

# **Multimedia Group Activity Report**

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Team

Status

Tasks

Future



**Multimedia**

- Kieran Bingham (UK) – FDP
- Kuninori Morimoto (JP) – Sound
- Laurent Pinchart (FI) – DU, VSP, Team Lead
- Niklas Söderlund (SE) – VIN
- Ulrich Hecht (DE) – HDMI



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## Multimedia – Team

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**Status**  
Tasks  
Future



**Multimedia**

		Gen2	Gen3
<b>Capture</b>	VIN	Upstream	Public
	CSI-2	N/A	Prototype
	ISP	N/A	No
<b>Codec</b>	JPU	Upstream	Upstream
	VCP (Video Codec)	No	No
	iVDP1 (Low-Latency Video Decoder)	No	No
	iVCP1 (Low-Latency Video Encoder)	N/A	No



# Multimedia – Overview

		Gen2	Gen3
<b>Processing</b>	VSP	Upstream	Upstream
	DRC (Dynamic Range Correction)	No	No
	IMP-X (Image Recognition Engine)	No	No
	IMR (Distortion Correction Engine)	No	No
	FDP	Public	Public
<b>Bus Access</b>	DCU	N/A	No
	2D-DMAC	No	N/A
	FCP	N/A	Public (No Decompression)



# Multimedia – Overview

		Gen2	Gen3
<b>Display</b>	DU	Upstream	Upstream
	CMM (Color Management Module)	No	No
	DOC (Display Output Checker)	No	No
	HDMI	N/A	Prototype
	LVDS	Upstream	Upstream
	TCON	Prototype	Prototype
	GP2D	External	External
	GPU	No	No



# Multimedia – Overview

		Gen2	Gen3
<b>Sound</b>	Audio DMAC	Upstream	Upstream
	SCU (SRC, CTU, MIX, DVC)	Upstream	Upstream
	SSIU	Upstream	Upstream
	SSI	Upstream	Upstream
	ADG	Upstream	Upstream
	HDMI output	N/A	Prototype
	ADSP	No	No



# Multimedia – Overview



- VIN
  - Redesigned driver merged in v4.8
  - Gen2 fully supported
  - Gen3 support in progress, requires Media Controller
  - UDS (scaler) not supported
- CSI-2
  - Patches posted
  - Media Controller support to be developed
  - CSI-2 to VIN routing painful
- ADV7482
  - Prototype available
  - Supports CVBS (analog) and HDMI inputs
  - Upstreaming would require significant work



# Multimedia – Capture

- VSP
  - Most features implemented (Gen2 & Gen3)
  - CLU & LUT merged in v4.8
  - HGO available, targeting v4.9
  - Missing SHP (lacking documentation), ILV, BRS, UIF, HGT
  - Image partitioning support in progress
  - Request API in progress
- FDP
  - Driver posted for upstream review
- FCP
  - Merged in v4.8 with limited features (clock & power domains)
  - Missing data compression and decompression support



- **DU**
  - Most features implemented (Gen2 & Gen3)
  - VSP integration available
  - IPMMU integration missing
- **RGB & LVDS**
  - Available upstream
- **HDMI**
  - Available for Gen2 (on-board)
  - Prototype for Gen3 (SoC)
  - Gen3 upstreaming will require limited refactoring
- **TCON**
  - Prototype available (Cogent)



# Multimedia – Display

- **Audio Input/Output**
  - Most features implemented
- **HDMI output**
  - Prototype available
  - Hotplug support missing
  - Requires new DT bindings for integration for video



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## Multimedia – Sound

Team  
Status  
**Tasks**  
Future



**Multimedia**

- VIN
  - IPMMU Integration
  - Gen3 support
    - CSI-2
    - UDS (Scaler)
  - Interlacing
- VSP
  - Image partitioning
  - Fixed alpha (Gen3)
  - Rotation (implemented, pending image partitioning)
  - Request API
  - Suspend/Resume



- **DU**
  - IPMMU integration (through VSPD + FCP on Gen3)
  - Gen3 HDMI output
  - 3-planes formats
- **Sound**
  - HDMI output with DT bindings
  - HDMI hotplug



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Status  
Tasks  
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**Multimedia**



- Test procedures documented in the elinux.org wiki (<http://elinux.org/R-Car/Devices>)
- Test tools for DRM/KMS and V4L2 collaboratively developed (yavta, mediatext, kmsxx, ...)
- Test scripts for automated test suite  
[git://git.ideasonboard.com/renesas/vsp-tests.git](https://git.ideasonboard.com/renesas/vsp-tests.git)
- Multiple bugs and regressions caught already
- More tests to be developed



## Multimedia – Tests

- New API require open-source userspace implementation
- Not just test tools but integration in a major graphics stack (X11, Wayland, Android HWC)
- Userspace patches need to be accepted by maintainers



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## Multimedia – Upstreaming

- VCP3, VCP4: H.264, H.265, VP8, ... (depending on instance)
- iVCP1C: H.246/AVC low-latency decoder
- iVDP1C: H.264/AVC (& JPEG) low-latency decoder
- Documentation not available
  
- V4L2 Upstream API now includes good support for codecs
- Industry is moving to V4L2 (including Android)
- V4L2 codecs developed and submitted upstream (Mediatek, Qualcomm, ...)



## Multimedia – Codecs