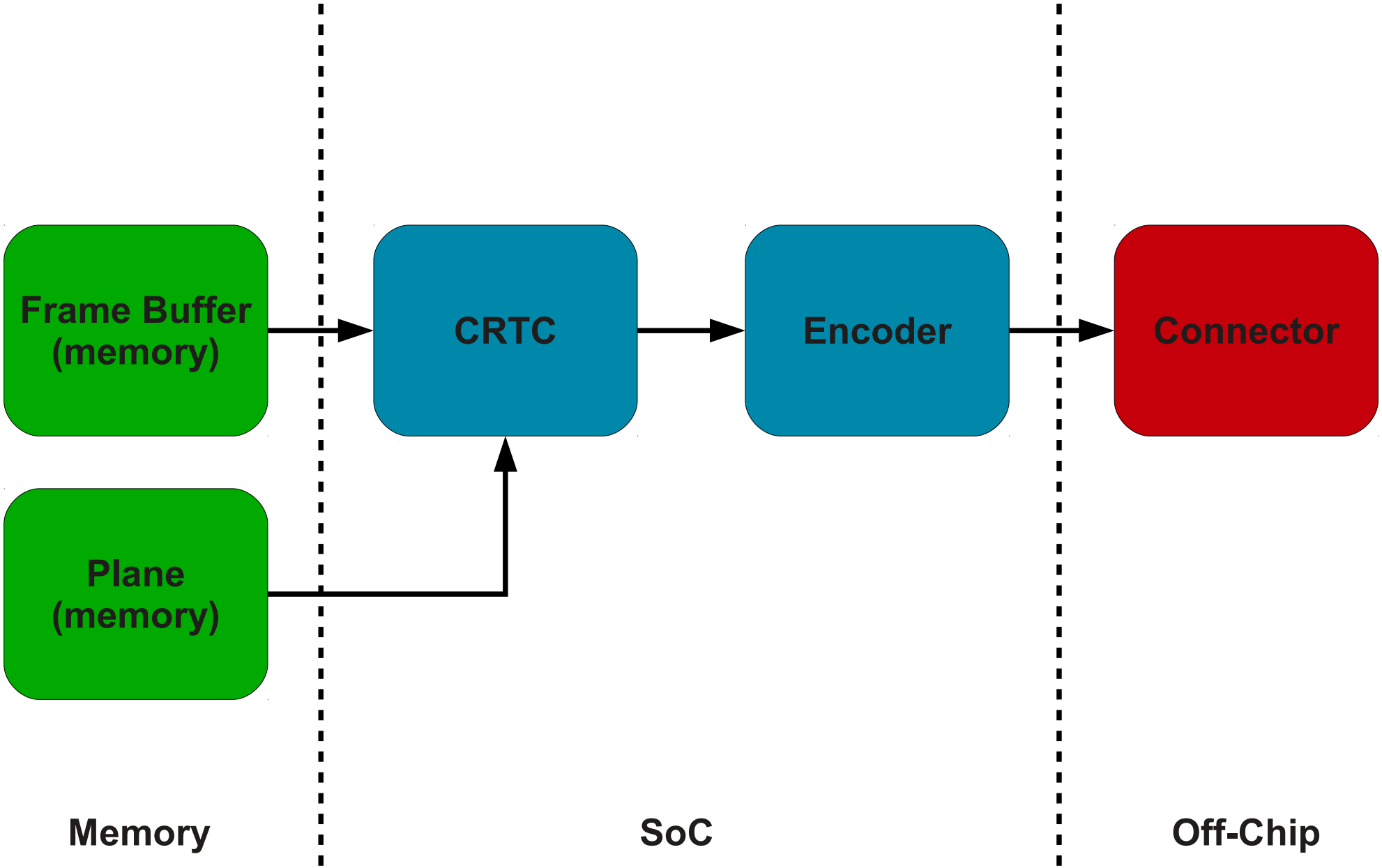
FB vs. DRM - sloccount

Use Cases - FBDEV

(that's it...)

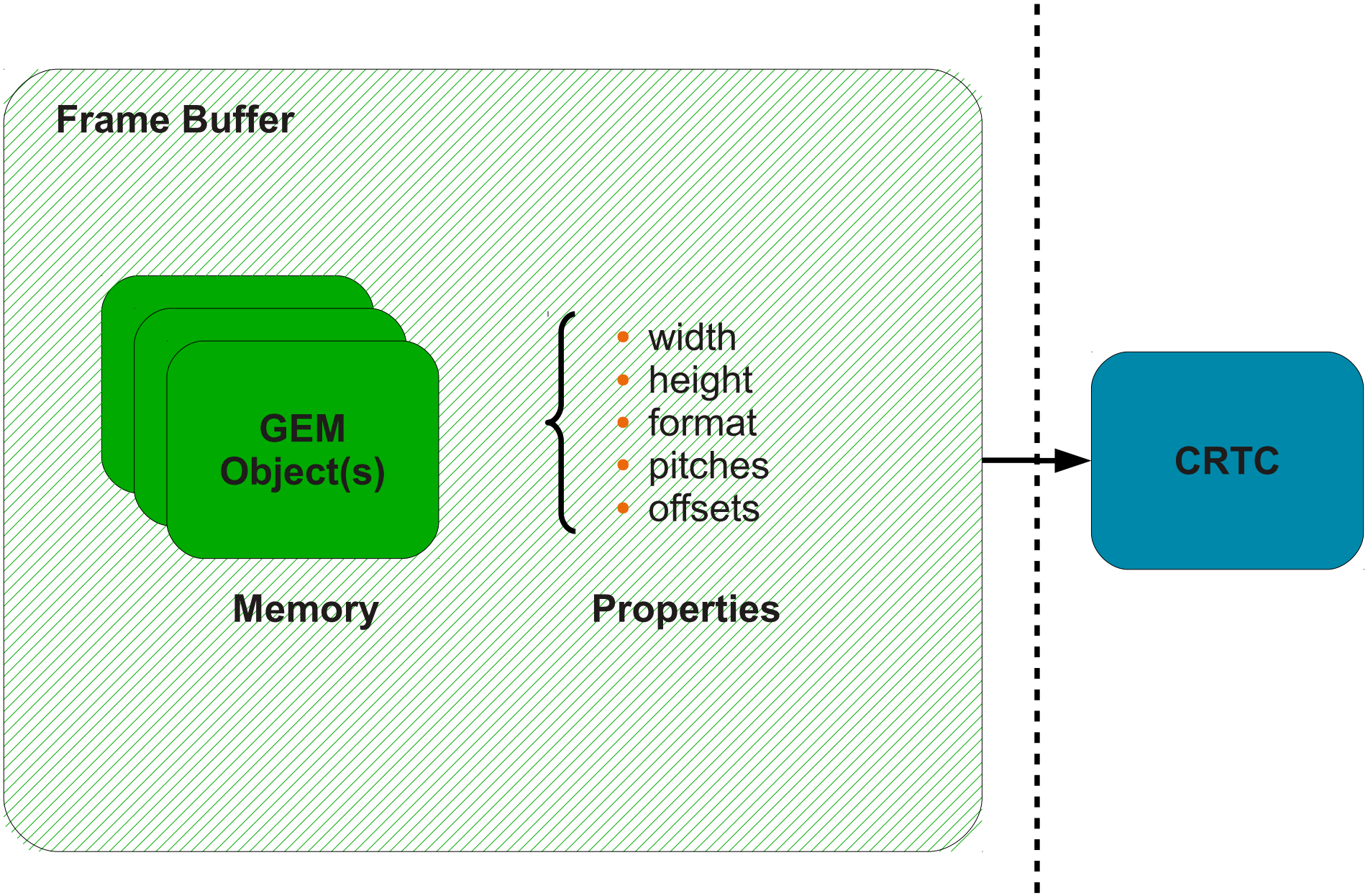
Video

Everything else



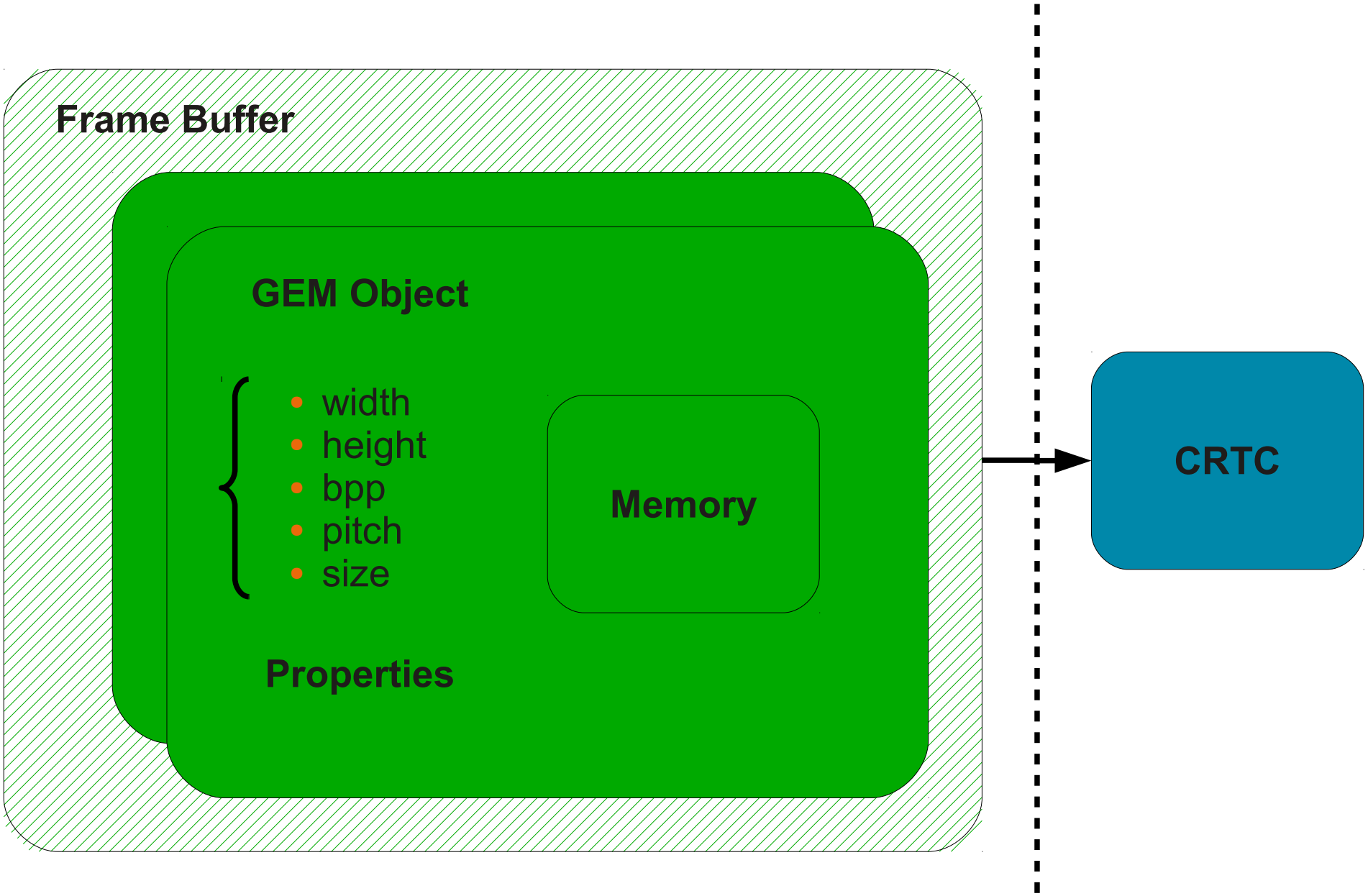
IDEAS ON BOARD

KMS – Device Model

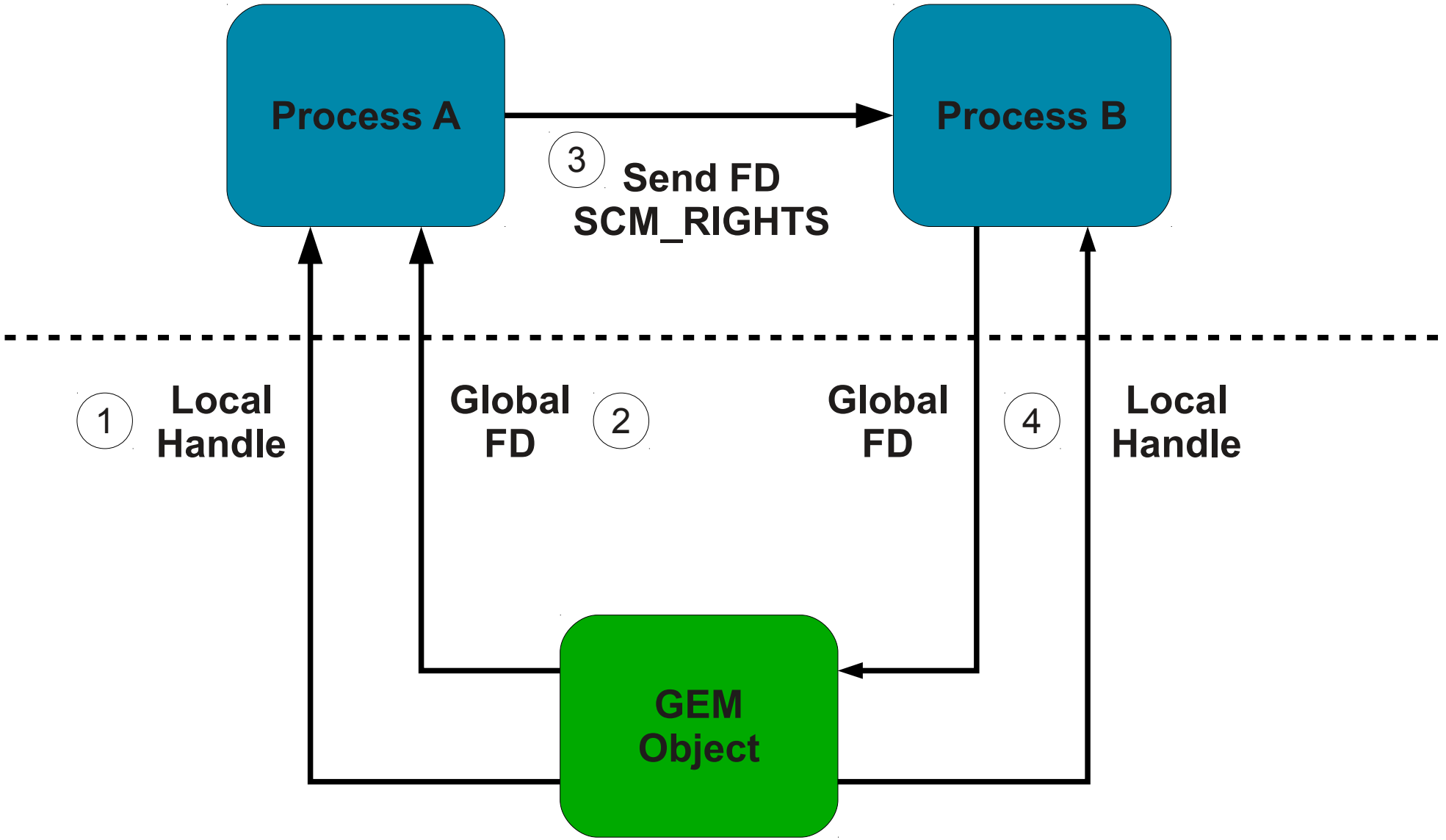


IDEAS ON BOARD

KMS – Frame Buffer



DRM/KMS – GEM Object


Process A
Process B
3
Send FD
SCM_RIGHTS
1
Local
Handle
Global
FD
2
Global
FD
4
Local
Handle
GEM
Object

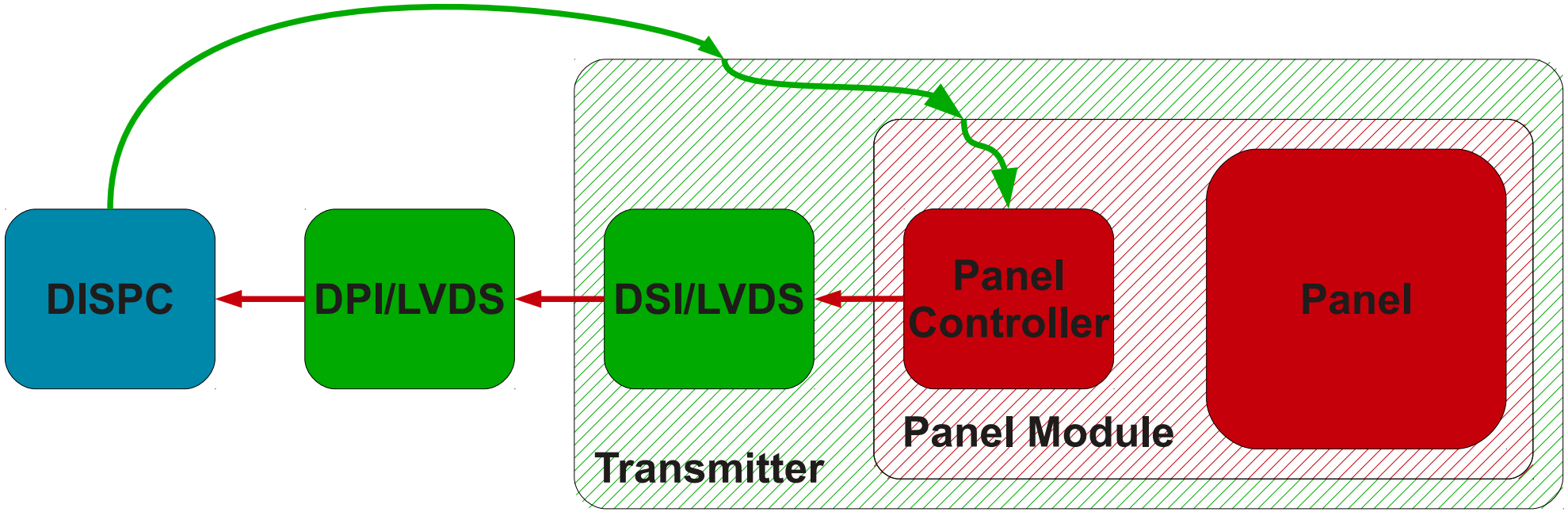
DRM – Handles

IDEAS ON BOARD

Source: http://www.flickr.com/photos/buckaroobay/3721809183/

panel & backlight

http://lwn.net/Articles/512363/



WIP – Display Framework

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- linux-fbdev@vger.kernel.org
- linux-media@vger.kernel.org

- laurent.pinchart@ideasonboard.com

Contact

thx.