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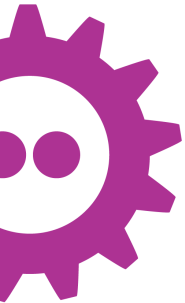

Mainline Linux on Motorola Droid 4

Sebastian Reichel

Collabora

February 4th, 2018

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Mainline supported phones

- ~~Openmoko Freerunner (Samsung S3C2442 [armv4t])~~
- Nokia N900 (OMAP3 [armv7])
- Goldelico GTA04 (OMAP3 [armv7])
- Motorola Droid 4 (OMAP4 [armv7])
- Nokia N950, N9 (OMAP3 [armv7])
- Maybe a few more, that I'm not aware of?

Why so few?

- (Most) Phone vendors don't care
- Lot's of code required (SoC support, Peripheral support)
- Low code quality out-of-tree code, often needs rewrite
- Chicken-and-egg problem (userspace vs kernel)
- No datasheets/documentation available
- Debug access may be hard

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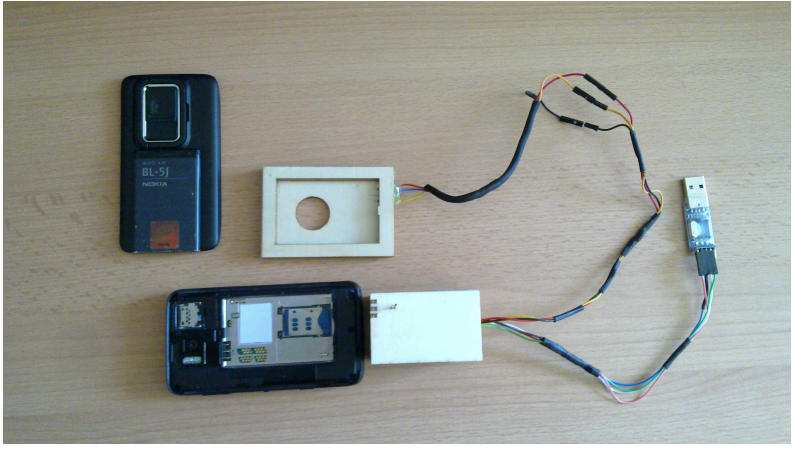
Debug interface - N900



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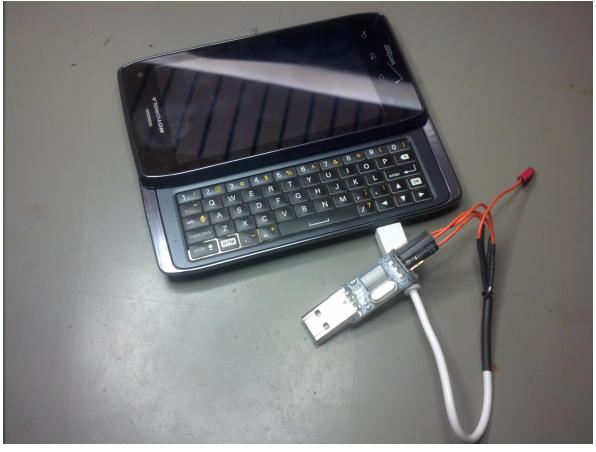
Debug interface - Droid 4



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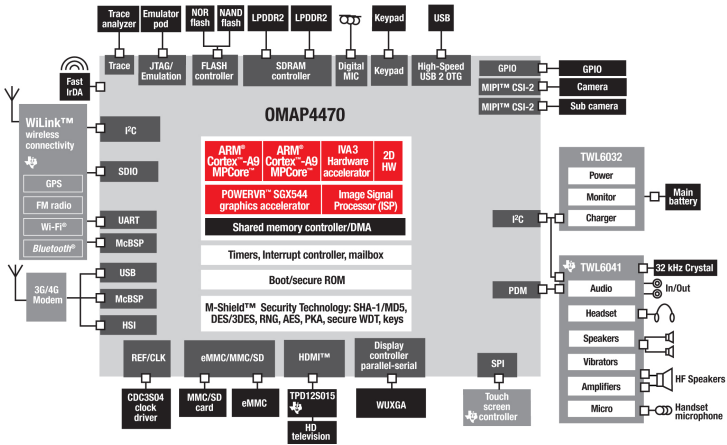
SoC Support



source: http://www.ti.com/en/graphics/wtbu/OMAP_44x.jpg

SoC - OMAP4430

- Clocks
- Reset
- Timers
- Interrupts
- MMU
- DMA
- UART
- MMC/SD
- GPIOs
- USB
- **Display**
- Keyboard
- SPI
- I2C
- Audio
- Mailbox
- PWM
- Crypto
- **GPU**
- **Camera**
- **DSP**
- **Coprocessors**

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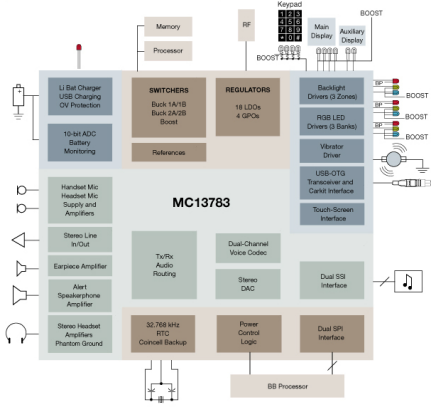
PMIC - Motorola CPCAP

- Regulators
- ADC
- Battery/Charger
- RTC
- Status LED
- **Audio**



source: nxp.com, MC13783 product page

Peripherals

- Touchscreen (MXT224E)
- Keyboard
- Buttons
- Vibrator (PWM)
- HDMI
- **LCD Panel (Command mode DSI panel)**
- **Backlight (LM3532)**
- Temperature Sensor (TMP105)
- Accelerometer (LIS3DH)
- Compass (AKM8975)
- Proximity / Ambient Light (ISL29030)

Connectivity Peripherals

- WLAN / Bluetooth / FM (TI WL1285C)
  - WLAN
  - Bluetooth
  - **FM**
- 2G/3G modem (MDM6600)
  - data connection
  - GPS
  - **voice call**
- 4G modem (W3GLTE)
  - Does not yet work

Camera Peripherals

- **LED flash (LM3559)**
- **Main camera (OV8830?)**
- **Selfie Camera (MT9M114?)**

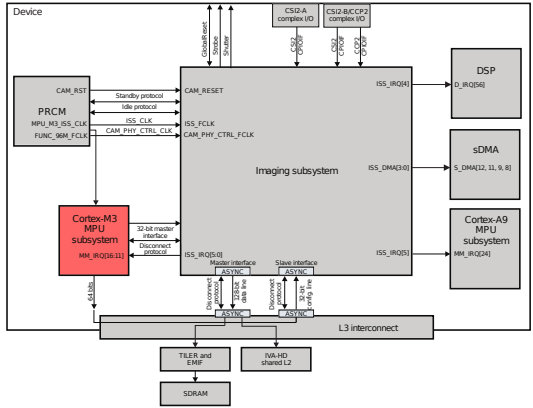


Figure 8-2. ISS Integration

Copyright © 2010-2014, Texas Instruments Incorporated (OMAP4430 TRM, page 1483)

Userland

- Here be dragons...
- FSO, phone middleware, inactive upstream
- Ofono, high-level modem middleware, actively maintained upstream
  - possibly to be used with telepathy-ring
- Android (does not run on mainline, but WIP)
  - »Running Android on the Mainline Graphics Stack« from Robert Foss in K1.105
- Normal Linux distributions (Debian, Fedora, ...)
  - Mostly useless without HW keyboard

Userland

- SHR (inactive upstream)
- FirefoxOS (discontinued)
- SailfishOS (still not fully open source)
- Tizen (?)
- Purism (in development)
- PostmarketOS (in development)
- Maemo Leste (in development)

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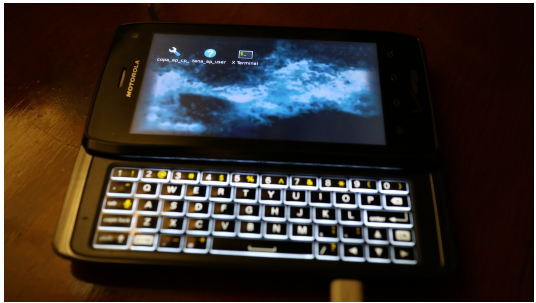
Userland



Conclusion

- Interesting topic to get into kernel development
  - Getting in touch with many subsystem
  - Learning about different hardware components
- Each new kernel driver helps
  - Hardware components are often re-used
  - SoC function blocks are re-used in newer generations
- Big hurdles
  - 3D acceleration
  - Camera support
  - Missing proper userspace

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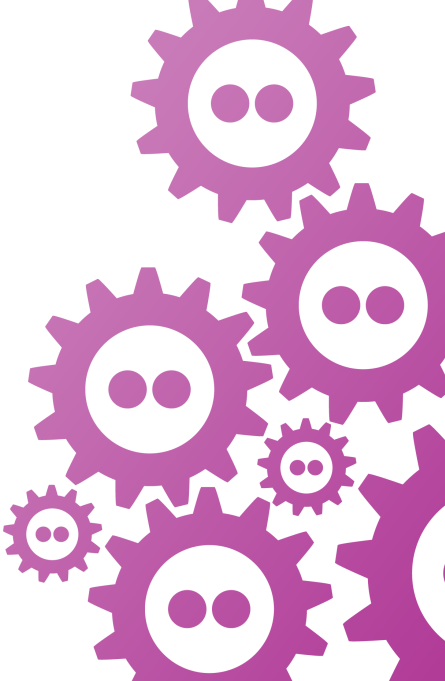
Thanks!

Q & A

We are hiring!

`http://col.la/careers`



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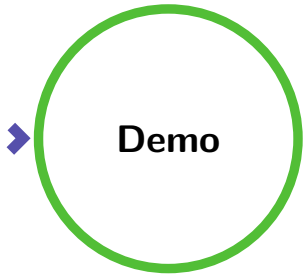
Demonstration



See for yourself...