Long Road to HDR10 on ChromeOS

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ChromeOS Graphics / Compositor
Recap

Piecewise transfer function

- sRGB-like curve at the beginning
- Linear for HDR segment
- Programmable “elbow” to customize HDR content headroom and available bits for SDR content
- Uses display’s primaries directly
HDR10 / HDR10+

- Most common HDR format
- 10 bits per channel
- BT.2020 color primaries
- PQ electro-optical transfer function
HDR_OUTPUT_METADATA

- Post blending
- Requires color space conversion
- May require tone mapping
EDID Parsing

Block 0, Base EDID:
- EDID Structure Version & Revision: 1.4
- Basic Display Parameters & Features:
  - Digital display
  - Bits per primary color channel: 10
- Color Characteristics:
  - Red: 0.6796, 0.3203
  - Green: 0.2373, 0.7226
  - Blue: 0.1396, 0.0498
  - White: 0.3125, 0.3291

Block 1, CTA-861 Extension Block:
- Revision: 3
- Native detailed modes: 0
- Colorimetry Data Block:
  - BT2020RGB
- HDR Static Metadata Data Block:
  - Electro optical transfer functions:
    - Traditional gamma - SDR luminance range
    - SMPTE ST2084
  - Supported static metadata descriptors:
    - Static metadata type 1
  - Desired content max luminance: 116 (616.884 cd/m^2)
  - Desired content max frame-average luminance: 96 (400.000 cd/m^2)
  - Desired content min luminance: 7 (0.005 cd/m^2)
- Checksum: [...]
What’s Next?

- Dynamically adjust SDR white level?
- Per-plane color management uAPI?
  - Overlays with different color spaces?
- Dynamic metadata (per-frame changes)?
Thank You