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/8828
    - https://aomedia-review.googlesource.com/8829
  - Software decoder slowdown now between 0.12%-0.44% (success)

pvq

- 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/2430fdfa90ca381f38a974d82720592c6723c25e
  - Eliminates the coefficient re-scaling (good)
  - Good results without activity masking
    - Small improvements to perceptual metrics
  - Currently breaks activity masking (still investigating)

cdef

- “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)