Solution Brief

Video Transcoding
Visual Computing

Fast, High-Quality Transcoding Enabled by Intel and HandBrake

HandBrake, an advanced open-source transcoder, supports both software- and hardware-based encoding and decoding, accelerated by 12th Gen Intel® Core™ processors and Intel Arc™ Graphics solutions.

"Open source development practices continue to enable rapid evolution of HandBrake's tight integration with Intel Graphics solutions. Support for the next-generation AV1 video codec in the Intel Arc series of products represents a major advance in delivering high-performance, state-of-the-art transcoding to video creators."
– Bradley Sepos
Software Engineer
HandBrake Team

HandBrake

Fast and efficient transcoding has become essential to digital video distribution, enhanced by new technologies that support ultra-high-defintion resolutions and effective compression processes. HandBrake and Intel developers worked together closely to integrate Intel Deep Link technology and AV1 encoding capabilities into the latest software offering. As a result, HandBrake now takes full advantage of the hardware architectures of 12th Generation Intel Core Processors and Intel Arc Graphics solutions, providing access to multiple GPUs for streamlining operations in a system. Load balancing between CPUs and GPUs can also be managed in certain system configurations.

Digital content creators and those who distribute and stream video files are keenly aware that adapting to the wide range of formats and multiple codecs can be challenging. HandBrake—available as a free, open-source transcoding tool—converts video from nearly any format to the industry's most widely supported codecs. HandBrake runs across multiple platforms, including Windows, macOS, and Linux.

Support for AV1 in the Intel Arc series of products offers a relaxed-royalty alternative to the HEVC and AVC codecs, delivering commercial-grade quality and excellent bitrates.

Improving Video Performance

Intel accelerators tackle the challenge of compute-intensive transcoding operations in HandBrake, including Intel Quick Sync Video (Intel QSV) and Intel Deep Link through Intel oneAPI Video Processing Library (oneVPL).

Designed to maximize efficient use of Intel computing components, Intel Deep Link intelligently boosts performance on systems to create video content at hyper fast speeds. This feature enables the computing power of a discrete GPU to be combined with a powerful integrated GPU.

Intel QSV—a set of hardware features integrated into Intel GPUs—contributes to high-performance transcoding, as does the optimized combination of HandBrake and FFmpeg as a middleware framework.

Artem Galin, an application engineer at Intel, noted, "Thanks to HandBrake's support for Intel Deep Link technology on systems with multiple Intel GPUs, users with both Intel Iris® Xe graphics and Alchemist graphics hardware can enable Deep Link Hyper Encode to boost performance and accelerate transcoding tasks."

Transcoding Versatility

HandBrake opens a wide range of multimedia file types and encoders to modern, industry standard video formats, such as H.264/AVC, H.265/HEVC, and AV1—all of which may be accelerated via Intel Quick Sync on supported hardware.

HandBrake's configurable preset system allows selecting a complete settings profile in one click, and presets optimized for Intel-based hardware are included with the application. Further customization can be made via Intel Quick Sync on supported hardware.

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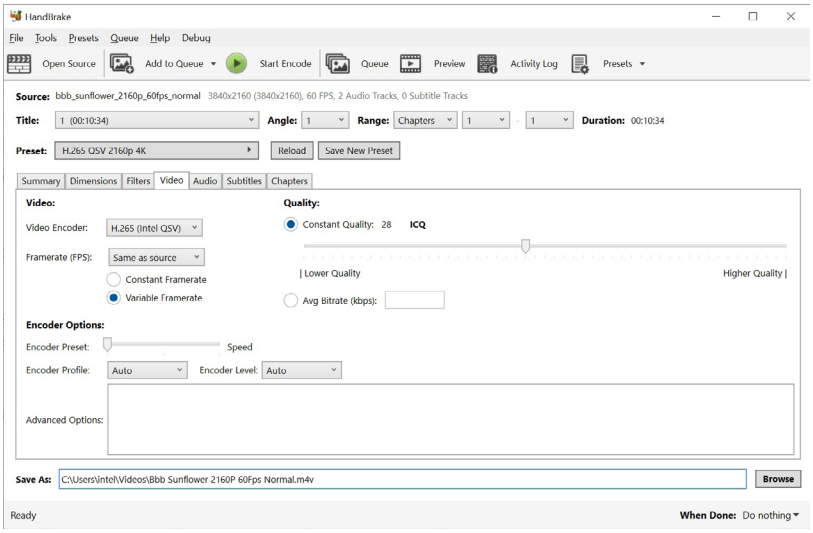

Figure 1. Most program functions are available through a single window.

Transcoding operations can be quickly launched via the main window (Figure 1) and multiple jobs can be set up to run in sequence or parallel via the built-in queue. A command-line version is also available. To achieve better hardware utilization, use presets specifically tuned for Intel QSV.

Increased Transcoding Speed with Intel Deep Link

As shown in an Intel demonstration video, a side-by-side comparison of an encoding operation using an Intel Alchemist GPU (on the left in Figure 2) and a configuration with two GPUs (on the right) showed a 40 percent improvement in encoding time. The Intel Iris Xe plus an Intel Alchemist GPU using Intel Deep Link technology gained transcoding speed by keeping the two GPUs saturated as much as possible.

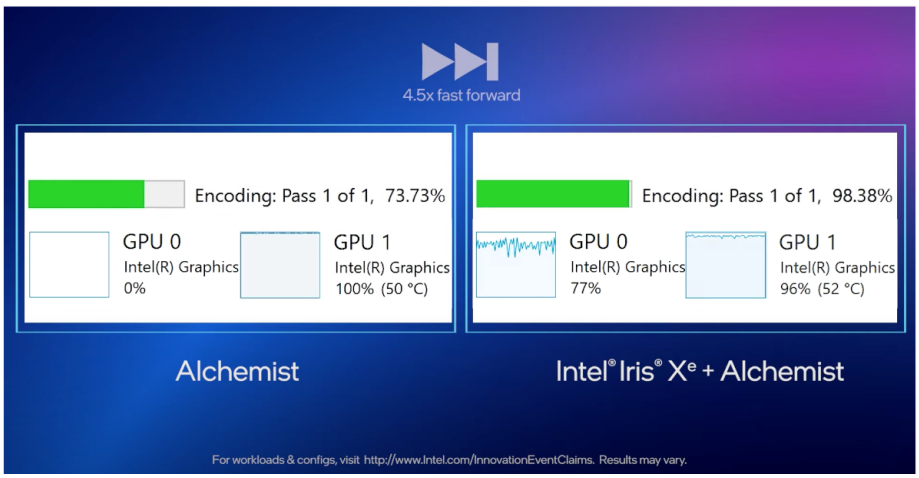

Figure 2. Using Intel Deep Link, transcoding time was cut by 40 percent.

Intel Deep Link technology gives developers a means for strategically dividing processor workloads across GPUs and gaining efficiency by assigning tasks on a system using resources that would otherwise be dormant.

Development Highlights

HandBrake embraces an open-source development model with all code publicly available on GitHub. Open collaboration with the HandBrake Team enables Intel to continually contribute significant features and updates to Intel QSV and related encoding technologies supported in HandBrake.

The recent integration of oneVPL components added unfied, cross-architecture capabilities. oneVPL provides a single video processing API for encoding, decoding, and other functions, compatible with a wide range of accelerators.

Guy Tamir, technology evangelist at Intel, said in an Intel Software video, “Intel GPUs, the integrated or the new discrete ones, have dedicated fixed functions to accelerate video processing. So oneVPL can not only help you offload all your video processing, which is a very heavy task, from the CPU to the GPU, but it will allow you to squeeze in more video channels and do more processing work on the GPU than the CPU can typically perform.”[1]

Intel QSV delivers an additional measure of performance, as shown in the following table that compares in general terms CPU encoding and encoding using QSV (subject to variations in CPU/GPU/SKU specifications).

	Quick Sync Video	CPU
Speed	Very fast	Slow
Power	Very low	High
Quality	High	Configurable
Runs on	Intel GPU	CPU
Other	Runs exclusively on GPU, freeing CPU from excess workloads.	Consumes most of the resources of the system, slowing down most tasks.

HandBrake offers unprecedented capabilities and versatility that compares favorably with many commercial transcoding applications.

If interested in exploring AV1 encoding capabilities or switching from Intel Media SDK to oneVPL, visit this page or investigate the the freely available HandBrake source code.

Dig Deeper

Intel Quick Sync Video

Through the dedicated media processing capabilities of Intel QSV, the full capabilities of Intel Graphics Technology can be unleashed. This enables faster decoding and encoding and frees the processor from intensive graphics tasks, enhancing the overall system efficiency.

Learn more ›

Intel Iris Xe

Designed for maximum creativity and exceptional productivity, Intel Iris Xe dedicated graphics are available in systems available through select partners.

Learn more ›

The HandBrake Project

HandBrake is a free, open-source transcoding tool developed by a small team of volunteers and used by millions worldwide. All code is publicly available via **GitHub** and community contributions are welcome. Step-by-step documentation, including installation instructions and a quick start guide, is available online at **HandBrake.fr**.

"Software video encoders have traditionally been seen as the pinnacle of high-quality encoding. Intel's hardware accelerated video encoders challenge this assumption by combining high quality with remarkable performance while consuming much less power. Furthermore, one can fine-tune settings with Intel QSV just as one can with software encoders."

– Bradley Sepos, Software Engineer, HandBrake Team

1. Chandler, Roger. *The Next Chapter in Our Graphic Story: Intel Arc High-Performance Graphics.* Intel Tech. August 2021. https://medium.com/intel-tech/the-next-chapter-in-our-graphics-story-intel-arc-high-performance-graphics-f68e7d2dc068
2. *What is the oneAPI Video Processing Library?* Intel Software. June 2021. https://www.youtube.com/watch?v=su3yJvXUPeQ