

Modern Camera Handling in Chromium

Implementing Camera Access with xdg-desktop-portal and PipeWire in Chromium



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About Me

- Michael Olbrich
- Embedded Linux developer
- Graphics team



- Pengutronix
- Embedded Linux consulting & support



Cameras in Chromium – Current State

- Uses V4L2 directly
- Very little development ("finished")






“Obscure” Unsupported Use-Cases

- Camera selection outside of Chromium
- Screenshot as camera
- H.264 only cameras
- IP cameras



“Real” Unsupported Use-Cases

- Proper camera handling in Containers (Snap  / Flatpack )
- Cameras that require libcamera 
 - e.g. some Microsoft Surface™ devices with IPU3.



High-level Camera API

Requirements:

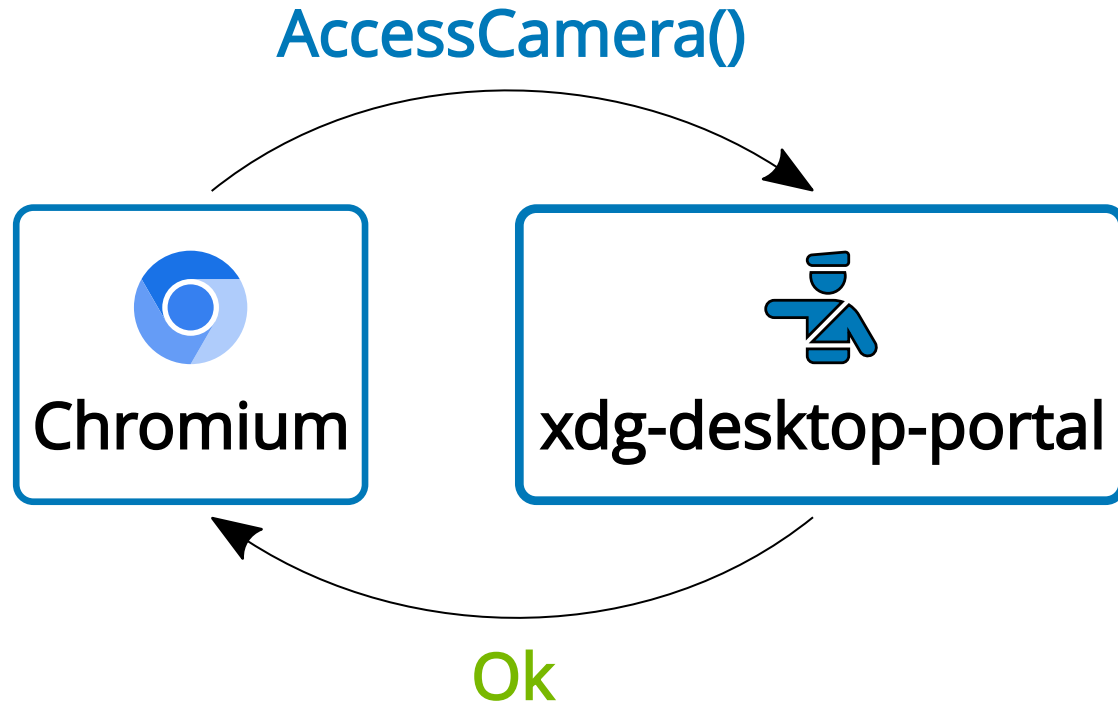
- Flexible camera authorization
- High-level camera API that can support different backends

Solution:

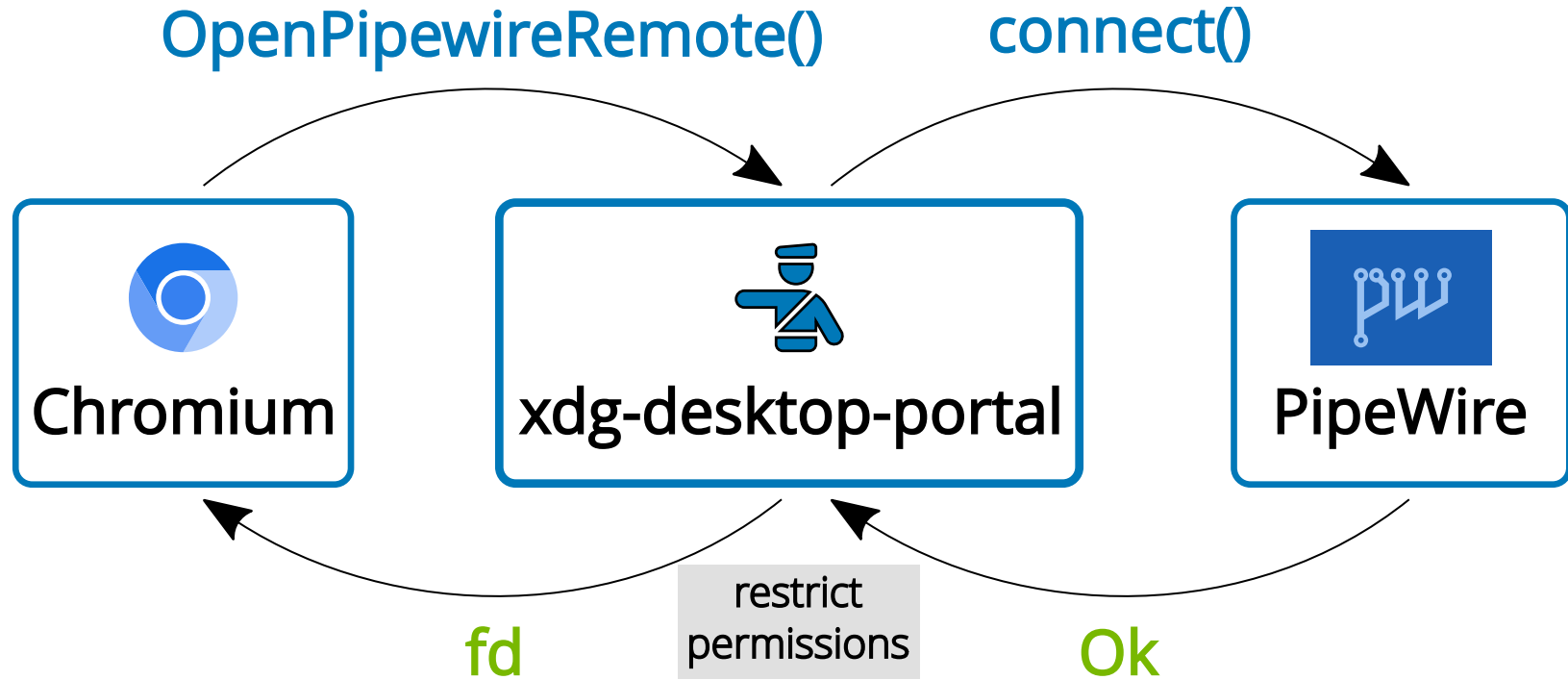
- xdg-desktop-portal & PipeWire



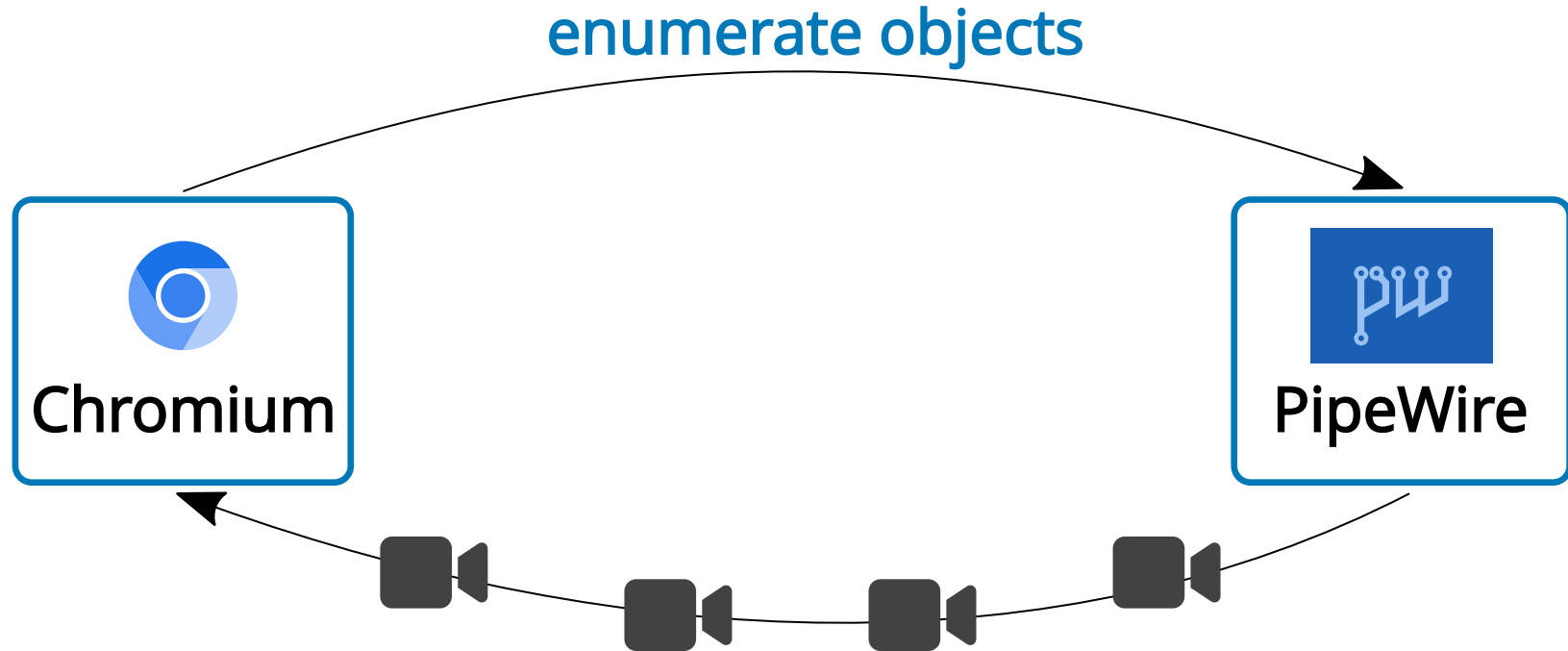
xdg-desktop-portal / PipeWire Camera API



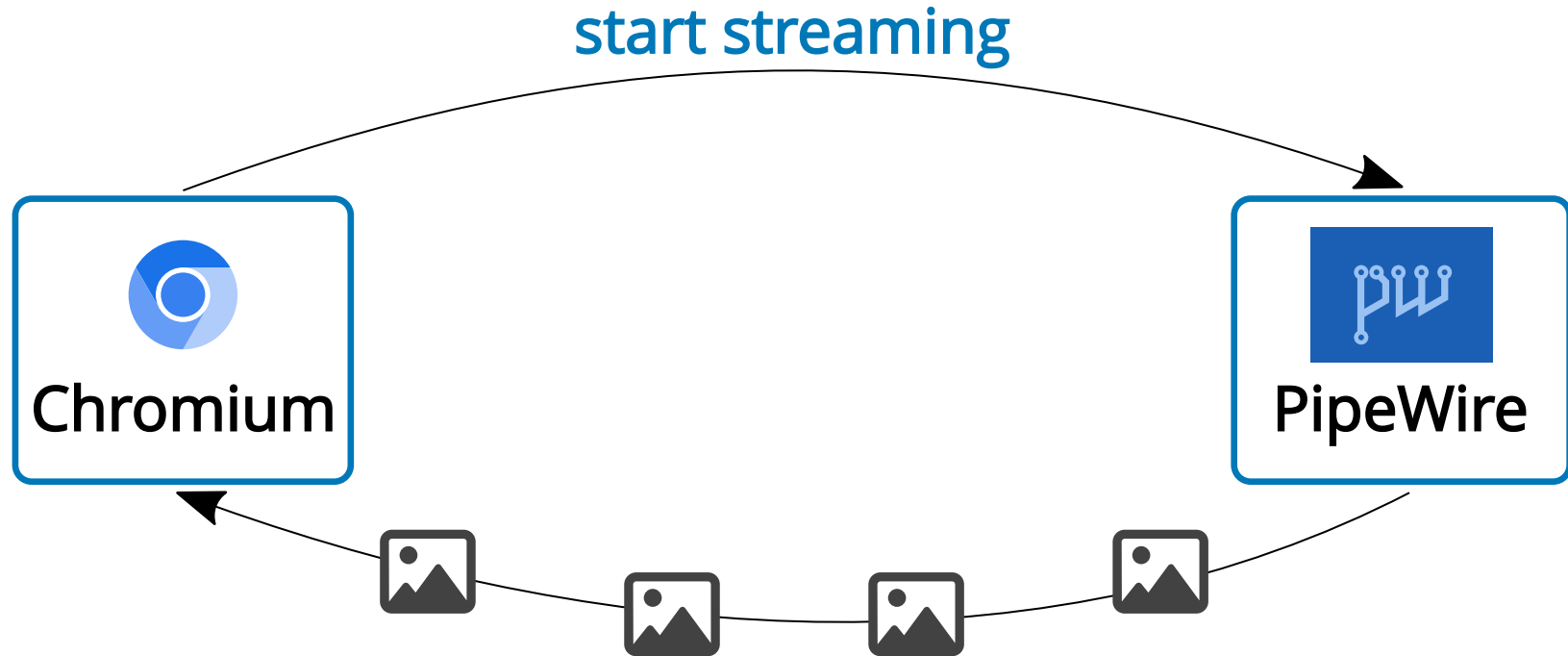
xdg-desktop-portal / PipeWire Camera API



xdg-desktop-portal / PipeWire Camera API



xdg-desktop-portal / PipeWire Camera API



1. Try: PipeWire Camera Backend in Chromium

- Initial implementation ready in January 2021
- Some initial problems finding reviewers
- Problems dynamically loading libpipewire



1. Try: PipeWire Camera Backend in Chromium

“I didn't see the code yet, but I think this belongs into WebRTC, ...”

-- Jan Grulich



2. Try: PipeWire Camera Backend in WebRTC

- Camera API already exists, used by Firefox
- New PipeWire camera backend in WebRTC
- New WebRTC camera backend in Chromium

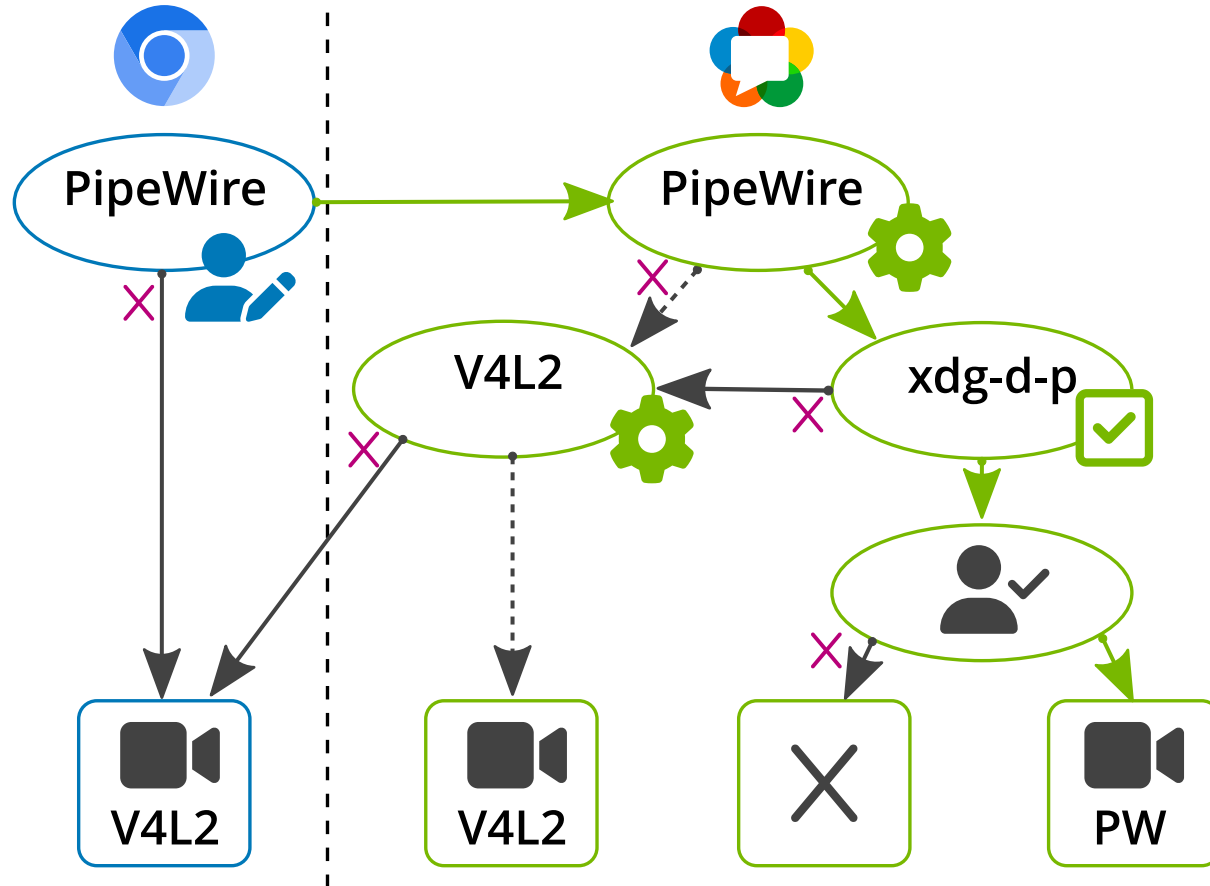


Camera API Problems

- synchronous API to enumerate camera devices:
 - `static DeviceInfo VideoCaptureFactory::CreateDeviceInfo()`
 - PipeWire and xdg-desktop-portal communication is asynchronous
- stateless API to create a camera object:
 - `static VideoCaptureModule VideoCaptureFactory::Create(string id)`
 - Camera enumeration and creation must share the pipewire session
- frames are copied and converted to I420 in WebRTC
 - Chromium does the same thing for frames coming from the backend



Supporting PipeWire and V4L2 Simultaneously



Where are We Now (WebRTC)?

- Split out generic portal / pipewire code **Merged**
 - <https://webrtc-review.googlesource.com/c/src/+281661>
- Add callback for raw frames for video capture **Merged**
 - <https://webrtc-review.googlesource.com/c/src/+264548>
- Add pipewire/portal video capture support **Merged**
 - <https://webrtc-review.googlesource.com/c/src/+261620>
- Build video capture implementation for chromium
 - <https://webrtc-review.googlesource.com/c/src/+264553>



Where are We Now (Chromium)?

- Video Capture Linux: factor out v4l2 camera support
 - <https://chromium-review.googlesource.com/c/chromium/src/+3634526>
- Video Capture Linux: add backend for portal / pipewire cameras
 - <https://chromium-review.googlesource.com/c/chromium/src/+3308882>



What's Next?

- Support new xdg-desktop-portal device API
 - <https://github.com/flatpak/xdg-desktop-portal/pull/659>
- Image rotation
- Pan, tilt, zoom, focus, ...



Thanks

- **WOLFVISION[®]**
- Jan Grulich, Mark Foltz
- Ilya Nikolaevskiy, Alex Cooper
- Kieran Bingham
- ...



By the way...

... we are hiring



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Thank You!

Questions?

