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XSplit Taps Into Efficient Encoding with Intel® Arc™ Graphics

Gamers can experience a boost in video quality at lower bitrates with XSplit—thanks to the AV1 codec.

> "We are very excited about AV1 encoding support being part of Intel Arc graphics software, as the superior compression of AV1 will lower the barrier even further for content creators everywhere to create high-quality gaming videos with much lower bandwidth requirements and disk space usage than ever before."
>
> — Andreas Hoye, CPO XSplit

The worldwide audience for the live streaming of games is robust, projected to reach 728.8 million in 2021, growing at a CAGR of 9 percent.[1] Amidst this growth, however, the task of moving large volumes of video content over wired and wireless channels often depends on compression efficiency. Currently, the US averages 17.93 Mbps download speed and 7.63 Mbps upload.[2] Globally, the average drops to 8.74 Mbps for downloading and 4.93 Mbps for uploaded content. An H.264 live stream requires at least 6 Mbps for passable resolution and 8 Mbps for higher quality video output at 1080p at 60 fps.

Andreas Hoye, CPO of XSplit, summarized the issue this way: "Embedded hardware encoders, including Intel Quick Sync Video, have changed the game over the last few years by significantly lowering the barrier for content creators to create live stream and video-on-demand (VOD) content without requiring powerful CPUs. However, high-bandwidth requirements for good quality live streaming and large file sizes of video content still remain an issue."

In the past, to produce high-quality live video content consistently, content creators have been forced to invest in fast Internet connections or obtain dedicated connections, both expensive propositions. AOMedia Video 1 (AV1) changes this situation.

Live Streaming Enhanced with AV1

The AV1 codec promises higher quality for at lower bitrates with 46.2 percent better compression over the leading software H.264 encoder, x264 in its high profile, based on tests made by Facebook.[3] At this level of performance, AV1 can achieve the same video quality as 8 Mbps H.264 encoding at significantly lower bitrates of 5 Mbps or even as low as 4.5 Mbps.

Efficient encoding lowers costs for businesses and consumers, reducing bandwidth and minimizing storage requirements. These characteristics significantly lower the barrier of entry for live video content creation, making it possible to produce a high-quality live stream across most modern consumer Internet connections.

With the release of Intel Arc graphics products, the AV1 codec is physically embedded in hardware, delivering higher quality at reduced bitrates. It also reduces the storage requirements of video files by nearly 50 percent over the last generation H.264 encoder.

The Evolution of Live Content Creation

The trend toward efficient, interoperable, royalty-free codecs has been driven to a large measure by the rising popularity of 4K and 8K ultra-high definition video streaming, but in the format wars many different factors are at play.
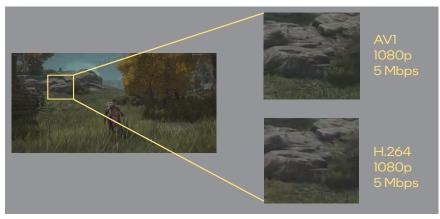
XSplit

AV1
1080p
5 Mbps

H.264
1080p
5 Mbps

Figure 1. Images from the game Elden Ring™ comparing game streaming quality.

". . . AV1 can achieve the same video quality as 8 Mbps H.264 encoding at significantly lower bitrates of 5 Mbps or even as low as 4.5 Mbps."[3]

Achieving a balance between visual fidelity, bitrates, and storage space presents an ongoing challenge. Another factor has been the royalty fees associated with patented algorithms used in existing codecs. The Alliance for Open Media (AOMedia) was formed in September 2015 to develop a high-quality video codec, initially aimed at streaming web video, to be released as open-source software .

In the earlier days of live video streaming, encoding H.264 video was primarily a processor-intensive task. As live broadcasting and recording gained popularity, software-based encoding required a high-performance CPU, leaving consumers with no choice other than obtaining an expensive system capable of producing high-quality video content without compromising other system operations.

In response to the market increasingly moving to H.264, hardware manufacturers started implementing these encoders in silicon within their products. Hardware-based H.264 encoders were crucial in streamlining the content creators' workflows, enabling CPUs to perform more complex productions. Today's hardware-based H.264 encoders are on par with—and sometimes better than—traditional software-based encoders.

However, the H.264 codec's compression limitations—particularly in light of the rising popularity of ultra high-definition video formats—can't effectively accommodate these newer formats, compromising the size and quality of content.

Hoye noted, "For streaming, broadcasters might need to lower their bitrate to accommodate their Internet provider's upload speed. This in turn leads to lower quality streams with either the resolution, the frames per second (FPS), or both being lowered to be able to produce a watchable stream given the constraints. On the other hand, they may be able to set a higher bitrate to maintain quality at the cost of more bandwidth, which is not good for those on metered connections or connections with limited upload speed. It also runs the risk of some viewers not being able to watch the content properly, especially if the broadcaster has no access to transcoding."

This challenge is also an issue when recording video. Lower bitrates produce more compact recordings but sacrifice visual fidelity. High bitrates maintain quality but consume substantially more space on storage media.

Open-Source Royalty-Free Benefits

One of the primary objectives of the founding members of AOMedia—Amazon, Cisco, Google, Intel, Microsoft, Mozilla, and Netflix—was to take advantage of the benefits of collaborative, open-source development to build a video codec to accommodate next-generation video technologies. The efforts of AOMedia—including the many organizations that have signed on and contributed to the collaborative effort in recent years—have resulted in an open, royalty-free video format, AV1, with a level of compression that inspires new and innovative applications, extending the boundaries of live video streaming and recording.[4]

The complexities of licensing prior video codecs, paying per-device royalty fees, and tracking patent issues have discouraged some companies from adopting other high-compression codec contenders, such as HEVC/H.265. The video industry can capitalize on a technology that delivers open standards interoperability and keeps pace with rapid changes in ultra-high-definition (UHD) streaming.

Intel and XSplit Technology Demo

To showcase the potential of AV1 encoder efficiency, Intel and XSplit have jointly produced a technology demonstration that highlights the capabilities of the AV1 encoder/decoder embedded in the new Intel Arc graphics products.

XSplit Broadcaster has directly implemented AV1 encoder support for the first product in the Intel Arc rollout (codenamed Alchemist) by means of Intel Quick Sync for both streaming and recording to show its value and benefit for content creators and at the same time highlight the ease of deployment and implementation for application integrators and platforms alike.

"We hope," Andreas Hoye said, "that our efforts will serve to accelerate the process of AV1 adoption; the benefits are immediate as well as being long lasting for all stakeholders."

Resources

What is AV1?

Gain more information about the history, purpose, and technology underlying the AV1 codec, including the benefits in comparison with other video compression formats. This article provides an overview of AV1 and includes useful resources for learning more about the codec. For a live comparison of the AV1 encoding and streaming quality delivered by Intel Arc, view this video.

Learn more ›

What is game-related live streaming?

Live streaming platforms make it possible to record and broadcast content simultaneously over social media, giving the audience an opportunity to engage in communication during gameplay or just view the action.

Learn more ›

New Intel Arc graphics solutions

Intel Arc graphics solutions are built to deliver exceptional, high-performance gaming and streaming, as well as rich creative opportunities.

About XSplit Broadcaster

XSplit Broadcaster is one of the most widely used applications for live internet broadcasting, with a user base ranging from hobbyists to prominent professional casters in more than 150 countries. XSplit allows users to record or live stream any type of media, while taking advantage of TV-like broadcasting features that anyone can learn to master.

XSplit.com

Alchemist, the first generation of Intel Arc products, will feature hardware-based ray tracing, offering full support for DirectX 12 Ultimate and AI-driven Xe Super Sampling. Based on Intel's X^e-LP, HP, and HPC microarchitectures, the family of products will deliver scalability and compute efficiency with advanced graphics features.[5]

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