White Paper

Video Processing
Video Streaming Services, Broadcasters, and Studios

Synamedia Virtual Digital Content Manager: AV1 Streaming with the SVT-AV1 Encoder

By extending its compression and processing solution based on virtual Digital Content Manager (vDCM) with the Alliance for Open Media's SVT-AV1 encoder, Synamedia gives broadcasters, content providers and service providers the ability to provide exceptional viewing experiences while helping them reduce bandwidth and streaming requirements.

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With video shifting to the cloud, content and service providers need a stable, reliable and scalable video solution that operates 24/7. The solution must support the latest generation of consumer devices as well as legacy ones while delivering pristine video quality and opening the door to monetization opportunities. It must work at the edge in a cost-effective manner, and given the fluidity of today's video industry, it needs a broad feature set for making changes quickly. Synamedia's video solution meets all these criteria and more.

Consumer demand has moved decisively to more immersive entertainment experiences, both in living rooms and on mobile devices, delivered with higher resolutions and visual quality than in years past. Content and service providers are straining to deliver on these new requirements, which drives them to seek more cost-effective yet easy-to-deploy solutions. The AV1 video coding format, developed by the Alliance of Open Media (AOMedia), is a major step forward in this set of challenges, providing high density of streams per server with high quality at lower bandwidth than the traditional codecs. AV1 was quickly adopted by major streaming providers such as YouTube and Netflix for OTT applications, and it continues to gain traction in the industry.

Scalable Video Technology for AV1 (SVT-AV1) is an AV1-compliant software encoder/decoder library, based on a project originally begun by Intel and Netflix, then adopted by AOMedia. Synamedia has integrated the SVT-AV1 encoder into its high-performance virtual Digital Content Manager (vDCM) pipeline, creating a powerful platform for live AV1 encoding, streaming and delivery.

Synamedia video compression solution

Synamedia's video compression and processing solution is a comprehensive, software-based platform that can be managed by the customer or delivered as a service with Synamedia's Quortex offering. It provides a comprehensive set of capabilities for streaming workloads, optimized for flexibility and total cost of ownership (TCO). Highly optimized for 24/7 video workflows as well as event-based services, the solution offers the processing stability, efficiency and resiliency you need to offer modern video user experiences.

Cost-effectively support existing devices

While video continues to move to full streaming solutions, myriad legacy devices are still in use and must be supported. At the same time, providers must upgrade legacy systems to improve video quality, lower operational costs, and facilitate transitions to the cloud. Synamedia's video compression and processing solution enables video streaming to new devices as well as traditional transport streaming to existing devices.

Optimize video acquisition, including via the cloud

Although video content still is acquired largely over satellite, the shift to cloud transport is in high gear. Transport technology may be mature, but it is less reliable than satellite, and therefore requires strong 24/7 monitoring and analysis tools. Anchored by Synamedia's vDCM, the video compression and processing solution has a wide range of features to manage cloud acquisition safely.

vDCM is the successor to the widely deployed hardware-based DCM, in a fully software-based form that offers deployment flexibility, including on private or public cloud infrastructure. It provides a flexible, high throughput pipeline for video processing, encoding, transcoding and packaging.

A multi-codec world with a growing AV1 ecosystem

Since we're living in a multi-codec world with many different compression formats, we need flexibility. vDCM offers support for various encoding formats, including MPEG-2, H.264/AVC and HEVC, based on Synamedia's in-house-developed, software-based encoders. Following the finalization of AV1 by AOMedia, ecosystem growth has accelerated, with a growing universe of devices that support hardware-accelerated AV1 decoding. Synamedia participates in this rapid evolution with the integration of the SVT-AV1 encoder into vDCM.

Performance opportunities from the SVT-AV1 encoder

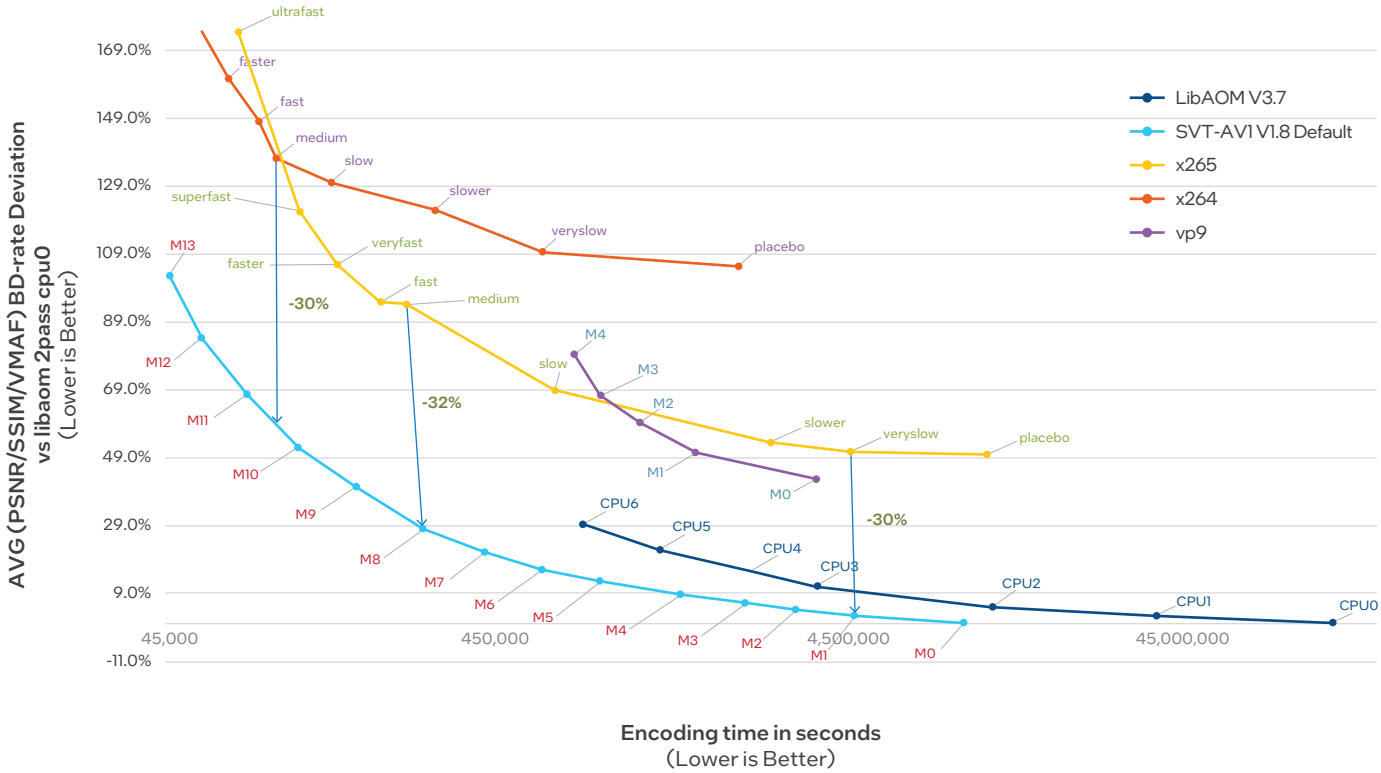
A central challenge to video providers is to transcode massive amounts of content while maximizing efficient use of resources including bandwidth, compute and energy. The SVT-AV1 encoder builds on the AV1 standard with optimizations for Intel® Xeon® processors that help drive up performance and power efficiency.

For example, Intel® Advanced Vector Extensions 2 (Intel® AVX2) and Intel® Advanced Vector Extensions 512 (Intel® AVX-512) provide wider media-processing instructions that enable the processing of more data per clock cycle, for higher throughput while using less power. The encoder is available under SVT-AV1 license BSD 3-Clause Clear and AOMedia Patent License 1.0. It is often used in video-on-demand settings, but as illustrated here, it is also suitable for live/real-time deployments.

Encoding results: Bandwidth savings and speedup

The choice for the SVT-AV1 encoder was supported by its high compression performance compared to open source encoders, along with its high level of CPU optimization, as illustrated in the graph below.[1] Results show approximately a 30% bandwidth savings versus x264/x265 at similar wall times. In addition, SVT-AV1 V1.8 provides an 8x-12x speedup at similar quality levels versus libaom 3.7.1 CPU1/CPU0.

BD-rate-Wall-time tradeoffs for VOD (ElFuente + UGC) on Intel® Xeon® Platinum processors (96 cores/3.0GHz)



Integrating SVT-AV1 in vDCM

Synamedia tightly integrated the SVT-AV1 encoder into its high-performance video compression pipeline, with the default behavior of SVT-AV1 providing for fluent Integration. SVT-AV1 provides settings and presets allowing for easy real-time encoding of up to 4K resolution, and its multi-threading behavior allows for efficient scaling across higher-core-count CPUs.

Reaching high channel density with SVT-AV1 in vDCM

Performance evaluation of Synamedia's vDCM with integrated SVT-AV1 encoder on Intel Xeon processors reveals significant potential advantages for video providers. The compression performance of the SVT-AV1 encoder is combined with a high degree of parallelism, enabling many streams/channels to be processed concurrently on a single server.

In testing with a server based on two Intel Xeon Platinum 8592+ processors (56 cores per socket), Synamedia's vDCM software with SVT-AV1 integrated can encode more than 30 AV1 streams in parallel at 720p resolution, and up to six UHD streams can be encoded live, from either SDI input or transcoded from an incoming pre-compressed source.[2]

Resolution	AV1 bitrate	# of encodes per server
720p50	2 Mbps	32
1080p50	4 Mbps	19
2160p50	10 Mbps	6

Conclusion

With the incorporation of the SVT-AV1 codec, Synamedia gives the video industry a powerful tool to deliver differentiating viewer experiences with lower TCO. In the competitive, evolving marketplace for video content services, that combination of technology capabilities can help provide a lasting competitive advantage.

Learn More:

Synamedia vDCM

Intel's SVT-AV1 Encoder

[1] Test by Intel as of February, 2024, 1-node, 2x Intel(R) Xeon(R) Platinum 8275CL CPU @ 3.00GHz, Core(s) per socket: 24, 2 sockets, Turbo On, Total Memory 192 GB (2 slots/ 96 GB/ DDR4 3200 MHz [run @ 3200 MHz], Handle 0x0000, DMI type 0, 24 bytes BIOS Information: Vendor: Amazon EC2, Version: 1.0, Release Date: 10/16/2017, Address: 0xF0000, Runtime Size: 64 kB, ROM Size: 64 kB, Characteristics: PCI is supported, EDD is supported, ACPI is supported, System is a virtual machine, BIOS Revision: 1.0 , ERNEL: 6.8.0-1012-aws, Application: SVT-AV1 V1.8.

[2] Test by Synamedia as of February, 2024. 1-node, 2x qual sample SRV [EMERALD RAPIDS] Processor 1.90 GHz, 280M Cache @ 1.90GHz, 56 cores/socket, 2 sockets, HT On, Turbo On, Total Memory 256 GB (16 slots/ 16 GB/ DDR5 4800 MHz [run @ 4800 MHz], UEFI Firmware: B05.TEL4P1, 05.08.01, 0x2b000461, Rocky 9.2 Kernel 5.14.0-284.11.1 BIOS 3B05.TEL4P1 Application name : vdcm Version : 23.03.00-31

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