



Upstreaming Progress: Video Capture and Camera Support for Recent Rockchip SoCs

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COLLABORA

\$ whoami

- Linux user since 2006
- First steps in the kernel 2009-2013
- Full time kernel developer since 2020
- Joined Collabora in 2025
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- Mostly linux-media, linux-rockchip, ...



Recent Rockchip SoCs?

- Rockchip RK356xy
 - RK3566/68
 - RK3588
 - RK3576
 - RK3562
- For camera and video capture we can group
 - RK3566 + RK3568
 - RK3588 + RK3576 + RK3562

Video Capture and Camera Support?

- Capture video frames from companion ICs to RAM
- Camera requires more
 - Process frames (Debayering, 3A, corrections, ...)
 - Auxiliary devices: flash, lens controller, ...
 - **“Illuminating the Frame: Enhancing Flash Control in V4L2”**, Richard Leitner, Sun 12:40-12:50, <https://fosdem.org/2026/schedule/event/A7P7XE-v4l2-flash-control/>
 - **“Raw to Real and Green to Great: Open Source Camera Tuning for Linux Devices with libcamera”**, Kieran Bingham & Jacopo Mondi, Sun 13:30-13:55, <https://fosdem.org/2026/schedule/event/BQJPUP-libcamera-tuning/>

Upstream?

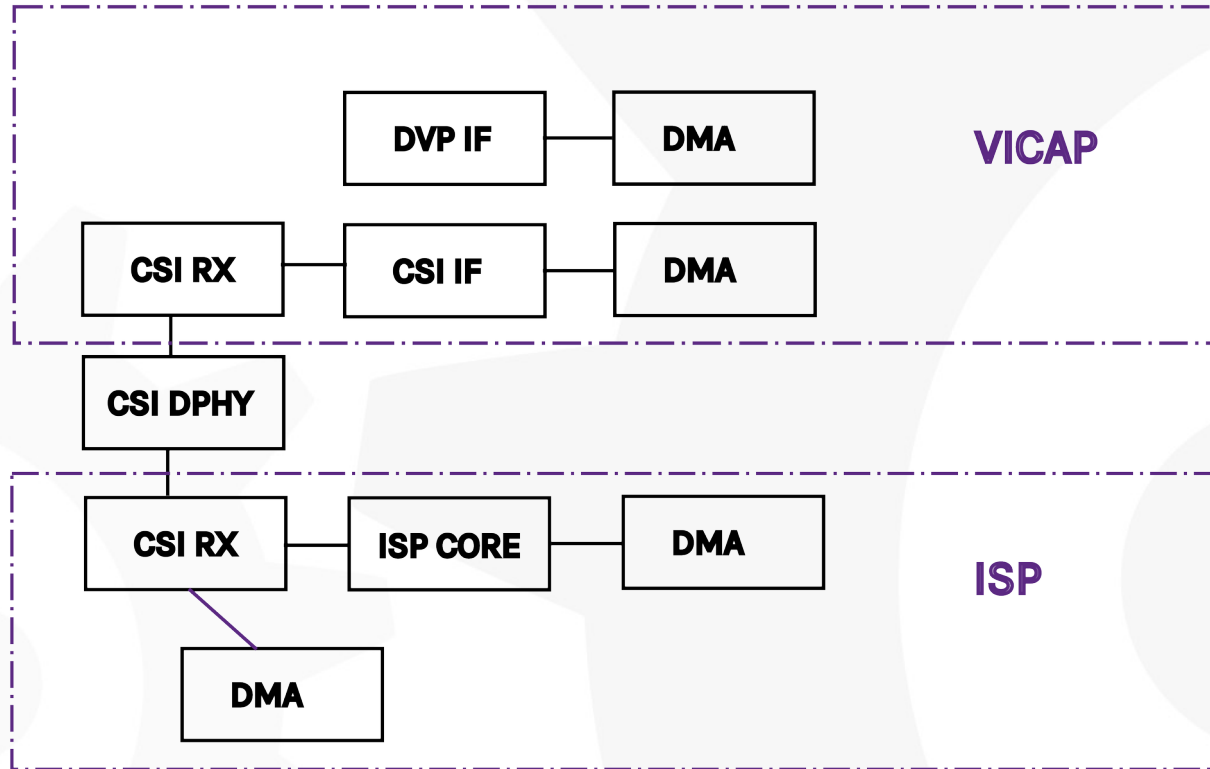
- No need to explain the “WHY” here ;-)
- Rockchip SoCs are well supported in mainline Linux... :-)
- **“No Line Like Mainline: Update On The Fully Mainline Software Stack For Rockchip SoCs”**, Nicolas Frattaroli, Sun 14:00-14:25, <https://fosdem.org/2026/schedule/event/KLFW73-no-line-like-mainline-rockchip/>
- ... apart from Video Capture and Camera Support :-/
- Let's close this gap!

Progress?

- This is a continuation of **“Towards Mainline Video Capture and Camera Support for Recent Rockchip SoCs”**, Michael Riesch, Open Source Summit Europe 2025 (August 2025)
- Over the last months, some work was completed, new issues were raised, some work is still WIP (and may be rough around the edges), and there is still a decent TODO list
- Some discussions may be required
- Agenda for today:
 - A brief look at the hardware
 - An overview of the current state of the art
 - The next steps

The Hardware

RK3566/RK3568



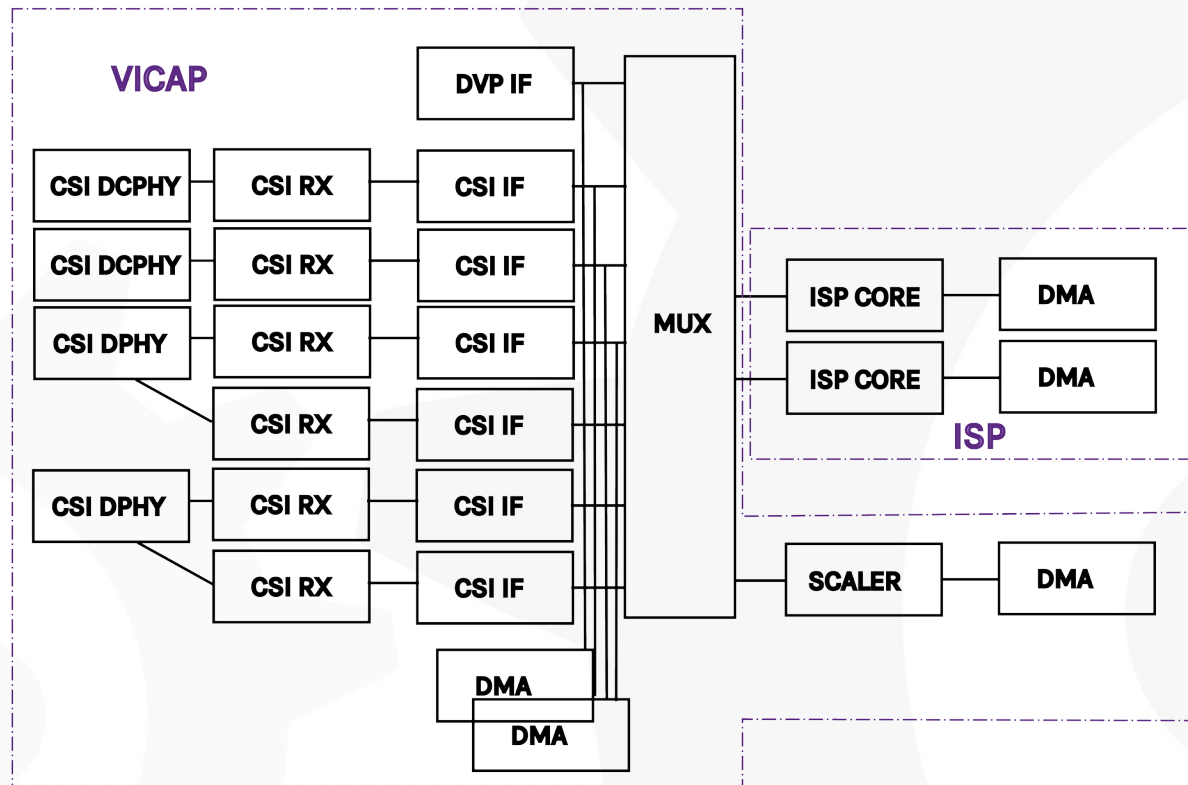
RK3566/RK3568

- 1x MIPI CSI-2 DPHY
 - 1x4 lanes or 2x2 lanes (split mode)
 - Data can be passed to ISP and/or VICAP
- 1x ISP v2.1
 - inline mode using integrated MIPI CSI-2 receiver
 - mem2mem mode, raw capture, HDR

RK3566/RK3568

- 1x MIPI CSI-2 receiver (coupled to VICAP)
- 1x VICAP
 - Digital Video Port (parallel 8/16 bit, BT.656/BT.1120) interface
 - 1x MIPI interface
 - 4x DMA engine for DVP (BT.1120 IDs?)
 - 4x DMA engine for MIPI (CSI VC/DT)

RK3588/RK3576/RK3562



RK3588/RK3576/RK3562

- 2x MIPI CSI-2 DPHY
 - 1x4 lanes or 2x2 lanes (split mode), all to VICAP
- 2x/1x/0x MIPI CSI-2 DCPHY, no split mode, all to VICAP
- 2x/1x/1x ISP v3.0/v3.9/v3.2 (?)
 - inline mode from VICAP MUX/TOISP
 - mem2mem mode, raw capture, HDR, unite mode

RK3588/RK3576/RK3562

- 6x/5x/4x MIPI CSI-2 receiver (coupled to VICAP)
- 1x VICAP
 - 1x/1x/0x Digital Video Port interface, 6x/5x/4x MIPI interfaces
 - 4x/4x/0x DMA engine for DVP (BT.1120 IDs?)
 - 24x/20x/16 DMA engine for MIPI (CSI VC/DT)
 - MUX/TOISP block, SCALER (4x/1x/1x DMA engine)
- 1x/0x/0x HDMI RX (already well supported in mainline)

Current State of the Art

Status Matrix 1/2

⁰ v6.1
¹ v6.18

² v6.19
³ v6.20 (w/o DT)

* should be easy™
** new on this list

SoC	RK3566/68	RK3588	RK3576	RK3562
MIPI CSI-2 DPHY	DONE ⁰	PATCH-v2 DONE ¹	TODO	TODO
DPHY split mode**	TODO	TODO	TODO	TODO
MIPI CSI-2 DCPHY	n/a	TODO	TODO	n/a
MIPI CSI-2 receiver	PATCH-v10 DONE ³	WIP DONE ³	TODO*	TODO*
VICAP MIPI capture	PATCH-v10 DONE ²	WIP	TODO*	TODO*
VICAP DVP capture	PATCH-v10 DONE ²	TODO*	TODO*	n/a
VICAP MUX/TOISP	n/a	TODO WIP	TODO	TODO
VICAP SCALER	n/a	TODO	TODO	TODO

Say “cheese”!

First stream:
Radxa ROCK 5B+
(RK3588) +
Radxa Camera
4K (IMX415)



Status Matrix 2/2

nothing easy™ here
** new on this list

SoC	RK3566/68	RK3588	RK3576	RK3562
ISP MIPI CSI-2 RX	WIP (paused)	n/a	n/a	n/a
ISP main/self path	WIP (paused)	TODO WIP	TODO	TODO
ISP stats/params/3A	WIP (paused)	TODO	TODO	TODO
ISP raw capture	TODO	n/a	n/a	n/a
ISP mem2mem	TODO	TODO WIP	TODO	TODO
ISP HDR	TODO	TODO	TODO	TODO
ISP dual support	n/a	TODO	n/a	n/a
libcamera support**	TODO	TODO	TODO	TODO

The Next Steps

Things to Discuss

- How to expose the HW using V4L2/MC?
 - DPHY split mode (RK3568)
 - Number of media graphs/media devices (/dev/mediaX)?
 - How to enable mem2mem or inline ISP operation mode?
 - How to enable dual ISP operation mode?
- V4L2/MC features
 - Streams API for MIPI CSI-2 VC/DT: still experimental, needs testing
 - Multicontext MC (in discussion) for time-division multiplex
 - Scheduler framework in V4L2/MC?

Next Steps for Me

- 1) Complete RK3588 VICAP support
 - Most importantly, MUX/TOISP support
 - Optionally: SCALER and DVP support (for the latter, find HW?)
- 2) Minimal RK3588 ISP support
 - Main path/self path with debayering only, no processing
 - Statistics, parameters, processing
- 3) ???

Next Steps for You

- Go forth and test :-)
- Play around with different setups and different use cases.
- Consider extending support to RK3576 and/or RK3562 HW
- And if you don't want to wait for the ISP support...
 - ...consider giving the software ISP a try
 - Capture raw frames and process them on the CPU/GPU
 - **“libcamera software ISP status update”**, Bryan O'Donoghue & Hans de Goede, Sun 13:00-13:25, <https://fosdem.org/2026/schedule/event/TKSK3G-libcamera-softisp/>

Thank you!

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