

## *Why you'll want to use Dolby Impact for H.265 (HEVC) video encoding*

# H.265 HEVC High Efficiency Video Coding

Developed exclusively by Dolby Laboratories and integrated into the Dolby Hybrik cloud media processing platform, Dolby Impact is a software encoder for the international H.265 (HEVC) video compression standard. Because **Dolby Impact creates H.265 (HEVC) streams with the highest possible coding efficiency**, it is an expedient alternative to other HEVC encoders (e.g., x265 or Beamr). Files created with Dolby Impact can be played back by any device or software player equipped with a standard H.265 (HEVC) decoder.

### What is H.265 (HEVC) and why is it important?

Currently (in mid 2023), the most widely adopted video compression standard is H.264, also known as Advanced Video Coding (AVC) or MPEG-4 Part 10. When AVC first became available, in 2004, it was a marked improvement over prior codecs because it significantly reduced bitrates without lowering video quality. Two video codecs have since emerged that both use much less bandwidth than AVC to deliver the same or better visual quality than any of their predecessors:

- AV1 is an open-source video codec developed by the Alliance for Open Media, a consortium of companies including Google, Apple, Amazon, Facebook, Microsoft, and others. AV1 uses sophisticated techniques including intra- and inter-frame prediction, as well as variable block size transform, to achieve highly efficient video compression. AV1 also supports features such as HDR (High Dynamic Range) and a wide color gamut.
- H.265, also known as High Efficiency Video Coding (HEVC) or MPEG-H Part 2, is a proprietary codec developed by the Joint Collaborative Team (JCT-VC), which is a working group lead by members of the United Nations International Telecommunications Union (ITU) and Motion Pictures Experts Group (MPEG). Like AV1, H.265 (HEVC) uses intra- and inter-frame prediction, likewise supports HDR and a wide color gamut, and adds new features such as the ability to code blocks of different sizes within a single frame. Most recent smartphones, TVs, laptops, tablets, OTT and consumer content devices, as well as most streaming services, all support HEVC, and it is also supported by the today's widely used video streaming protocols including RTSP, MPEG-TS, and HLS.

AV1 use is not as widespread as HEVC and others. While some studies suggest AV1 may offer somewhat better compression at certain bitrates, encoding AV1 files is more computationally intensive and therefore may take up to three times longer than HEVC encoding. So, with its wider adoption and support, as well as potentially faster and more economical encoding, HEVC has already become the second most widely used video coding format, and most analysts agree that HEVC will soon replace AVC as the most popular industry standard.

---

Most analysts agree that HEVC will soon replace AVC as the most popular industry standard.

---

### Why is Dolby Impact a better H.265 (HEVC) encoder?

Both x265 and Dolby Impact are H.265 (HEVC) encoders and produce streams that can be played on any H.265 (HEVC) capable device. But, while the bitstream format and decoder are exactly described by the HEVC specification, encoder implementations vary and have a high degree of freedom. Several factors make Dolby Impact the best available encoder:

- **Higher quality, lower bitrates:** Dolby Impact creates H.265 (HEVC) compatible streams with the highest possible coding efficiency because it is designed to optimize the ratio between the resulting visual quality and the required amount of data – i.e., the bitrate. The average and peak bitrates of streams created by Dolby Impact is typically lower than for those resulting from the use of x265, while achieving the same or better visual quality. While the fastest x265 presets may achieve higher processing speeds than Dolby Impact, the cost is significantly reduced compression efficiency (i.e., higher bitrates), as compared with Dolby Impact output. At similar processing speeds, Dolby impact typically achieves higher visual quality than x265.
- **Cleaner streams:** The probability of severe visual artifacts in short sequences or single pictures is significantly reduced with Dolby Impact.
- **Output optimized for the human eye:** Dolby Impact has not been pre-tuned for any specific objective metric, such as PSNR, SSIM or VMAF. It uses an internal model to achieve the best compromise between subjective visual quality and bitrate. While the Hybrik option “tune” can be used to optimize the results for specific metrics, these all have strengths and weaknesses. Subjective viewing by humans is always recommended to best evaluate and benchmark visual quality.

- **Presets plus more options:** Like x265, Dolby Impact offers various encoding presets (also called complexity modes) that allow you to choose between high-speed processing vs. maximum compression efficiency. But Dolby Impact provides more options to perform high-quality encoding and achieve good compression efficiency. In Hybrik, the default preset for Dolby Impact is "medium." For optimum visual quality given a certain bitrate, we recommend the "very slow" preset. Or if your focus is more on cost reduction than quality, you may want to select a faster preset for high bitrates and picture resolutions, since these targets contribute most to the overall processing time and are typically less sensitive with respect to visual quality degradation.
- **Resource conservation:** Dolby Impact is designed to minimize required memory, CPU usage, and compute time.
- **Ease of use:** Dolby Impact can be enabled in Hybrik by simply adding the parameter "codec\_provider": "dolby\_impact" to the video target configuration in your transcode task. Dolby Impact can be used without any additional configuration parameters. In most use cases, the user may want to specify at least an average bitrate (bitrate\_kb) or a target quality level (crf). Additional constraints about the GOP-structure (e.g., key-frame period) can also be configured. Setting additional parameters for picture quality tuning is not usually required – Dolby Impact will internally determine the optimal coding parameters.

### What are some of the features and formats the Dolby Impact encoder supports?

Dolby Impact is a generic H.265 (HEVC) encoder that's tuned and optimized for all kinds of video.\* The Dolby Impact encoder supports:

- **HEVC profiles:** Main and Main10
- **HEVC levels:** All levels are supported. If no level is specified, then the lowest possible level is chosen that still complies with the configured picture size, framerate, and bitrate.

- **Chroma sampling:** Always set at 4:2:0
- **Fixed keyframe interval (IDR period):** To ensure a constant IDR-period in Hybrik, you can set the minimum and maximum IDR interval to the same value.
- **Containers:** Muxes to MP4, MOV and MPEG transport streams
- **Dolby Vision and other HDR formats:** Dolby Impact includes special tuning to gracefully handle Dolby Vision and various other picture formats. Note that the Dolby Vision distribution formats transform the video base layer before HEVC encoding is applied, depending on the actual Dolby Vision profile. The Dolby Impact encoder has been tuned to support and optimize encoding for all "flavors" of Dolby Vision.

### What rate control modes does Dolby Impact support?

Dolby Impact supports multiple modes to control bitrate and visual quality. Each of these modes facilitates the specification of parameters for a VBV (video buffering verifier) model, which is used to ensure that an encoded video stream can be correctly buffered and played back at the decoder device.

- **VBR (multi-pass)** – Variable bitrate mode requires the definition of an average bitrate in kbits/sec.
- **CRF** – Constant rate factor is an encoding mode that adjusts the file data rate up or down to achieve a selected quality level rather than a specific bitrate. The higher the rate factor, the more visual distortion is accepted and the lower the resulting bitrate will be. The default rate factor value in Dolby Impact is 21.
- **CBR (multi-pass)** – Constant bitrate (a.k.a. capped variable bitrate) is fully described by the VBV (video buffering verifier) model – see below – and does not usually require any additional configuration.
- **CAVE** – Content-aware video encoding is a special mode, available only in

\* Note that Dolby Impact does not perform lossless encoding.

*The media files created by the Dolby Impact encoder can be decoded and played back with any H.265 (HEVC) enabled software or hardware player or device.*

Dolby Impact. It requires multi-pass processing and automatically computes optimal coding parameters for each scene, depending on the complexity of the video content and the user configuration. Because of the multi-pass computing, CAVE encoding may take significantly more compute time than other modes, but may yield dramatic savings in bitrate while keeping visual quality constant. Users should configure two parameters for the content, representing expected bitrate and visual quality. The optimal configuration values are usually based on experience and may be adapted over time to provide optimal results.

Each of these rate-control modes facilitates specification of the following three parameters for a VBV (video buffering verifier) model, which is used to ensure that an encoded video stream can be correctly buffered and played back at the decoder device:

- **Maximum bitrate** (in kbits/sec) – The default value for the maximum bitrate in VBR mode is 2x the (average) bitrate.
- **Buffer size** (in kbits or milliseconds) – Larger buffer sizes allow more variation of bitrate and may avoid visual distortion at scene changes or in short, complex scenes. The default value is 2 seconds, corresponding to 2x the maximum bitrate. Reasonable values are between 0.5 second and 4 seconds.
- **Initial buffer occupancy** (in kbits) – There is usually no need to configure the initial buffer occupancy. The default value is 100%.

### How much does Dolby Impact cost?

As a Dolby Hybrik customer, you pay no additional fees to Dolby to use Dolby Impact for encoding. However, the use of H.265 (HEVC) in your system or service may incur royalty obligations to other entities. For more information on this topic, we recommend starting with this post by video technology industry expert Jan Ozer: <https://www.linkedin.com/pulse/truth-content-royalties-netint-technologies>

### Can the Dolby Impact H.265 (HEVC) encoder be used without Dolby Hybrik?

The media files created by the Dolby Impact encoder can be decoded and played back with any H.265 (HEVC) enabled software or hardware player or device. However, the Dolby Impact encoder is only available for use within the Dolby Hybrik cloud media processing platform. It is not currently available for licensing, integration into, or installation onto any other system or device. For additional information, please contact Dolby Support or our sales team at: <https://professional.dolby.com/technologies/cloud-media-processing/contact>

- **Learn more about using Dolby Impact at:**  
[https://tutorials.hybrik.com/dolby\\_impact/](https://tutorials.hybrik.com/dolby_impact/)
- **Learn more about Dolby Hybrik at:**  
<https://professional.dolby.com/technologies/cloud-media-processing>