Video & Live Streaming

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Best Video Codec For Live Streaming

Overview

This topic is related to the best video codec for live video streaming. Nowadays, we are observing a massive advancement in video technology and video, basically live video streaming getting massively popular. Therefore, video compression becomes a vital part of the professionals related to the industry. So, different companies, for example, Apple, Adobe, etc. have introduced their video codec to compressed a huge size video file and make it presentable. So now, you may ask, "which is the best video codec?". But, before we go deeper, you should first know, "what a video codec is?".

What is Video Codec?

Codec is short for "coder" and "decoder". Plainly said, a video codec is a program for encoding and decoding video streams. It can either be a device (electronic circuit) or software that fundamentally compresses (encodes) or decompresses (playback from a compressed state) a digital video.

For processing audio, digital images and text, there are also codecs, but in this article, we will focus on those for video data only.
As mentioned earlier, video codec is a sequence of "encoder" and "decoder". An encoder is a device that only compresses video, whereas decoder is the one that decompresses. However, this compression has to be either lossy or lossless. We will go into further details later in this article.
A video codec is, therefore, an algorithm that basically reduces the size of a media file, that is a video, and is crucial to transmitting large volumes of the data. A video codec is generally 'fourcc', a four character code. For example, MPEG, DivX, HEVC, etc.

Why are video codecs important?

Video Codecs are essential when it is about large streams of data and compressing (or decompressing) them into manageable sizes for storage, processing, and transmitting. Such high-resolution video is difficult to handle because of the technological limitations like bandwidth.

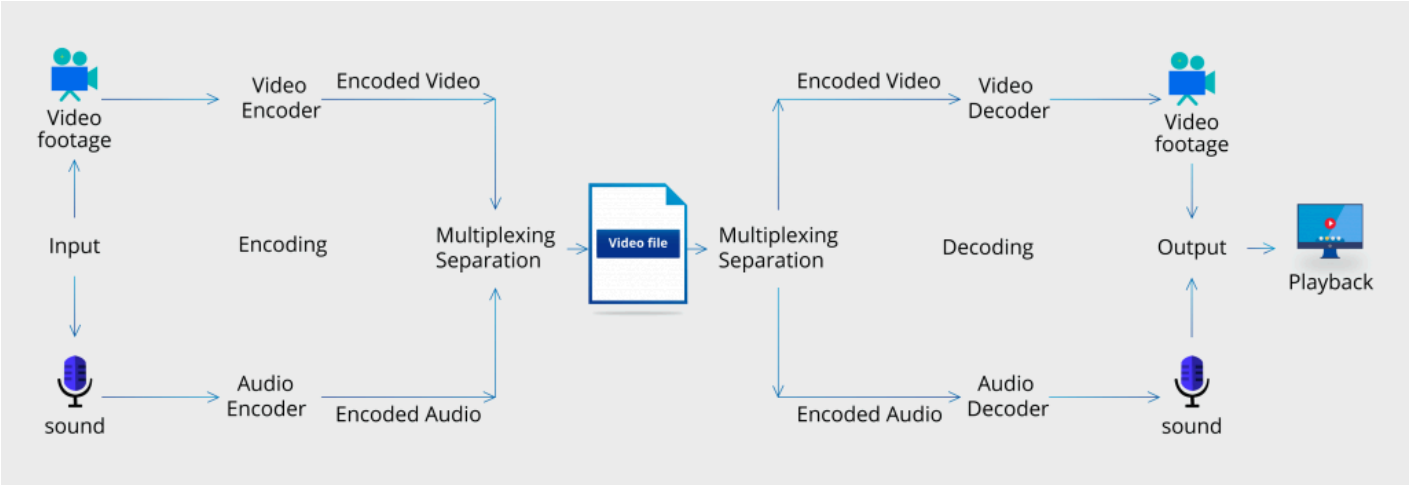

Diagram: Video Encoding & Decoding Process

What is the difference between Video Codec and File Formats?

A video file format is a specification of how a digital video data is stored or encapsulated prior to transmission. It is like a container where the data has been compressed by using a particular codec, which is a video codec, is stored. For instance, in case of a recorded video, the following operations occur within the system: Audio and video content are captured and encoded using one of the audio and video codecs respectively. Then, these 'compressed' contents are multiplexed and stored on a specific file format such as MP4, MOV, MPEG2, etc. After this, uncompressing or decompressing is required which is the act of expanding a compressed video file back to the original form in order to 'playback'.

Types of Video Codecs

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Lossless codecs: Keep all of the data, thus giving higher video quality and with larger files. Examples include H.263, H.264/MPEG-4 AVC, Lagarith, Huffyuv, and HEVC.

Lossy codecs: Produce smaller file sizes but leaves out some of the data from the original, resulting in lower video quality. Although some amount of the original video information is lost, these occupy less space. Examples are Xvid, DivX, VP3, MPEG4.

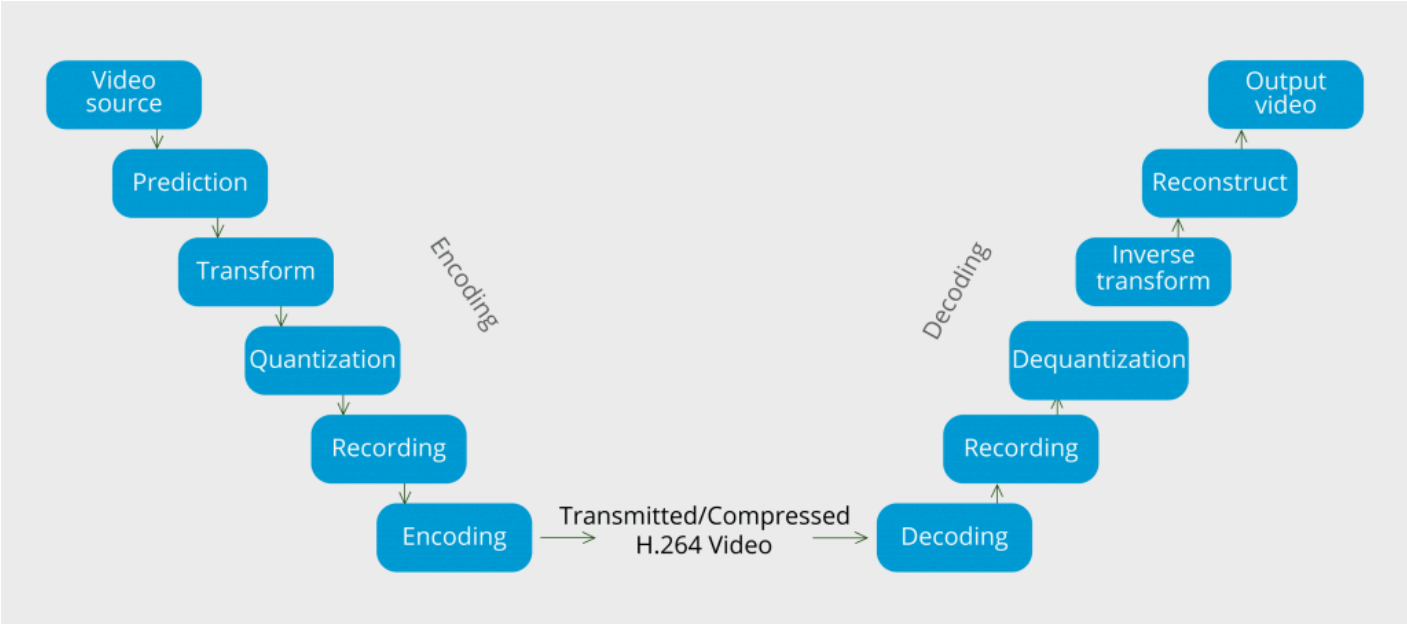
Here's a summary of the (most common) best video codec these days massively using. Please, take a look.

Codec	Description	Format	Compression Method
MPEG-1	Used in the production of VCD and download of video clip	MP4, MKV, 3GP, FLV	Lossy
MPEG-2	Used in the production of the DVD, few HDTV and high demand video editing, processing	DVD (VOB), Blu-ray (TS), MPG	Lossless
MPEG-4	New compression algorithm, used for compression of AV data for web, as used for streaming media, CD distribution, voice broadcast television applications	MP4, AVI, MKV	Lossy
DivX	Produced for DVD, works with a certain type of MPEG-4 file, able to compress (https://en.wikipedia.org/wiki/Video_compression) lengthy video segments while maintaining visual quality.	AVI	Lossy
XviD	An open source version of DivX	AVI, MKV	Lossy
H.264	Also known as AVC – Advanced Video Coding or MPEG-4 Part 10, it is a block-oriented motion-compensation-based video compression standard	MP4, MKV, 3GP, FLV	Lossless / Lossy
H.265 or HEVC (High-Efficiency Video Coding)	Also known as MPEG-H Part 2, HEVC is a video compression standard, designed as a successor to the widely used AVC. It has designed to offer more efficient compression for 4K video and Blu-ray.	MKV	Lossy

Best Video Codec: HEVC (H.265) Vs. AVC (H.264)

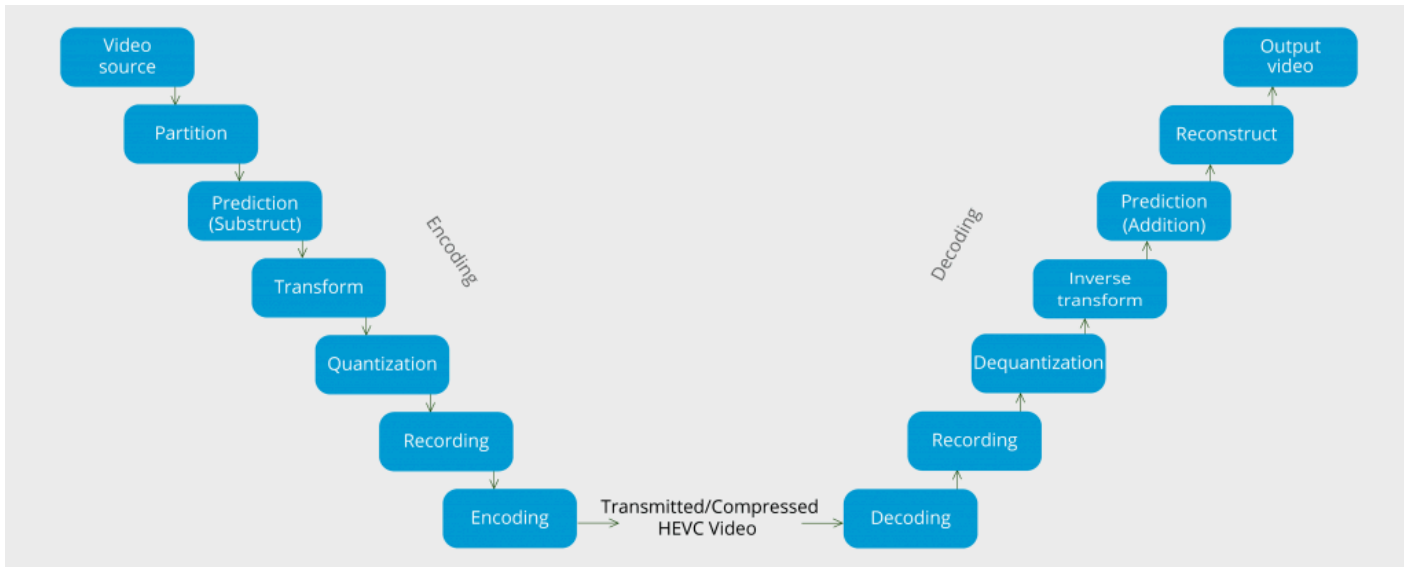
To know which one is the best video codec between AVC (H.264) and HEVC (H.265), here is a comparative study for your convenience.

H.264 is an industry standard for video compression that works by processing frames of video using a block-oriented, motion-compensation-based video compression standard. Macroblocks are such units of a block. It supports resolutions up to 8192×4320, including 8K UHD. This is mainly for Blu-ray and Internet videos.



AVC (H.264) Video Codec

Conversely, HEVC or H.265 is a video compression standard designed for the newest generations of high-resolution video. It was designed as a successor to the H.264. HEVC offers 25% to 50% better data compression with the same video quality. And, even it improved video quality with the same bit rate. It supports resolutions up to 8192×4320, including 8K UHD, for example, Full HD mobile broadcasting and 4K/8K broadcasting.



HEVC (H.265) Video Codec

HEVC codec offers these significant improvements over H.264 codec:

- The first and foremost difference is that HEVC compresses data so efficiently that it drops bandwidth and storage requirements by roughly 50%. So it can compress video nearly twice as efficiently as H.264! There is better visual quality at low storage and bandwidth.
- Increased macroblock size: In comparison with H.264's macroblocks, H.265 processes information in Coding Tree Units (CTUs) by which H.265 reduces bit rate 40-50% compared to that of H.264.
- Parallel Processing Computing Techniques: Apart from CTUs being one of the HEVC's main coding tools, this codec uses this method to make it faster and supports advanced extensions. This means the decoding process can be divided among multiple parallel process threads while using more efficient decoding opportunities.
- Intraframe motion: HEVC has improved motion prediction between frames with much greater precision and minimal residual errors.
- With HEVC, a video may encode at up to 8K UHD or 8192 pixels × 4320 pixels. This means HEVC has higher maximum frame size.
- HEVC's and Live Streaming: Viewers with H.265 compatible devices require less bandwidth and processing power to decompress that data and watch a high-quality stream. This, as previously discussed, because of larger CTU sizes and for the fact that HEVC has greater motion compensation and spatial prediction than H.264. This is also why HEVC requires more advanced hardware.
- 4K streaming is a dream come true with H.265 because of HEVC makes remarkable image quality at considerably lower bitrates.
- H.265/HEVC is not supported with most browsers or devices whereas H.264/AVC is compatible with any browser as well as any device.

A comparison of bandwidth requirement for H.264 vs H.265 against the resolution.

	Minimum Upload Speed			
Resolution	**480p**	**720p**	**1080p**	**4K**
H.264	1.5 Mbps	3 Mbps	6 Mbps	12 Mbps
H.265	0.75 Mbps	1.5 Mbps	3 Mbps	15 Mbps

In conclusion, hope you could easily identify what is best video codec for your broadcast quality live video streaming (https://www.synopi.com/video-quality-parameters/).

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