



# 2025 Display Next Hackfest Update

Harry Wentland

# Agenda

- About the Display Next Hackfest
- Participants
- HDR
- Commit Failure Feedback
- Backlight Improvements
- VRR for Desktop
- Pageflip timeouts
- Real-time Scheduling
- Outings, Drinks, Food, Conversation

# Display Next Hackfest

- Unconference format
- Brings together **display driver** and **compositor** developers and maintainers
- Goals
  - Keep moving
  - Align on designs
  - Identify and deal with pain points
  - Highlight bugs or problems
- No recording
- Jointly created working doc
- Hosted at AMD Markham (near Toronto)
- Previous hackfests organized by Red Hat and Igalia
- Three-day packed sessions
- Local and remote attendance



# Participants

## Compositors

---

- Gnome
- KDE
- Weston
- Smithay
- Sway / wlroots
- ChromeOS

## HW Vendors

---

- AMD
- Intel
- ARM
- Raspberry Pi

## Others

---

- VKMS
- IGT
- DRM CI
- LittleCMS
- Color Scientist



# HDR – Compositors & Apps

## Wayland Protocols Merged

- [Color management](#)
- [Color representation](#)

## Compositors with HDR support

- mutter
- kwin
- weston

## Applications with HDR support

- gamescope
- mpv
- Blender
- Firefox WIP - (gfx.wayland.hdr=true)
- Chromium WIP

## Discussions and Challenges

- Vulkan vs Wayland Reference Luminance
- Blending
- Composing SDR and HDR content
- Viewing Environment Adjustments

## Notes

- [Color & HDR – Status](#)
- [Color & HDR – Q&A](#)
- [Color & HDR – Compositors & Applications](#)





# HDR – HW Composition

## Pre-blending Color Pipeline

- DRM core, VKMS, and amdgpu
- Intel implementation based on this
- Reviewed and ready to merge
- Now only advertising relevant properties based on client cap

## IGT patches

- Need more review

## Userspace

- Kwin - Xaver Hugl
- Weston - Leandro Ribeiro



## Post-blending Color Pipeline - Nicolas F. R. A. Prado

- Based on pre-blending color pipeline
- Implementation for Mediatek driver
- IGT Tests

## Next Steps

- Merge pre-blending pipeline
- Color-space conversion color for YUV buffers
- Inverse EOTF precision

## Inverse EOTF precision

- Segmented LUTs
- Inverse LUT definition
- Dual-LUT
  - 1st LUT defines input points
  - 2nd LUT defines values (output points)

# Backlight Improvements

## Problem Statement

- Backlight is controlled via sysfs
- There is no way to correlate backlight device with connector

## Proposed Solution

- Add backlight connector properties to `drm_connector`

## Progress

- Mario Limonciello has been working on this

## Future Work

- Explore whether backlight can be set atomically
- Explore whether backlight can be specified in nits ( $\text{cd/m}^2$ )



# Commit Failure Feedback

## Problem Statement

- Compositors have no information why atomic commits fail
- Compositors need to guess
- Fallback to sub-optimal solutions

## Proposed Solution

- Start with simple stuff
- Keep it expandable for the future
- Enum to show the problem
- String with "verbose" info for logging by compositor
- Optionally: array of KMS object IDs

## Enum values

- Undefined
- Scanout Bandwidth
- Scanin Bandwidth
- Connector Bandwidth
- Memory Domain
- Spec Violation (out of range, immutable, -EINVAL)

## Progress

- User readable error codes on atomic\_ioctl failure - Arun R Murthy





# Pageflip Timeouts

## Problem Statement

- Some hard-to-reproduce driver bugs lead to pageflip timeouts
- Since compositor doesn't get an event it hangs
- User has to force reboot

## Possible solutions

- DRM already knows a page-flip timeout occurs
- DRM sends a `pageflip_timeout` event instead
- DRM calls driver callback to attempt recovery
- Compositor issues a full modeset to reprogram

## Progress

- None (that I'm aware of)



# Real-Time Scheduling

## Problem Statement

- Compositor wants to schedule its composition step as late in the frame as possible
- This reduces latency
- It needs to know when the deadline is and get feedback on how long driver programming takes

## Proposed Solution

- Report hw\_done event up to userspace
- Report time until HW latches with the event

## Progress

- Add atomic commit HW done event & deadline property - Michel Dänzer
- Adds hw\_done event
- Adds deadline property
- Assumes deadline doesn't change between modesets



# VRR for Desktop

## Problem Statement

- Enabling lower or variable refresh rate on desktop can save power
- We might want to target a fixed refresh rate when video playback is the main focus, or even for frame-limited games

## Proposed Solution – DRM

- Client cap that compositor can manage VRR
- Driver disables any low-frequency-compensation, etc., upon seeing this
- New properties for VRR min/max
- Driver simply programs HW to provided VRR min/max values

## Proposed Solution – Wayland

- A new protocol that allows applications to communicate a preferred refresh rate
- Compositors can decide whether to target it based on their own heuristics

## Progress

- drm/uapi: Indroduce a VRR Range Control Interface – Chuanyu Tseng



# Other Topics

- Async Pageflip Failures
- DP AUX Improvements
- Per-CRTC Page-flip Event Requests
- Superframes
- 2D Composition Engines
- Desktop Testing Framework
- DRM CI
- VKMS Improvements
- VRR Bugs



# Outings, Drinks, Food, Conversation

- It can be easier to get things done virtually after socializing in real life
- We're human beings and we care about connecting with other human beings



Trip to the CN Tower



**Hackfest 2026**  
**???**







# Copyright and disclaimer

- ▶ ©2025 Advanced Micro Devices, Inc. All rights reserved.
- ▶ AMD, the AMD Arrow logo, and combinations thereof are trademarks of Advanced Micro Devices, Inc. Other product names used in this publication are for identification purposes only and may be trademarks of their respective companies.
- ▶ The information presented in this document is for informational purposes only and may contain technical inaccuracies, omissions, and typographical errors. The information contained herein is subject to change and may be rendered inaccurate releases, for many reasons, including but not limited to product and roadmap changes, component and motherboard version changes, new model and/or product differences between differing manufacturers, software changes, BIOS flashes, firmware upgrades, or the like. Any computer system has risks of security vulnerabilities that cannot be completely prevented or mitigated. AMD assumes no obligation to update or otherwise correct or revise this information. However, AMD reserves the right to revise this information and to make changes from time to time to the content hereof without obligation of AMD to notify any person of such revisions or changes.
- ▶ THIS INFORMATION IS PROVIDED 'AS IS.' AMD MAKES NO REPRESENTATIONS OR WARRANTIES WITH RESPECT TO THE CONTENTS HEREOF AND ASSUMES NO RESPONSIBILITY FOR ANY INACCURACIES, ERRORS, OR OMISSIONS THAT MAY APPEAR IN THIS INFORMATION. AMD SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR ANY PARTICULAR PURPOSE. IN NO EVENT WILL AMD BE LIABLE TO ANY PERSON FOR ANY RELIANCE, DIRECT, INDIRECT, SPECIAL, OR OTHER CONSEQUENTIAL DAMAGES ARISING FROM THE USE OF ANY INFORMATION