Mediakind

Encoding: how changes to processing technology impact implementations

Tony Jones

Principal Technologist

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tony.jones@mediakind.com



About MediaKind

- What we do:
 - Encoding, decoding and processing for streaming and linear TV services
 - Cloud streaming for direct-to-consumer
 - Self-service cloud video processing as a service
 - Media platforms for sports, D2C and operators
- 30 years of implementing real-time video encoders
 - Developed in-house with our codec team
- Supply many of the world's top operators, including
 - DirecTV
 - Comcast
 - Sky
- And the prestigious sports streaming services, including
 - NBA
 - Premier League



What are the priorities for our encode customers?

- Mostly Live encoding
 - Bitrate efficient encoding for one-to-many
- Mostly HD, some UHD, still some SD
- Originally linear TV, but now streaming is the main focus of new business
- Streaming-only customers all deploy in public cloud
- Top tier customers typically prefer quality and bitrate over compute cost
 - We offer a range of profiles to allow customer choice



Encoder implementations from 2013 to today...



VVC processor-intensive functions: CTU quad tree splitting





VVC: many more split options: 16x32, 32x8, 8x32,16x8,8x16, 64xN, Nx64, 4xN, Nx4 and ternary splits

Even so....

- Complexity is very high and increases with resolution
- There is an emerging issue with each new generation of encoding standard:
 - Many more tools
 - Each a very small performance increment
- In order to apply more CPU power, it needs:
 - Processing distributed across multiple threads
 - Map well to SIMD instructions

- Delivery cost
 - Fast broadband becoming ubiquitous
 - Some markets have near 100% today
 - CDN cost per GB have fallen about 60% since 2019

Where are we today with VVC?

MediaKind have our own VVC encoder implementation

• Current status:

- In production live encoder since 2023 for PoC and testing
- Paused development, in order to prioritized HEVC and AVC encoder improvements
- Limited market demand currently for VVC, of course this may well change

• Future work:

• Expecting to pick up VVC encoding again in H1, although always subject to business prioritization

Timelines for "H.267"

Candidate use cases

- What problem is likely to solve?
 - Cost-of-bandwidth improvement for higher bitrates

• Most likely use cases:

- Resolutions above 4K UHD
 - Displays are not an issue available today
 - Production capabilities
 - technically easily available in maybe 5 years
 - Production costs? Much more difficult to establish
- Possibly 4K where VVC has yet to be established
- Possibly 1080P/720P if the gap beyond HEVC is sufficient

Consequential timelines

- If VVC doesn't get significant adoption:
 - Target:
 - Replace HEVC for 4K and use for 8K, primarily streaming
 - Subsequent adoption for lower resolution streaming
 - Probably looking at mainstream use at scale perhaps 2036 (considering refresh cycles)
 - Implies something like:
 - Consumer products in 2033
 - Silicon 2031
 - Standardization 2029
- If VVC does get significant adoption:
 - Target becomes more difficult to see
 - Likely becomes a replacement cycle for VVC, but:
 - Is the gain enough motivation?
 - Could be much later in this scenario

In summary

- Encoding needs to map to server CPUs that are readily available in datacenters
- No acceleration beyond CPU internal accelerators
- Distributing load across many cores will matter (for live)
- Tradeoff between compute and bitrate efficiency is changing
- Licensing....



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