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Status of the Embedded GPU Space

2018 Q3

Robert Foss
Senior Software Engineer
@memcpy_io

Open First

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Agenda

- History
- Upstream Support
- What Comes Next
- The Big Picture

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History

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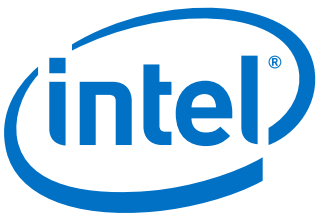
History



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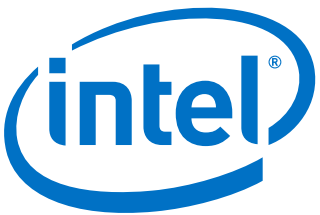
History



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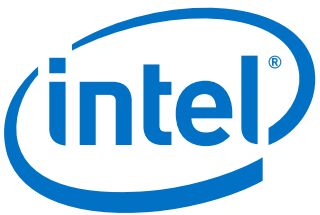

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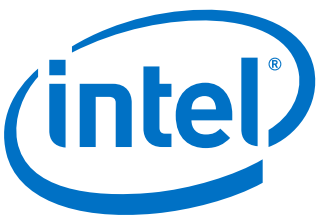

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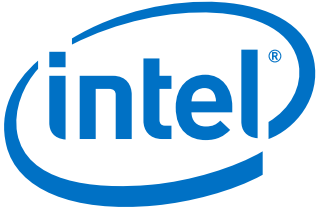

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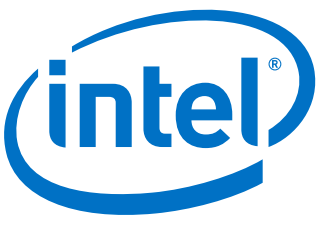

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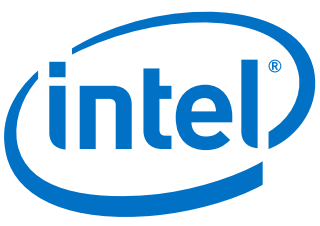
History

AMD

BROADCOM

Imagination


intel

NVIDIA

QUALCOMM

VIVANTE

COLLABORA

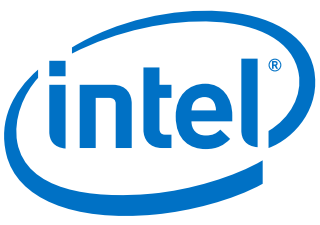
History

AMD

arm

BROADCOM

Imagination


intel

NVIDIA

QUALCOMM

VIVANTE

COLLABORA

Upstream Support

Upstream Support

NVidia

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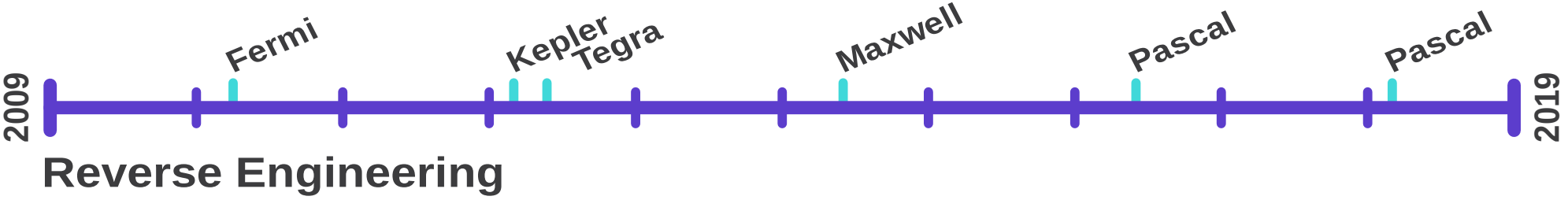
Upstream Support

NVidia



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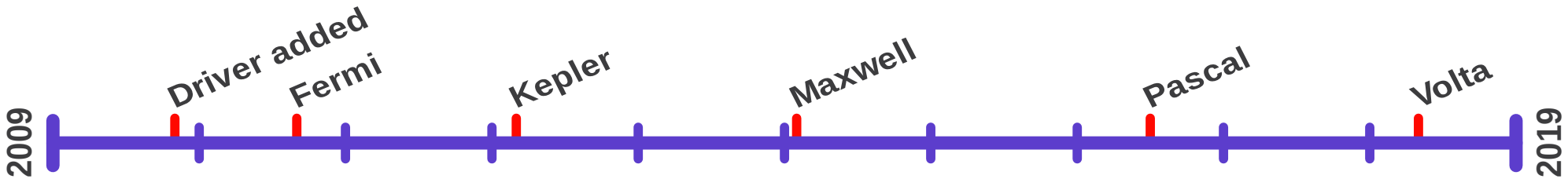
Upstream Support

NVidia

Reverse Engineering



Kernel and Mesa

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Upstream Support

Intel

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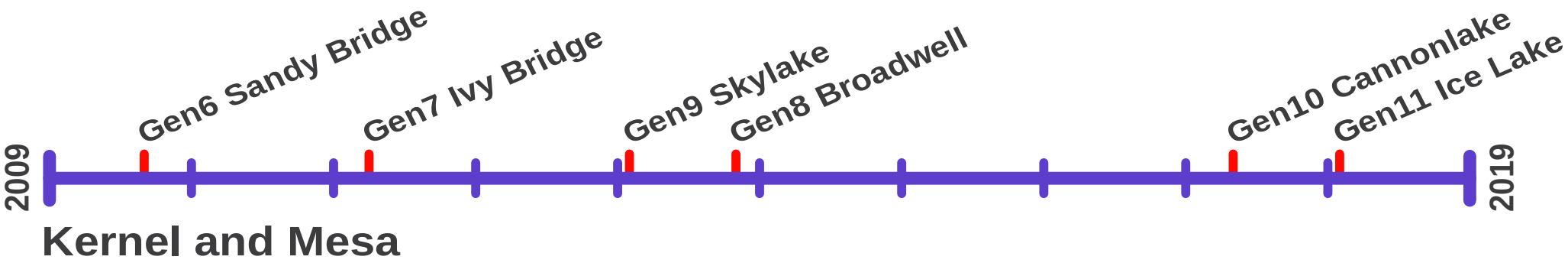
Upstream Support

Intel



Kernel and Mesa

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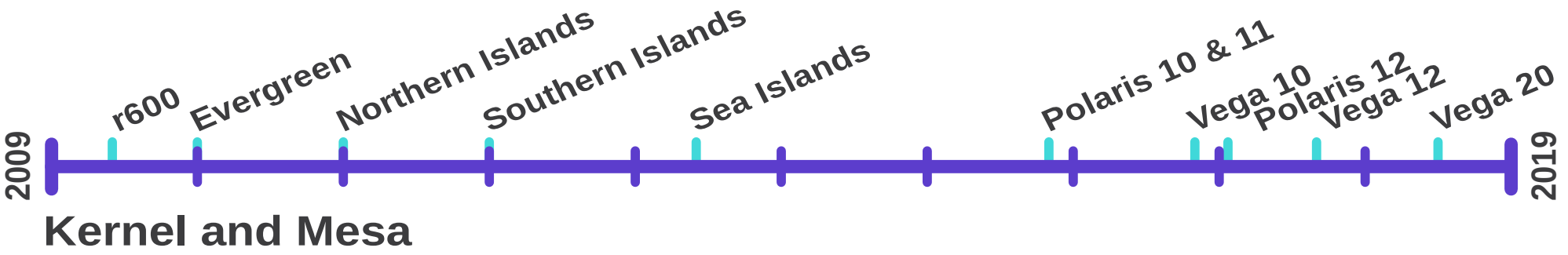
Upstream Support

AMD

COLLABORA

Upstream Support

AMD



Kernel and Mesa

Upstream Support

Broadcom

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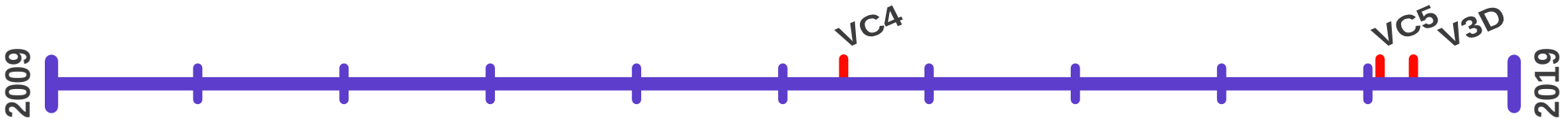
Upstream Support

Broadcom



Kernel and Mesa

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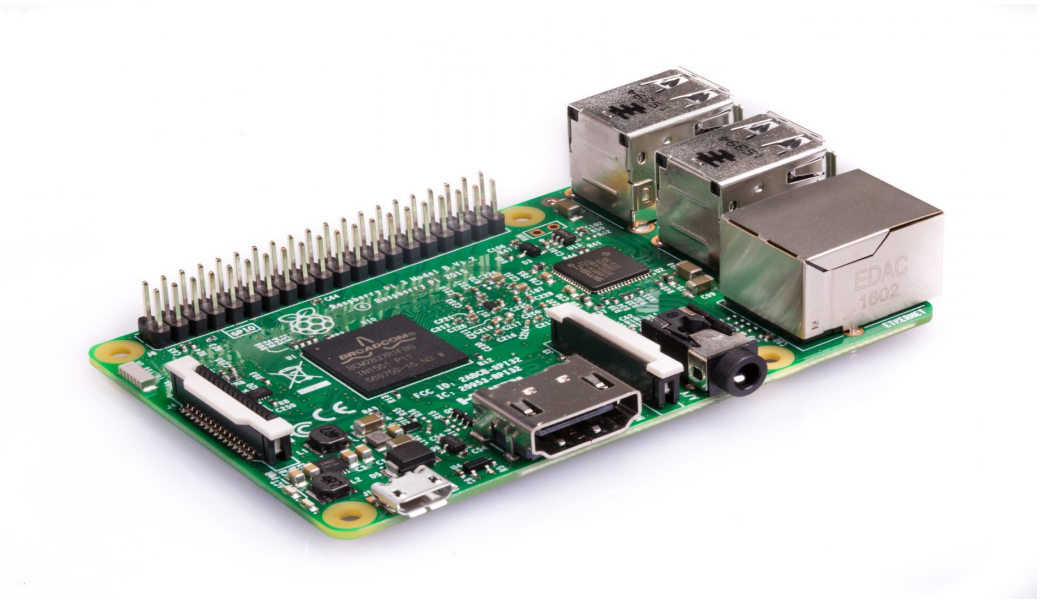
Upstream Support

Broadcom VC4

Board: Raspberry Pi 3
SOC: Broadcom BCM283



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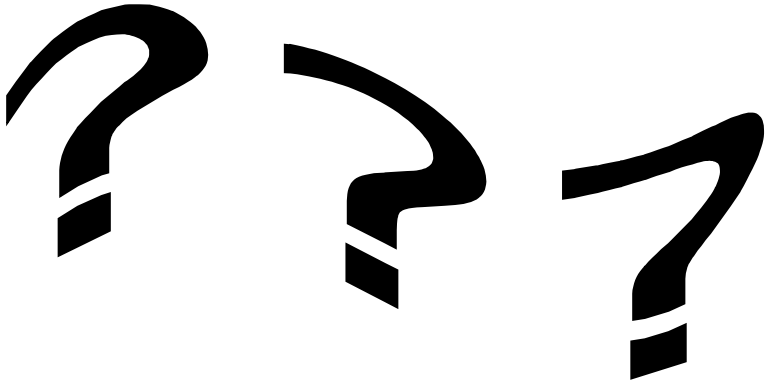
Upstream Support

Broadcom VC5

Board: ???
SOC: Broadcom BCM7268



Upstream Support

Qualcomm

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Upstream Support

Qualcomm

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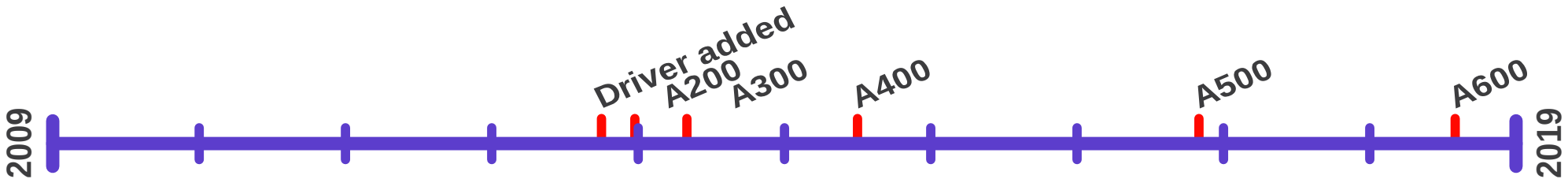
Upstream Support

Qualcomm

Reverse Engineering



Kernel and Mesa

Upstream Support

Qualcomm

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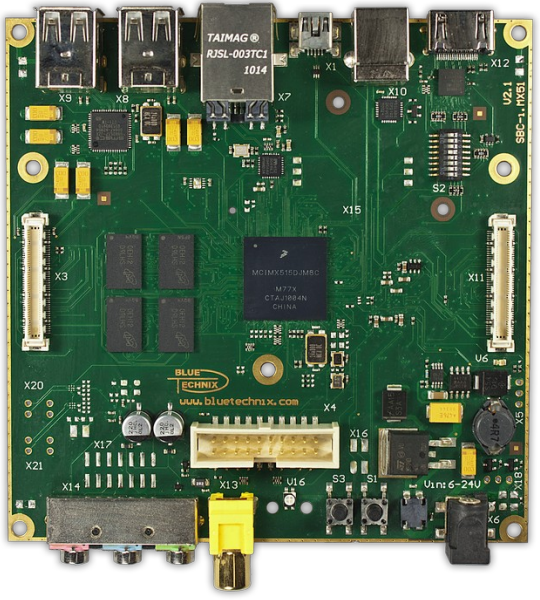
Upstream Support

Qualcomm Adreno A200

Board: iMX 53 Devkit
SOC: NXP iMX 53



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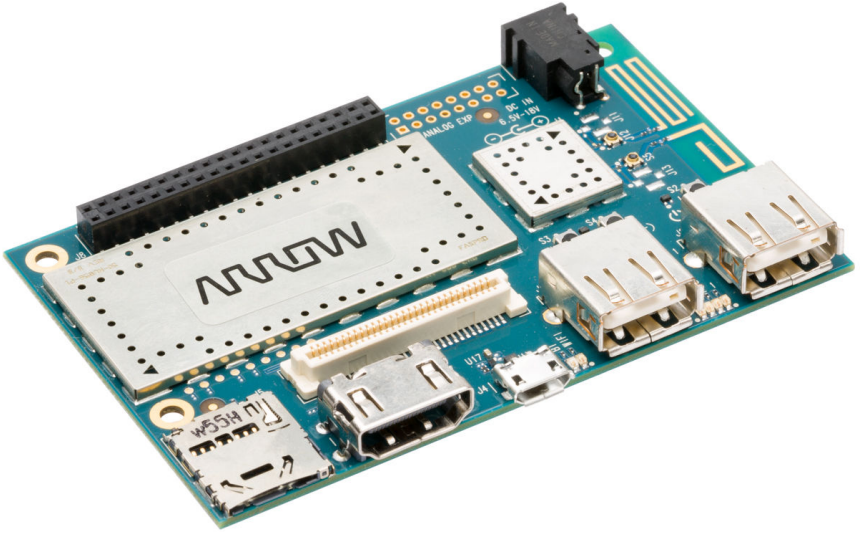
Upstream Support

Qualcomm Adreno A300

Board: Dragonboard 410C
SOC: Qualcomm 410E



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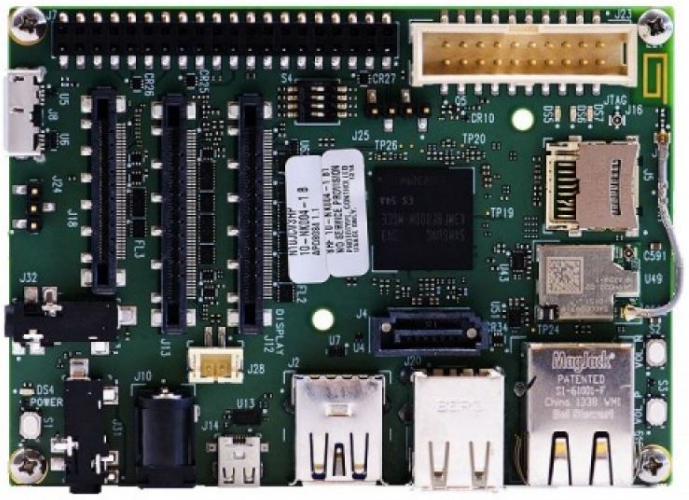
Upstream Support

Qualcomm Adreno A400

Board: Inforce 6540
SOC: Qualcomm 805



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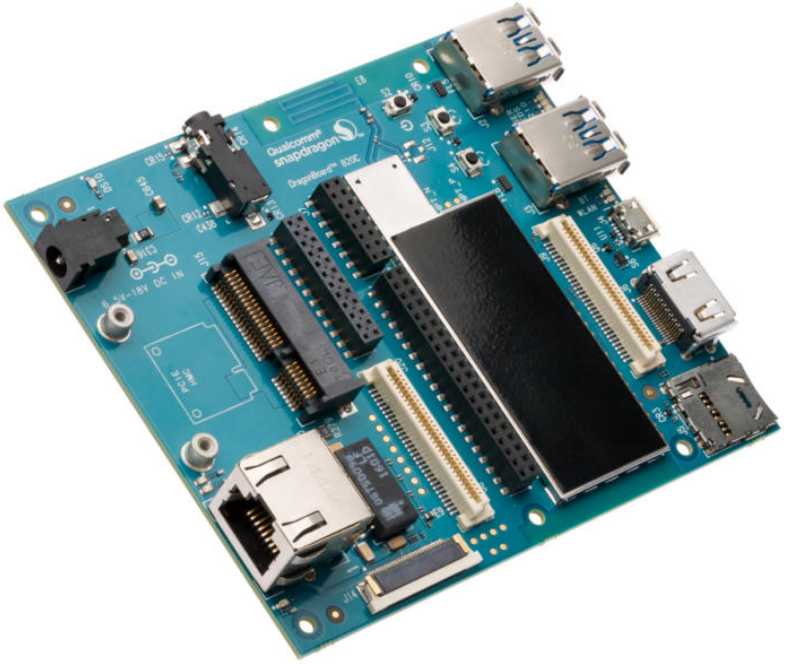
Upstream Support

Qualcomm Adreno A500

Board: Dragonboard 820C
SOC: Qualcomm 820E



Upstream Support

Vivante

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Upstream Support

Vivante

Reverse Engineering

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Upstream Support

Vivante

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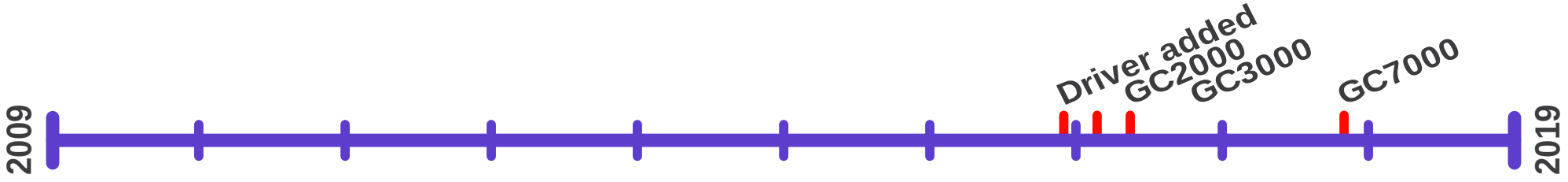

Kernel and Mesa

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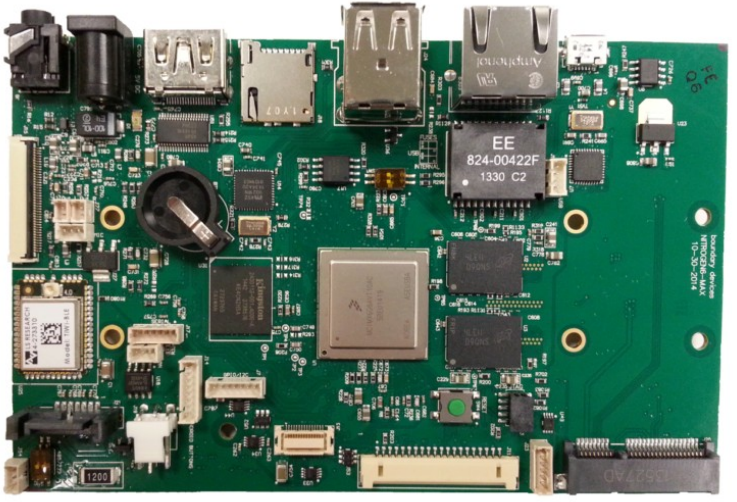
Upstream Support

Vivante GC2000

Board: iMX 6 Sabre
SOC: NXP iMX6q



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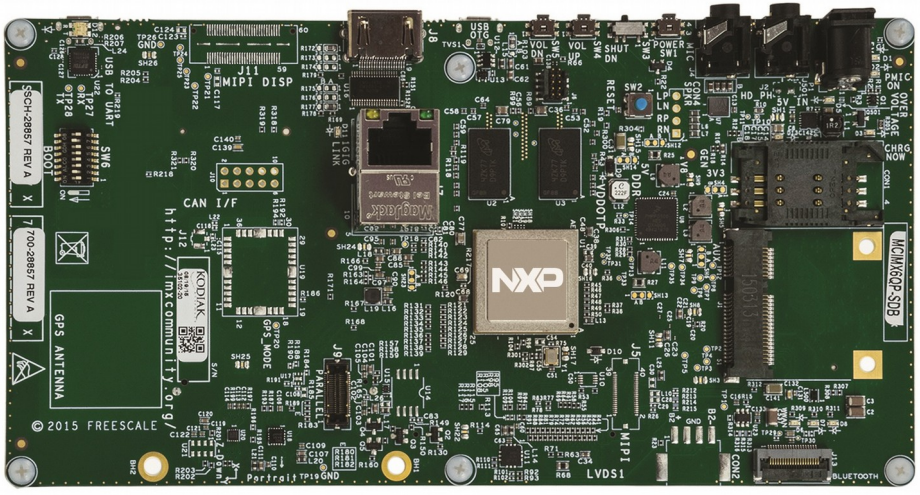
Upstream Support

Vivante GC3000

Board: iMX 6 QP Sabre
SOC: NXP iMX6qp



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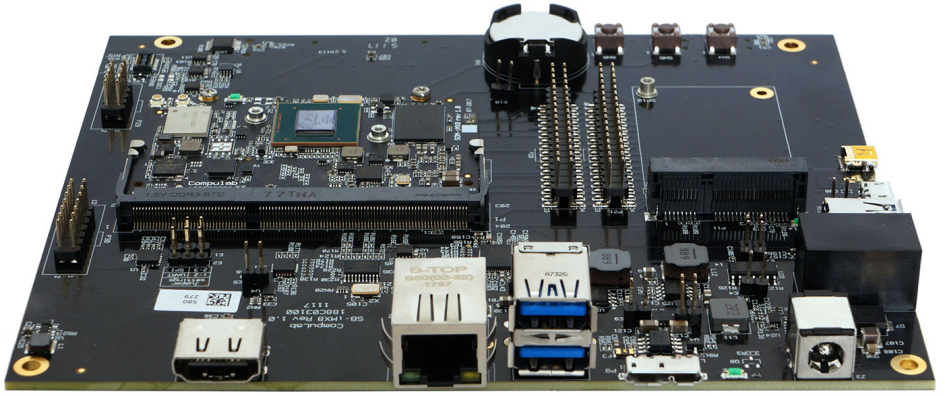
Upstream Support

Vivante GC7000

Board: iMX 8 Devkit
SOC: NXP iMX8



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Upstream Support

ARM

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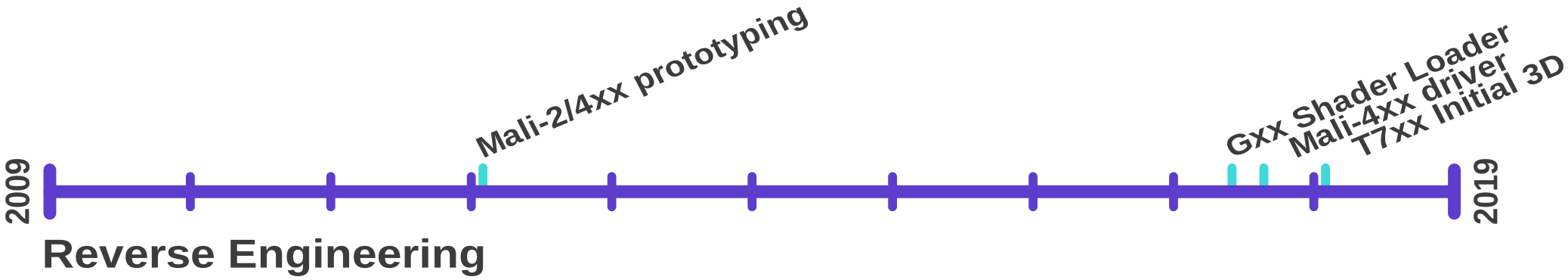
Upstream Support

ARM



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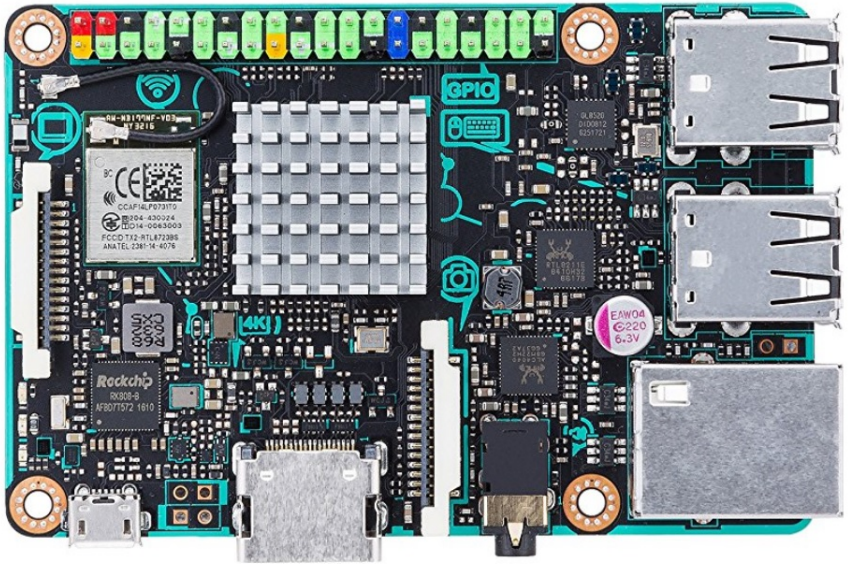
Upstream Support

ARM Mali Txxx

Board: Asus Tinkerboard
SOC: Rockchip RK3288



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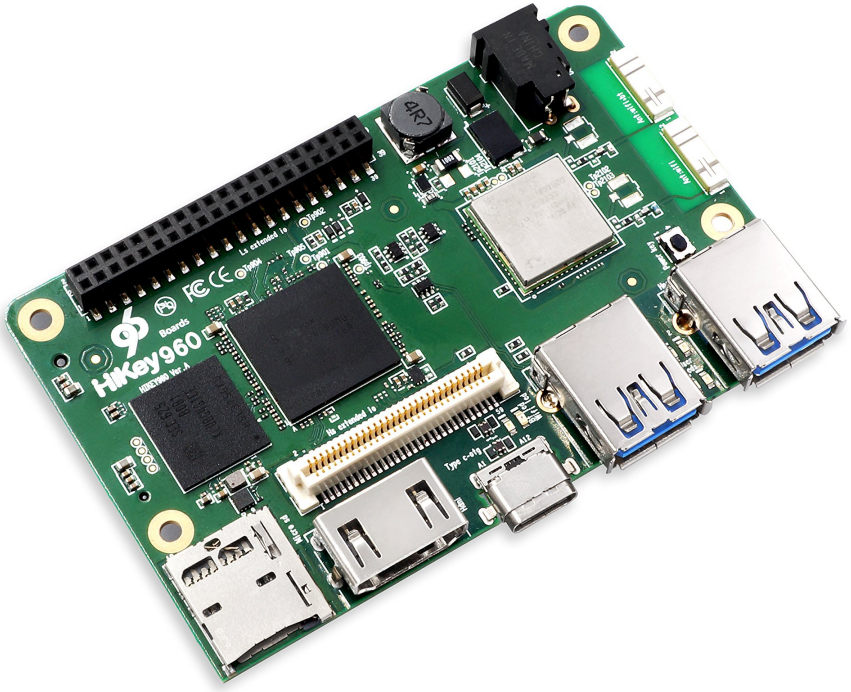
Upstream Support

ARM Mali Gxx

Board: HiKey 960
SOC: HiSilicon Kirin 960



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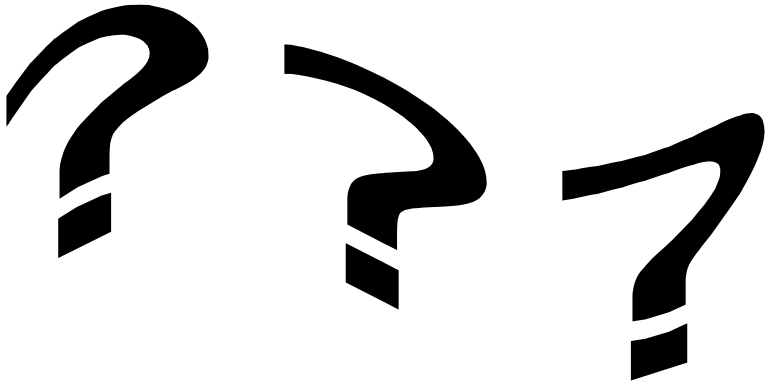
Upstream Support

Imagination

COLLABORA

Upstream Support

Imagination



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What comes next

What Comes Next

- OpenGL improvements

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What Comes Next

- OpenGL improvements
- OpenCL support

What Comes Next

- OpenGL improvements
- OpenCL support
  - Intel OpenCL Neo

What Comes Next

- OpenGL improvements
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  - AMD ROCm

What Comes Next

- OpenGL improvements
- OpenCL support
  - Intel OpenCL Neo
  - AMD ROCm
  - In progress: nouveau

What Comes Next

- OpenGL improvements
- OpenCL support
  - Intel OpenCL Neo
  - AMD ROCm
  - In progress: nouveau
  - In progress: freedreno

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What Comes Next

- OpenGL improvements
- OpenCL support

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What Comes Next

- OpenGL improvements
- OpenCL support
- Vulkan support

What Comes Next

- OpenGL improvements
- OpenCL support
- Vulkan support
  - AMD RADV & AMDVLK

What Comes Next

- OpenGL improvements
- OpenCL support
- Vulkan support
  - AMD RADV & AMDVLK
  - Intel ANV

COLLABORA

What Comes Next

- OpenGL improvements
- OpenCL support
- Vulkan support

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The Big Picture

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The Big Picture

Development

The Big Picture

Development

- Some drivers are very mature

The Big Picture

Development

- Some drivers are very mature
- Non-supported drivers use more common code

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The Big Picture

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- Reverse engineering to driver takes 0-3 years

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Development

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- OpenCL is hard.

The Big Picture

Development

- Some drivers are very mature
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The Big Picture

Vendors

The Big Picture

Vendors

- Some vendor support is really good

The Big Picture

Vendors

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- Open Source drivers come in different shapes

COLLABORA

The Big Picture

Vendors

- Some vendor support is really good
- Open Source drivers come in different shapes
  - Vendor supported or not

COLLABORA

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COLLABORA

The Big Picture

Vendors

- Some vendor support is really good
- Open Source drivers come in different shapes
  - Vendor supported or not
  - Small vendor teams or not
  - Control motivated vendor or not
  - NVidia

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The Big Picture

Manufacturers

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The Big Picture

Manufacturers

- Some industries need Open Source

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The Big Picture

Manufacturers

- Some industries need Open Source
  - Surprisingly the Aircraft industry

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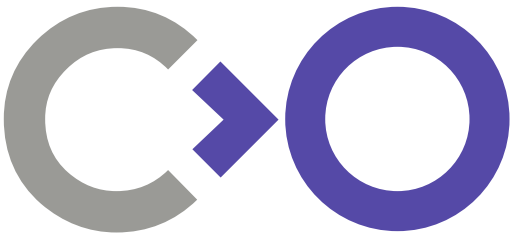
The Big Picture

Manufacturers

- Some industries need Open Source
  - Surprisingly the Aircraft industry
  - Anyone planning for >10 year product support



Thank you!

Links

- Timelines: https://github.com/robertfoss/timelines.py
- Slides: