Solution Brief

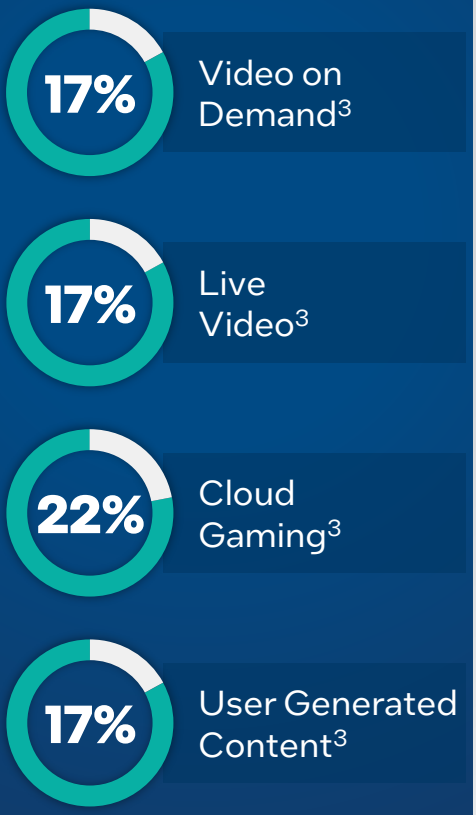
Optimal Video Processing
Artificial Intelligence

Producing Higher Quality Video at Lower Bitrate: The iSIZE BitSave Solution

iSIZE is Innovating Video Delivery with Efficient, Intelligent and Sustainable AI-Based Perceptual Preprocessing Solutions

iSIZE BITSAVE

enabling additional bitrate savings on top of any codec



Live Video and Streaming is Reaching New Heights

Evolutions in post-pandemic behaviors as well as recent technology advancements have led to a more digital world in which consumers are spending more time consuming more video across more devices. Whether it comes in the form of scrolling through social media content, video conferencing with colleagues, or streaming a favorite show, this shift in behavior has led to a dramatic uptick in video consumption. Today, over 92% of internet users view videos every week and the average viewer spends nearly 100 minutes a day consuming various video content.[1]

This exponential increase in demand is shaping provider behavior as well. In the hopes of retaining and drawing more consumer attention, providers—including those creating, hosting, facilitating the transfer of content—are leveling up in terms of both the quantity and quality of what they offer. But these service improvements come at a price: video consumption strains network traffic (current rates comprise nearly 82% of all IP traffic)[2] while accruing high operational costs and extensive amounts of carbon emissions. Currently, delivering uncompromised high-quality video requires the transfer of extensive amounts of data, calculated in units of bits per second, and the more bits that need to be transferred, the more bandwidth and compute power is required from the company's data centers. This creates tension between providers' abilities to balance consumer expectations sustainably and cost-effectively within their available bandwidth and compute budgets.

To alleviate these market obstacles, video streaming services have traditionally taken the approach of increasing on-prem hardware (such as additional data centers) or expanding content delivery network capacity and upgrading compression technology algorithms (also known as codecs). Unfortunately, these commonly used tactics do not address some of the most critical challenges for companies due to the significant costs and time investments tied to supporting additional on-prem data centers or acquiring new codec-compatible devices and/or systems.

The Four Most Critical Customer Obstacles

1 Latency Constraints

Ensuring low-latency video delivery comes at a high cost for companies, forcing the tradeoff between higher bitrates or diminishing the end customer viewing experience with lower-resolution streaming

2 Sustainability Initiatives

Video consumption growth is producing extensive carbon emissions, which conflicts with growing legislation and consumer demands towards a sustainable future

3 Device Incompatibility

Most legacy systems and solutions require a lengthy and costly adoption period before fully integrating with a newer, more efficient codec

4 Bandwidth Limitations

Many geographic areas experience limited wireless coverage and cannot sustain the bandwidth required for high-quality video services

The BitSave Solution Addresses Customer Obstacles

iSIZE's innovative BitSave technology is an AI-based perceptual preprocessing solution that allows conventional, third-party encoders to produce higher quality video at lower bitrate. Unlike traditional video processing methods, BitSave offers a cost-effective solution that can sustainably supply a seamless customer experience and enable companies to quickly adopt more efficient codecs.

Utilizing deep learning technology, BitSave preprocesses video content to lower the necessary video bitrate transmission by identifying the most important visual details and removing less important visual artifacts. Ultimately, with a lower bitrate, companies can maintain high-quality video while decreasing file size, lowering storage usage, optimizing transmission latency and distribution costs, and reducing energy consumption associated to damaging carbon emissions.

BITSAVE

maintaining the quality at a lower bitrate

Solution Features and Capabilities

Efficient Delivery

- Reduces the video bitrate by 22%, in certain cases up to 50%[3]
- Enables ability to run on legacy devices
- Boosts any video codec's efficiency
- Generates near zero latency

Codec Independent

- Provides compatibility with any codec, including AVC, HEVC, VP9, AV1, AV2 and VVC
- Offers codec flexibility to increase bitrate gains and quality

Seamless Integration

- Offers single-pass processing per content for an entire ABR ladder
- Requires no change in encoding, delivery, or decoding devices
- Provides compatibility with all existing video coding infrastructure

Sustainable Streaming

- Allows simpler encoding recipes
- Optimizes computational and energy efficiency
- Enables scalable, sustainable video streaming
- Maintains original artistic intent

Key Industries and Applications

Media and Gaming

- Social media
- User-generated content
- Cloud gaming and live game streaming
- VoD and live streaming

Communications / Virtual Interaction

- Video conferencing
- VR/ AR
- Metaverse
- Future of work applications
- Employee training

Education

- Lecture capture and recording
- Self-paced learning
- Written feedback recording
- Accessibility Aiding

Government

- Real-time messaging
- Public safety
- Responsive citizen engagement
- Traffic monitoring

Up to **50%** compression efficiency increase on top of any codec while optimizing workflow performance[3]

100% flexibility to adapt to future compatibility needs with any standard codec or infrastructure[3]

How the Solution Works

The solution offers higher quality video at a lower bitrate by preprocessing the video content before it reaches the video encoder, such that the output after compressing with any standard video codec is perceptually optimized with less motion artifacts or blurring, for the same or lower bitrate. BitSave neural networks can isolate areas of perceptual importance, such as those with high motion or detailed texture, and optimize their structure so that they are preserved better at lower bitrate by any subsequent encoder.

As shown in iSIZE's recent paper, when integrated as a preprocessor prior to a video encoder, BitSave can reduce bitrate requirements for a given quality level by 10% to 25% versus that encoder. When aiming for high-quality conversational services (MOS>4.5 out of 5.0) BitSave allows for up to 53% bitrate reduction at no quality compromise in comparison to leading AVC, HEVC, AV1 and VVC encoders.[3]

- AI-based pre-processing prior to encoding (AVC, HEVC, VP9, AV1)
- Improves encoding quality as measured by standard perceptual quality metrics (VMAF, SSIM, VIF)
- Integrated within Intel OpenVINO, ONNX and Dolby Vision, easy to plug&play within any existing workflow
- One frame latency
- Single pass processing per content for an entire ABR ladder

Valuable Intel Components

iSIZE's proprietary deep learning-based models can run on all Intel® hardware and are fully optimized for Intel® Xeon® Scalable processors, using the Intel® Distribution of OpenVINO™ toolkit, advanced features, and AI accelerators like AVX-512, VNNI or Intel DL Boost.

Intel® Distribution of OpenVINO™ Toolkit enables the BitSave solution to optimize and deploy with ease across an expanded range of deep-learning models including natural language processing (NLP), double precision, and computer vision. The runtime (inference engine) tunes the solution for higher performance by compiling the optimized network and managing inference operations on end customer-specified devices. Additionally, OpenVINO™ auto-optimizes through device discovery, load balancing, and inferencing parallelism across CPU, GPU, and more. The updated version includes better alignment to TensorFlow conventions, fewer parameters, and minimizes conversion.[4]

Intel® Xeon® Platinum Processors are built specifically for the flexibility to run complex AI workloads on the same hardware as your existing workloads. With AI acceleration and optimization that goes silicon deep and ecosystem wide, Intel® Xeon® Scalable processors take embedded AI performance to the next level with Intel® Deep Learning Boost (Intel® DL Boost)[5] to increase model optimization by up to five times when compared to non-optimized models running on other CPU instruction sets.[2]

Conclusion

BitSave customers can expect to reach more users, provide better user experience while diminishing their carbon footprint, optimizing operations, and ultimately lowering overall cost by:

- lowering bitrate while keeping or improving the quality,
- offering codec flexibility,
- integrating seamlessly with legacy systems, and
- allowing for low-latency.

About iSIZE

iSIZE is a deep-tech company that specializes in deep learning for efficient, intelligent, and sustainable video delivery. iSIZE patented technology is powered by the latest AI innovations to enable clients to reach more users, provide better experiences and reduce the financial and environmental costs associated with video delivery. iSIZE products provide innovations spanning encoding, denoising and generative video content creation. They reduce latency, enhance video quality, and integrate easily with any existing codec by using a deep neural network that improves itself over time, without breaking any standards. This unique approach results in substantial bandwidth, energy and cost savings for video entertainment platforms, gaming, VR/ AR, IoT, VoD and live streaming services.

Learn More

To learn more about iSIZE BitSave visit:

- iSIZE Solutions Website
- iSIZE Intel® Network Builders Page
- iSIZE BitSave Whitepaper

To learn about Intel® technologies visit:

- Intel® Xeon® Platinum Processor Product Page
- Intel® Distribution of OpenVINO™ Toolkit Product Page

1. Oberlo, Online Video Consumption Statistics, August 2022
2. Cisco, Global 2022 Forecast Highlights, 2020
3. iSIZE, BitSave Datasheet, 2021
4. Intel, Intel® Distribution of OpenVINO™ Toolkit, 2022
5. Intel, Why Intel is the Right Partner for Business vs. AMD. 2022

Notices & Disclaimers

Intel is committed to respecting human rights and avoiding complicity in human rights abuses. See Intel's Global Human Rights Principles. Intel® products and software are intended only to be used in applications that do not cause or contribute to a violation of an internationally recognized human right.

Intel technologies may require enabled hardware, software or service activation. No product or component can be absolutely secure. Your costs and results may vary. Intel does not control or audit third-party data. You should consult other sources to evaluate accuracy. Code names are used by Intel to identify products, technologies, or services that are in development and not publicly available. These are not "commercial" names and not intended to function as trademarks.

You may not use or facilitate the use of this document in connection with any infringement or other legal analysis concerning Intel products described herein. You agree to grant Intel a non-exclusive, royalty-free license to any patent claim thereafter drafted which includes subject matter disclosed herein.