Running mainline Linux on Snapdragon 410.[*]
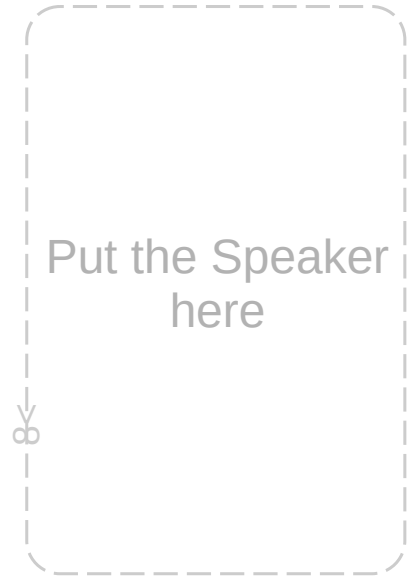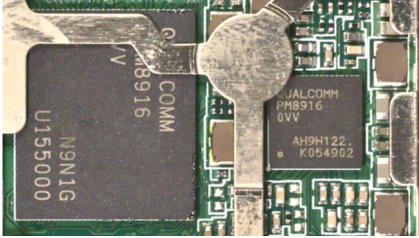
How we support over 25 devices in postmarketOS.

Nikita Travkin / FOSDEM'22
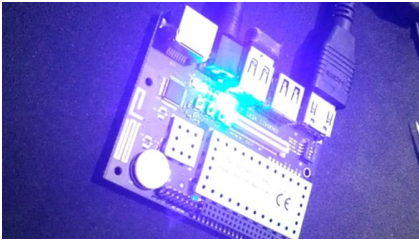

Put the Speaker here

* and on some other platforms

Qualcomm Snapdragon 410

MSM8916 with its friend PM8916

A board based on DragonBoard 410c
Has a flash light in a form of a BT led

Over 5000 pages of documentation
All available on the Qualcomm website

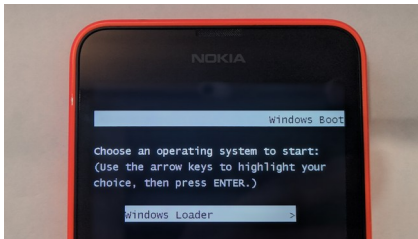DragonBoard, Qualcomm and Snapdragon are trademarks of Qualcomm Incorporated

There is no fastboot on Sammies

Samsung has a custom flash mode
No fastboot here, heimdall fails sometimes

"Normal" bootloaders can also be quirky
They may refuse to flash your image
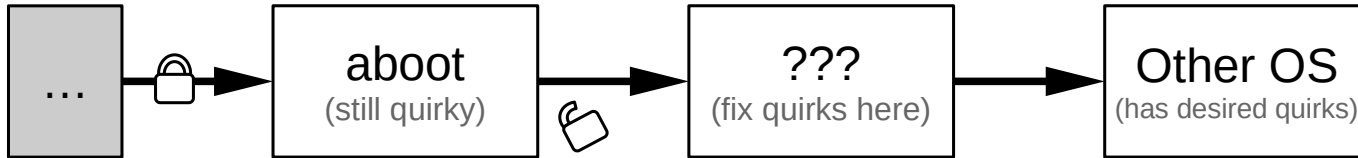because the fastboot protocol has changed...

??????
How do you even flash it via the
Windows Boot Manager?

How things boot on msm8916

How it was:

```
┌─────┐      ┌──────────────┐      ┌──────────────┐
│     │  🔒  │    aboot     │      │   Android    │
│ ... │─────▶│   (quirky)   │─────▶│ (also quirky)│
│     │      │              │  🔓  │              │
└─────┘      └──────────────┘      └──────────────┘
```

How we want it:

```
┌─────┐      ┌──────────────┐      ┌──────────────┐      ┌──────────────┐
│     │  🔒  │    aboot     │      │     ???      │      │   Other OS   │
│ ... │─────▶│ (still quirky)│────▶│(fix quirks here)────▶│(has desired quirks)│
│     │      │              │  🔓  │              │      │              │
└─────┘      └──────────────┘      └──────────────┘      └──────────────┘
```
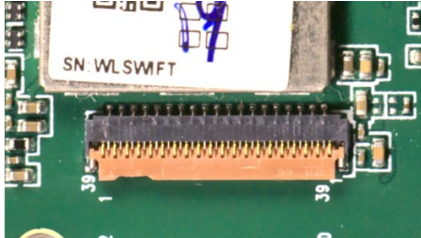
U-boot ?
EDK-II ?
      …   ?

Lk2nd – a shim bootloader that boots them all

lk2nd supports over 50 device models across multiple platforms
It provides an unified booting and flashing process for all of them

Making the display work

MIPI DSI – Just the transport layer
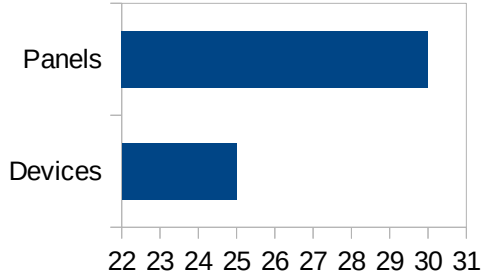There is nothing that tells the kernel
about the display

Sometimes the init sequences are long
Over 200 commands
– a bit too long to convert by hand

lmgpgd
lmdpdg
lmgpdg

Linux-mdss-dsi-panel-driver-generator
Downstream dtb goes in, C code goes out!

Dealing with all the drivers

There can be multiple possible panels
Vendors multi-source them

```
panel {
        compatible = "wingtech,wt88047-panel";

        qcom,mdss_dsi_r69431_720p_video {
                compatible = "wingtech,sharp-r69431";
        };
        qcom,mdss_dsi_nt35521_720p_video {
                compatible = "wingtech,auo-nt35521";
        };
        qcom,mdss_dsi_nt35521s_720p_video {
                compatible = "wingtech,boe-nt35521s";
        };
        qcom,mdss_dsi_nt35521_ofilm_720p_video {
                compatible = "wingtech,ofilm-nt35521";
        };
```
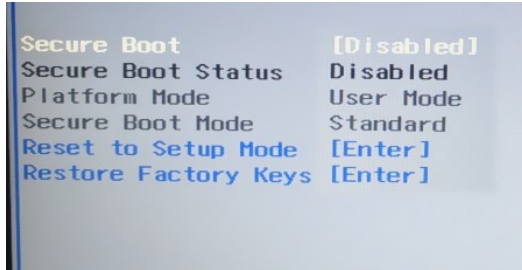
lk2nd does panel detection and DT patching
It hides those choices from the Kernel

linux-panel-drivers
Allows us to regenerate all drivers in a moment

Secure-Boot 's are not the same

Disabling x86 secure-boot
There is a menu in firmware for that

Disabling ARM secure-boot
Just swap the SoC, not too hard, right?

These are "different" devices

- SM-A500F
- SM-A500FU
- SM-A500H
- SM-A500YZ
        …

All of those can boot the same DT
Yet they can't boot the same firmware


```
[370] Display Init: Done
[370] serial number: 3d4af0
[370] ptn[0]:Name[apnhlos]
[380] ptn[1]:Name[modem] Si
[390] ptn[2]:Name[sbl1] Siz
[390] ptn[3]:Name[ddr] Size
```

msm-firmware-loader
        - mounts and links the firmware partitions
They didn't add them for nothing, right?

What's next?

DTB selection in lk2nd and generic system images
I want to have a single sdcard for all of those devices

Thanks for listening!

– Nikita Travkin / nikita@trvn.ru