Camera support on FOSS mobile devices

- Welcome and thank you for joining

The panel

- David Plowman *RaspberryPi Ltd*
- Naushir Patuk *RaspberryPi Ltd*
- Dorota Czaplejewicz *Purism Inc*
- Martin Kepplinger *Purism Inc*
- Kate Hsuan *Red Hat Inc*
- Hans de Goede *Red Hat Inc*
- Daniel Scally *Linux Surface*
- Benjamin Schaaf *Pinephone camera developer*
- Laurent Pinchart *Ideas on Board Oy*
- Kieran Bingham *Ideas on Board Oy*

The format

- 5 discussion points
- .. in 50 minutes
- final Q&A session (10 minutes)

- if any interesting questions comes up during the discussion...
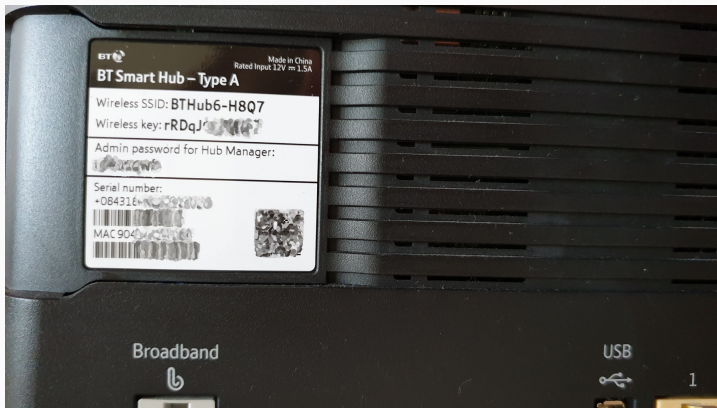- ... we'll be happy to take it, but please help me out :)

Let's resume the discussion

Does this apply to FOSS mobile devices too ?

The picture most commonly found in the smartphone of a Linux power-user

Camera and Linux mobile devices

Lot of devices: the development effort scales

Not that many devices ?

No new devices at all ?

Camera and Linux mobile devices

- What is the expected set of features ?
  - "just" take pictures
  - video call/video recording
  - professional photography (high end smartphone)

- is the effort of using a camera stack justified ?
- entry barriers ?

The librem5 and pinephone camera stacks

- "legacy" designs: no ISP on the SoC
- RAW and YUV sensors

- current state & future plans
- challenges
  - Debayering (GPU?)
  - 3A (statistics and algorithms)
  - formats used for preview/still capture

libcamera: the simple pipeline handler

- the (not anymore so) simple pipeline handler

- implementing a pipeline handlers is not an easy task
  - is the entry barrier too high ?

- pinephone pro: plans for camera support ?
- libcamera natively supports RK3399 !

Camera applications: other use cases

- desktop (UVC) and embedded (media-controller) diverged
- what are the requirements of camera applications in other context ?

The RaspberriPi camera stack

- libcamera-apps
- picamera2

Camera applications

Linux-surface: regular Linux app on complex cameras

- the camera stack
- v4l2-loopback

Camera applications
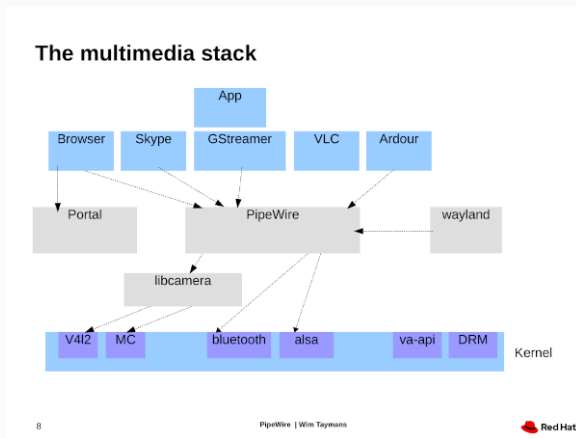
Portals, pipewire and the long term plan

The multimedia stack

Figure:
https://blogs.gnome.org/uraeus/2021/10/01/pipewire-and-fixing-the-linux-video-capture-stack/

Reusable 3A algorithms

- Implementation of an auto-focus algorithm

- Reusable 3A components
  - opportunities
  - obstacles

The pain and ~~joy~~ *just pain* of sensor drivers development

- (Most) sensor drivers are based on binary blobs
  - difficulties in accessing datasheet ?
  - difficulties in getting support from vendors ?
  - are all vendors equal ?

The pain and ~~joy~~ *just pain* of sensor drivers development

- How did we get there ?
- *MIPI CCS: Camera Command Set*
- Standardization of the kernel interface
- Compliance tools