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# Status of the Embedded GPU Space 2018 Q1

**Robert Foss**

Senior Software Engineer

@memcpy\_io

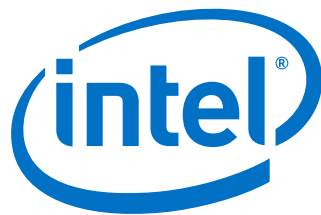
Open First

# Agenda

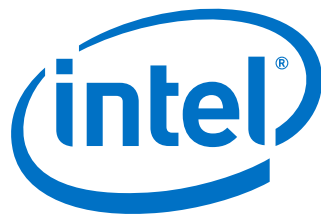
- History
- Upstream Support
- What Comes Next
- The Big Picture

# History

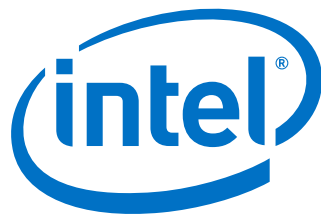
# History



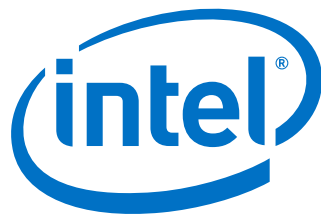
# History



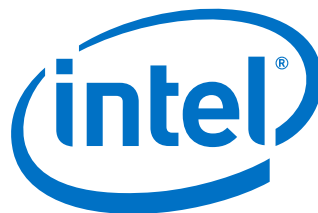
# History



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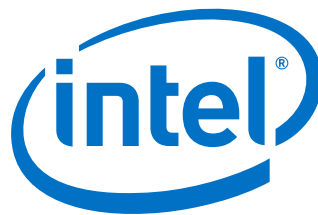


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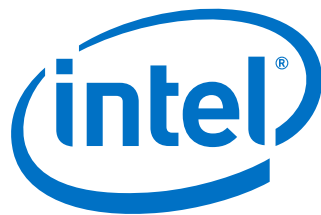




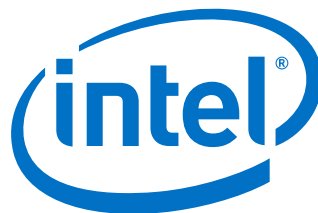
# History



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# Upstream Support



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# Upstream Support

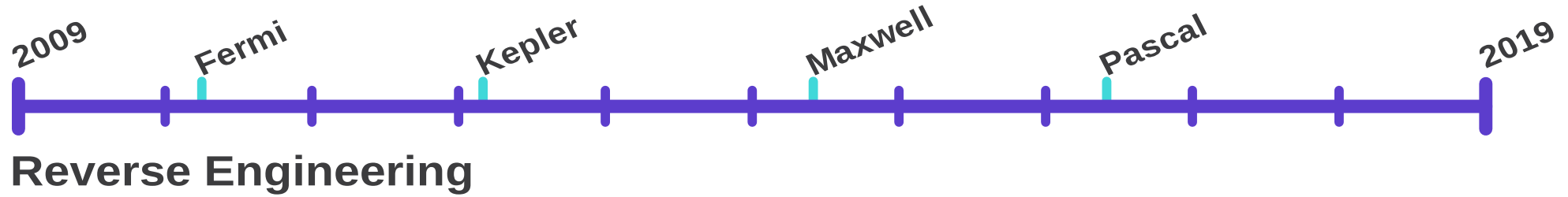
NVidia



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# Upstream Support

NVidia





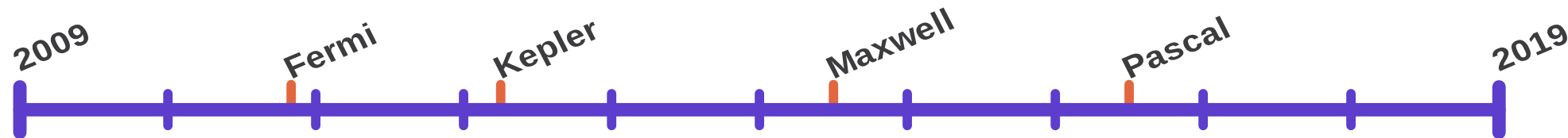
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# Upstream Support

NVidia



Reverse Engineering



Mesa



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# Upstream Support

Intel

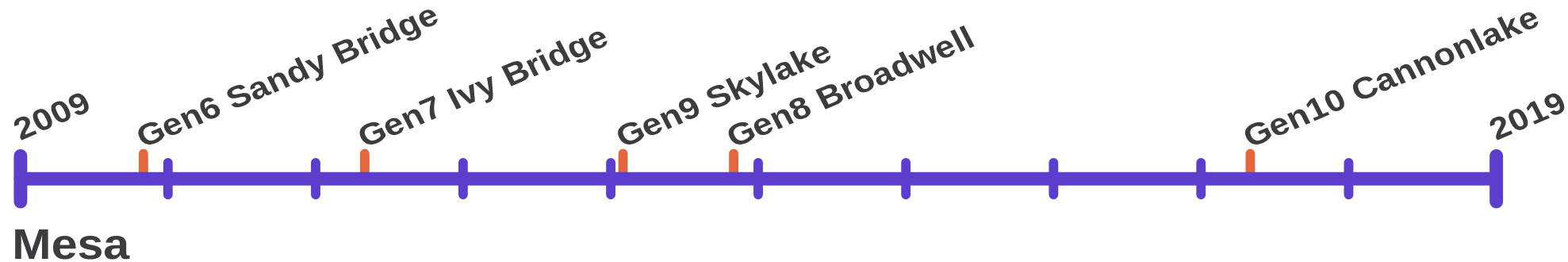




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# Upstream Support

Intel





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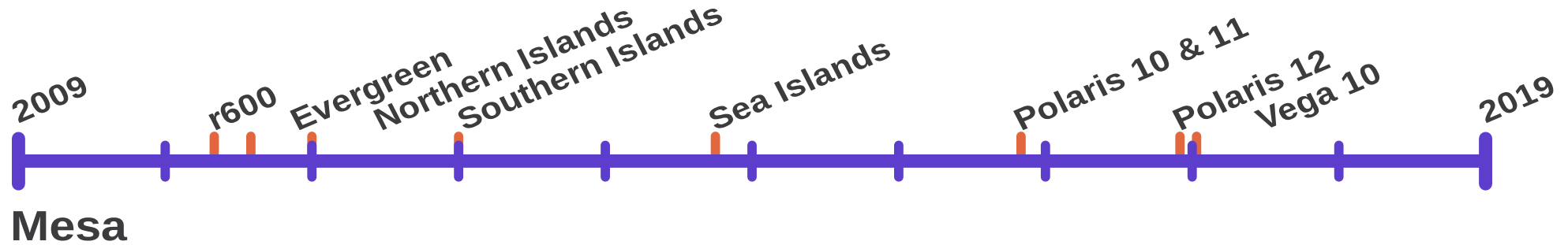
AMD



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# Upstream Support

AMD





# Upstream Support

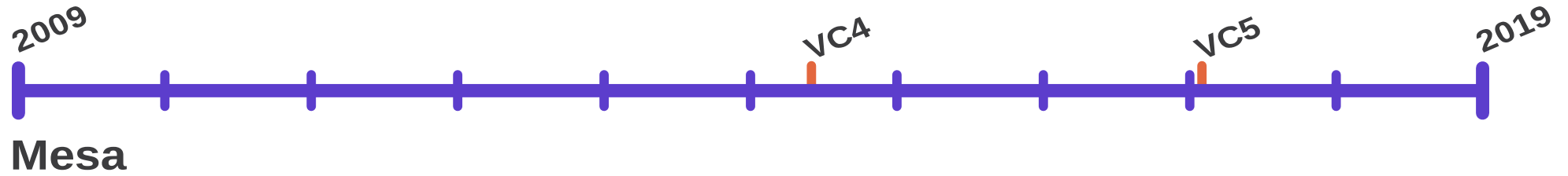
Broadcom



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# Upstream Support

Broadcom





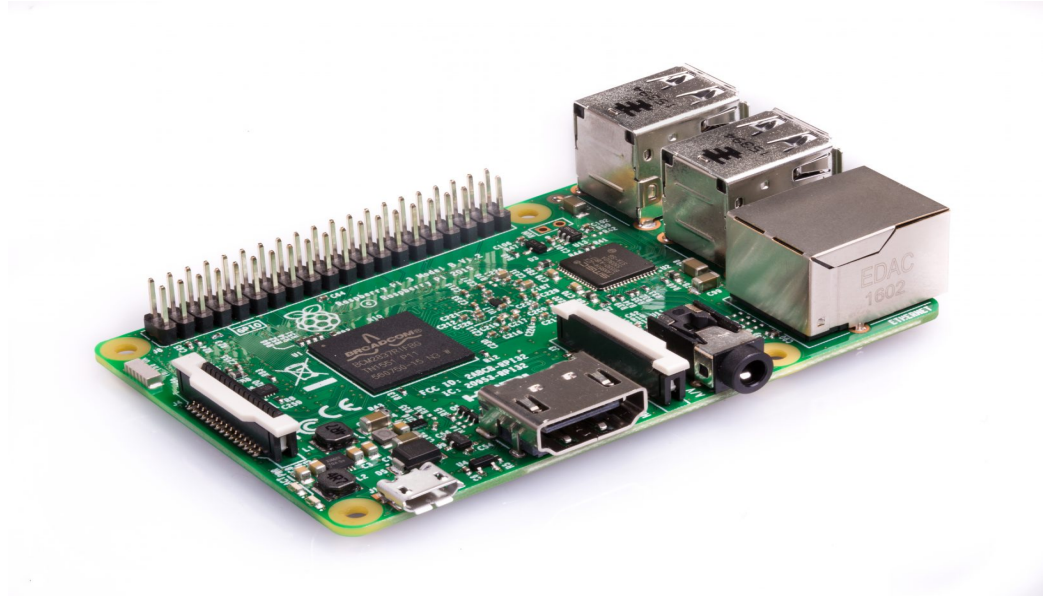
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# Upstream Support

Broadcom VC4

Board: Raspberry Pi 3

SOC: Broadcom BCM2837





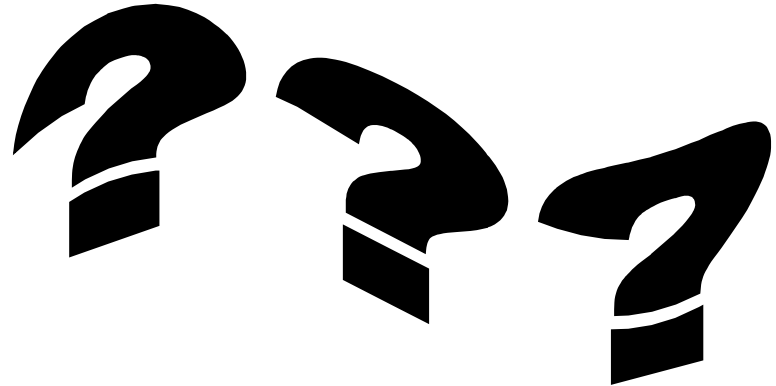
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# Upstream Support

Broadcom VC5

Board: ???

SOC: Broadcom BCM7268





# Upstream Support

Qualcomm

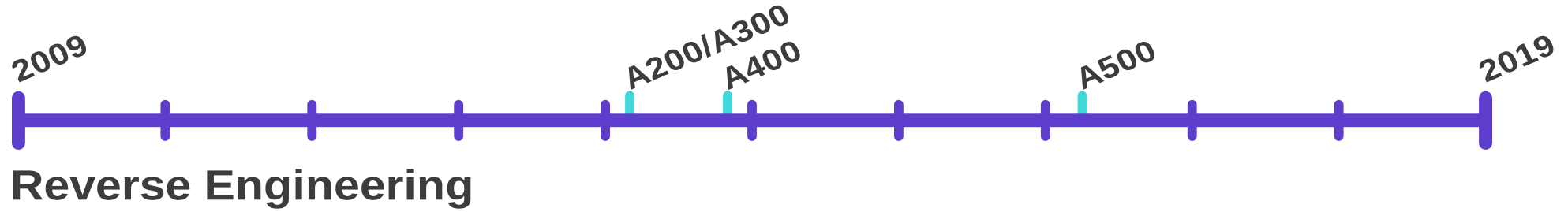




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# Upstream Support

Qualcomm

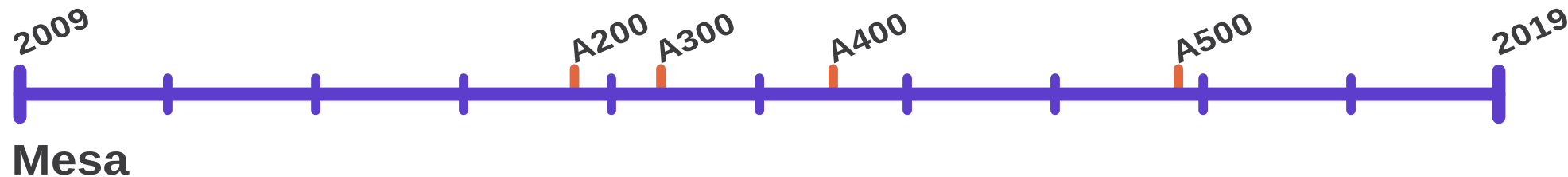
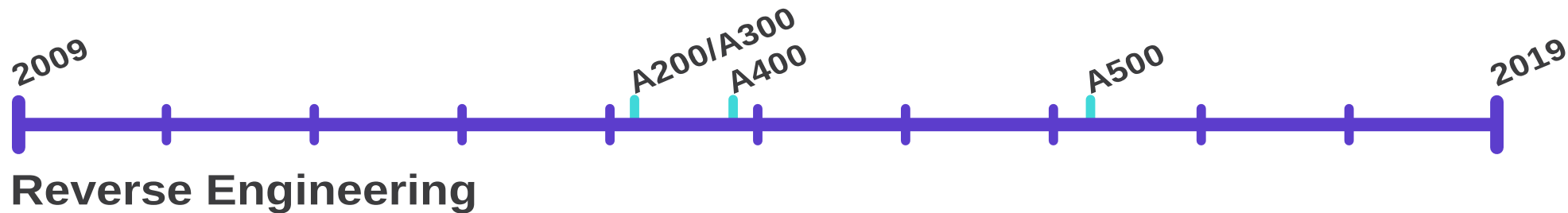




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Qualcomm





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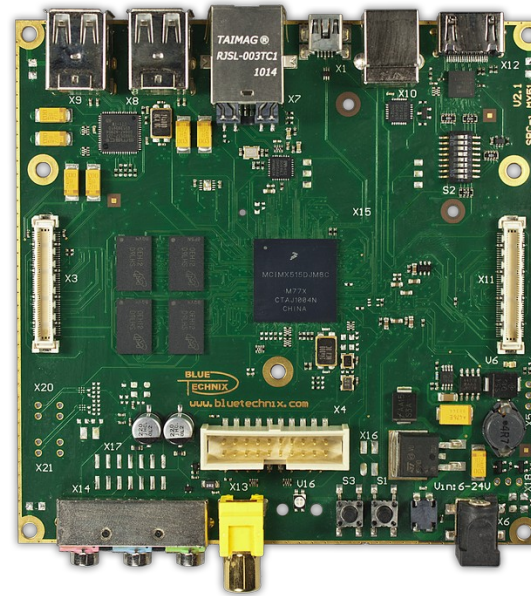
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# Upstream Support

Qualcomm Adreno A200

Board: iMX 53 Devkit

SOC: NXP iMX 53



# Qualcomm Adreno A300

Board: Dragonboard 410C  
SOC: Qualcomm 410E







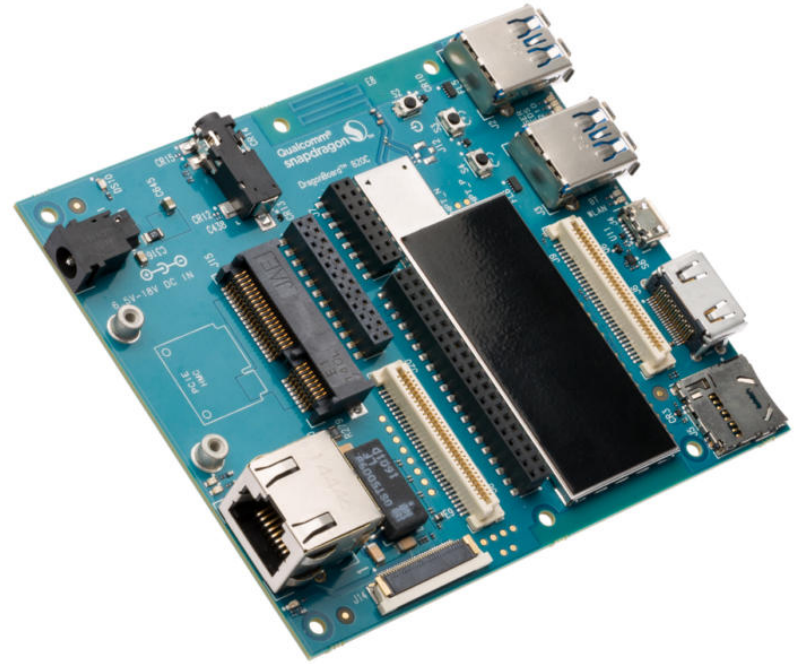
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# Upstream Support

Qualcomm Adreno A500

Board: Dragonboard 820C

SOC: Qualcomm 820E





# Upstream Support

Vivante

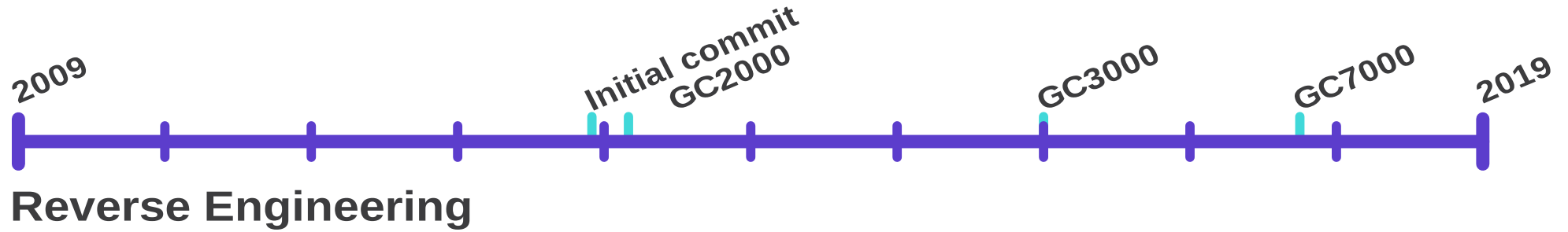




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# Upstream Support

Vivante

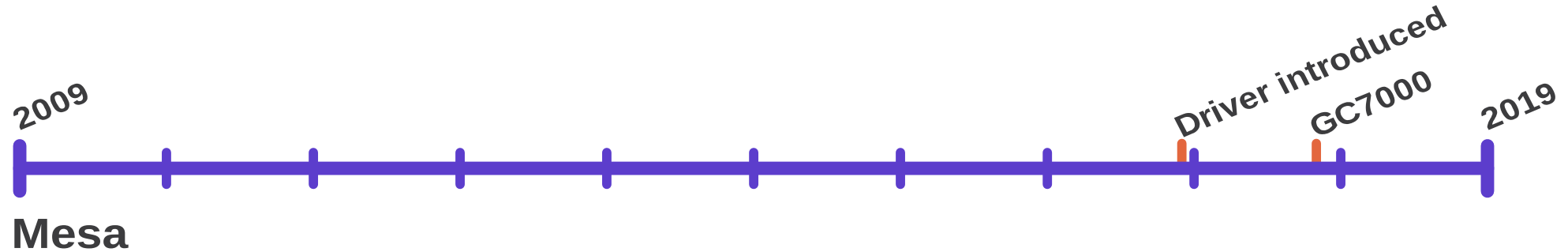
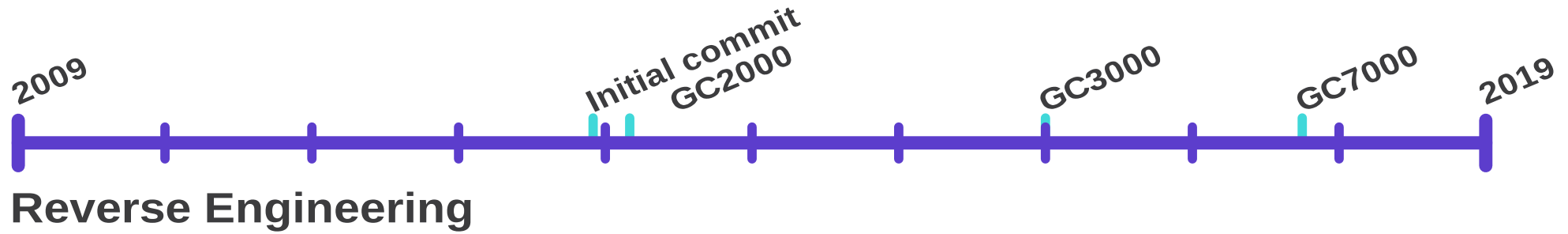




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Vivante





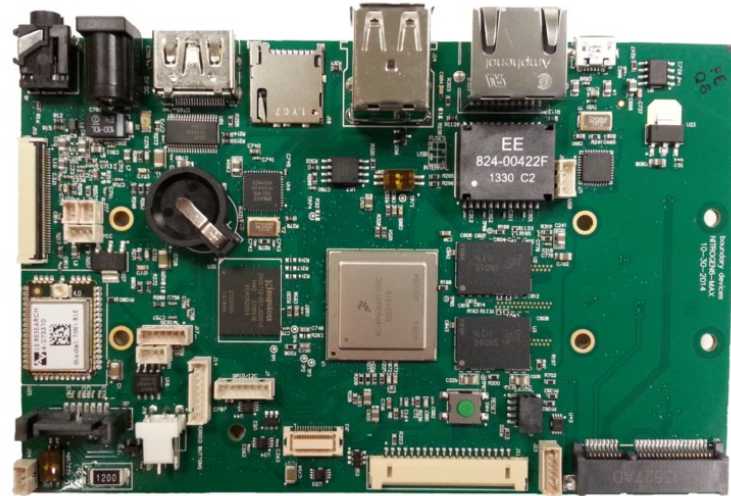
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# Upstream Support

Vivante GC2000

Board: iMX 6 Sabre

SOC: NXP iMX6q



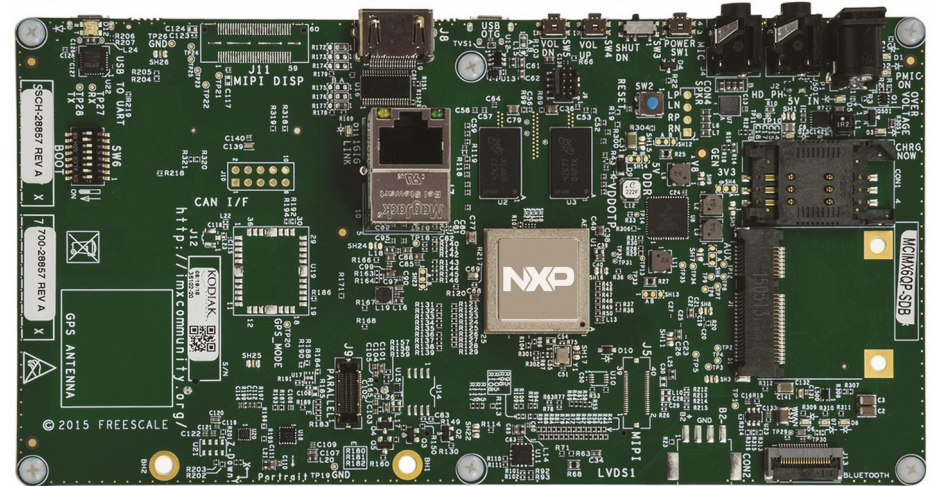


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# Upstream Support

Vivante GC3000

Board: iMX 6 QP Sabre  
SOC: NXP iMX6qp





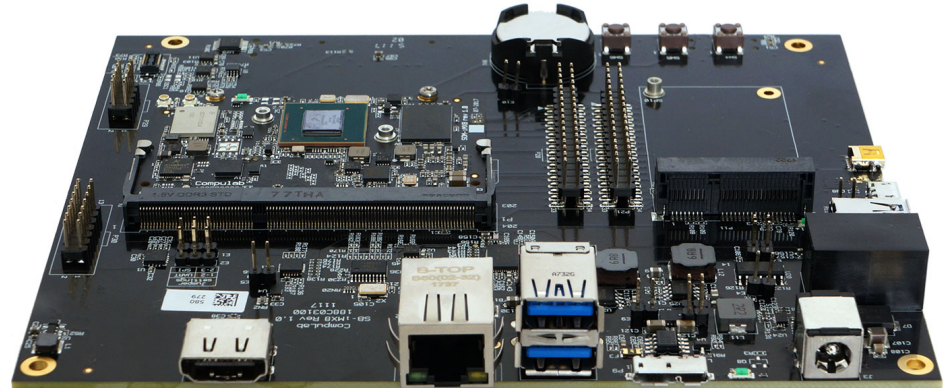
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# Upstream Support

Vivante GC7000

Board: iMX 8 Devkit

SOC: NXP iMX8





# Upstream Support

ARM



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# Upstream Support

ARM

2009



Reverse Engineering

Gxx Documentation  
Gxx Shader Loader  
T7xx Initial 3D

2019



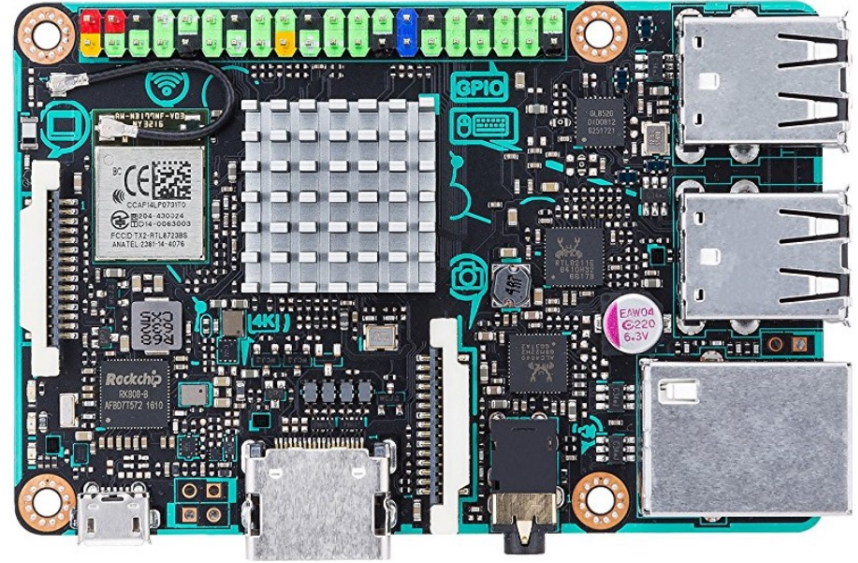
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# Upstream Support

ARM Mali Txxx

Board: Asus Tinkerboard

SOC: Rockchip RK3288







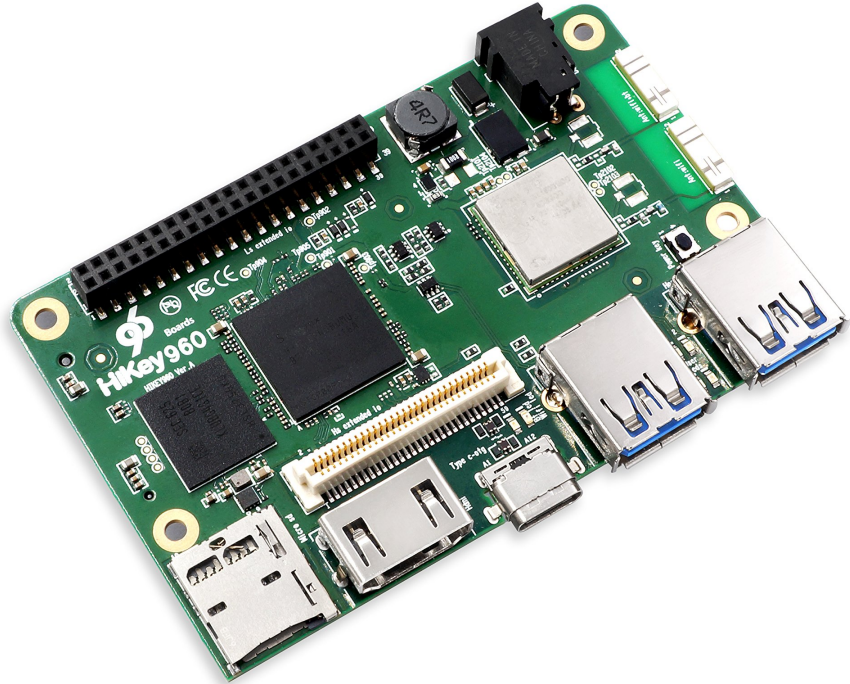
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# Upstream Support

ARM Mali Gxx

Board: HiKey 960

SOC: HiSilicon Kirin 960



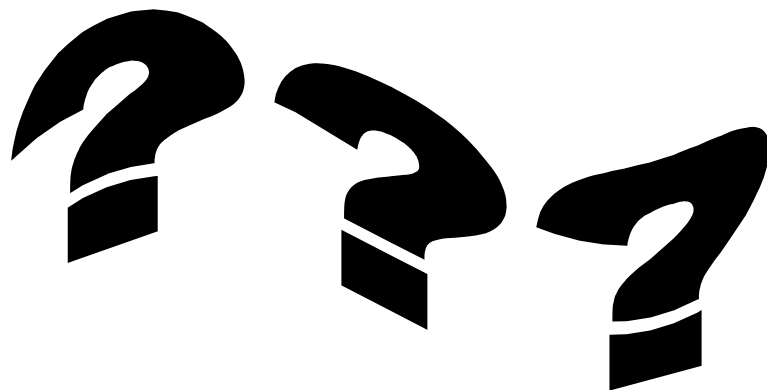


# Upstream Support

Imagination

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Imagination



# What comes next



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## What Comes Next

- OpenGL improvements

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- OpenCL support



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- OpenGL improvements
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  - Intel OpenCL Neo



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  - 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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- OpenGL improvements
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- Vulkan support



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- OpenGL improvements
- OpenCL support
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  - AMD RADV & AMDVLK



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- OpenGL improvements
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- Vulkan support
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  - Intel ANV



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# The Big Picture





# The Big Picture

Development



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# The Big Picture

## Development

- Some drivers are very mature



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- Non-supported drivers use more common code



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# The Big Picture

**Vendors**





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# The Big Picture

## Vendors

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  - Control motivated vendor or not



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- 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



# 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

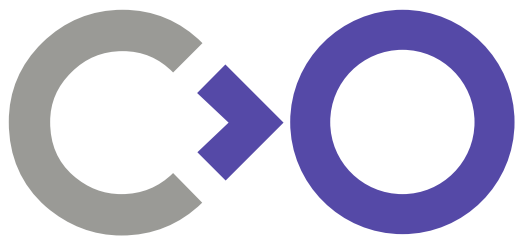


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# The Big Picture

## Manufacturers

- Some industries need Open Source
  - Surprisingly the Aircraft industry
  - Anyone planning for >1year product support



**Thank you!**