NETVC Hackathon Results
IETF 98 (Chicago)
NETVC

• 5 participants (1 in-person, 4 remote)
  – Guillaume Martres
  – Tristan Matthews
  – Steinar Mitdskogen
  – Jean-Marc Valin
  – Timothy B. Terriberry
ec_smallmul

- Reduces the multiplier size in the entropy coder
  - Reduces hardware area by 40%, latency by 20%
  - Important because entropy coding drives clock rates, and thus power
  - Creates complications for software

- At the Hackathon
  - Optimized the software decoder to reduce the impact of this change
  - 3 patches, 4,140 lines changed
    - [https://aomedia-review.googlesource.com/8827](https://aomedia-review.googlesource.com/8827)
    - [https://aomedia-review.googlesource.com/8828](https://aomedia-review.googlesource.com/8828)
    - [https://aomedia-review.googlesource.com/8829](https://aomedia-review.googlesource.com/8829)
  - Software decoder slowdown now between 0.12%-0.44% (success)
• Perceptual Vector Quantization
  – Designed for Daala where the precision used for the quantizer always matches the precision used for transform coefficients
  – In AV1 these do not always match
  – We were re-scaling coefficients to compensate
    • Slow, adds an extra rounding step (injects noise)

• At the Hackathon
  – Guillaume Martres plumbed the information needed to describe the relative precisions into PVQ
    • https://github.com/smarter/aom/commit/2430fdfe90ca381f38a974d8270592c6723c25e
  – Eliminates the coefficient re-scaling (good)
  – Good results without activity masking
    • Small improvements to perceptual metrics
  – Currently breaks activity masking (still investigating)
• “Constrained Directional Enhancement Filter”
  - Merging of deringing and CLPF proposals from Mozilla and Cisco
• At the Hackathon
  - Steinar Midtskogen added SSE2/SSSE3 and NEON intrinsics
    • Achieves speed-ups similar to existing SSE4.1, but available on more platforms
    • 3 patches, including unit tests
      - https://aomedia-review.googlesource.com/8823
      - https://aomedia-review.googlesource.com/8824
      - https://aomedia-review.googlesource.com/8826
  - Jean-Marc Valin experimented with a new encoder metric to reduce over-blurring
    - https://aomedia-review.googlesource.com/8825
    - Seems to help visually
    - Improves SSIM and MS-SSIM, but makes PSNR and PSNR-HVS worse
  - Steinar Midtskogen experimented with using the directionality of a block to control the amount of filtering
    • Negative results so far (but still good to learn this)