HEVC: The New Standard

The goals of HEVC are to provide the:

- Same quality as H.264 in half the bandwidth or double the video quality in the same bandwidth
- Ability to deliver higher video resolutions–up to 8192 x 4320

Why HEVC?

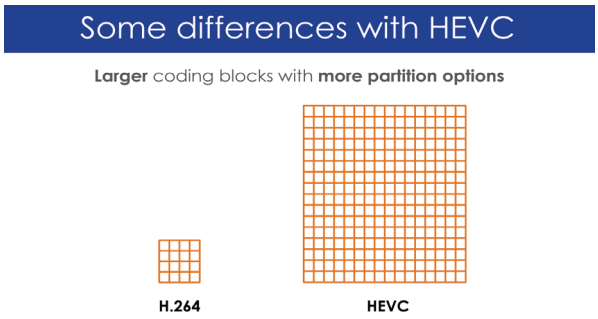
The quest for digital media file formats that offer more efficient use of bandwidth and better picture quality is constant. There are currently more than 200 compression schemes in use. The current codec leaders for video delivery are MPEG2/H.262 and MPEG4/H.264, also know as AVC. Each has many different implementations depending on the viewing platform of the end user.

The newest standard, which offers improvements in both bandwidth usage–bit rates–and picture quality, is High Efficiency Video Coding: HEVC/H.265.

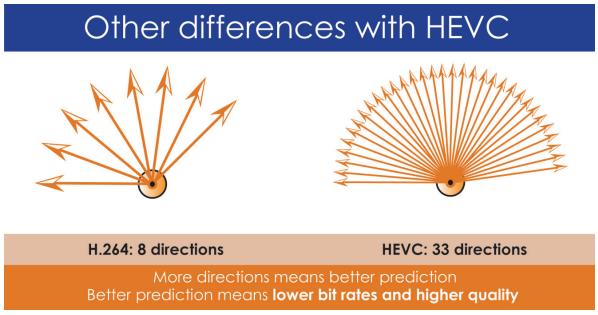
Obviously, the ability to meet these goals signifies a dramatic improvement over current standards. HEVC offers the potential to reduce CDN and mobile carrier costs, improve quality, and make the delivery of 4K Ultra HD (3840 x 2160) possible in the near term. It also offers the potential to address the two most common technical frustrations expressed by consumers about watching video over the Internet: issues with the download stream and video quality.

How is HEVC Better?

HEVC/H.265 offers several technical improvements over H.264. First, it encodes larger block sizes. HEVC uses "coding tree blocks" that have a maximum size of 64 x 64 pixels, whereas H.264 uses "macroblocks" with a maximum pixel size of 16 x 16. The large blocks allow more efficient encoding, particularly for higher resolutions such as 4K.



Second, HEVC provides more intra-predictive directions to find better reference picture pixel blocks within each frame of the video–33 directions vs. 8 for H.264. This allows for lower bit rates and higher picture quality.



Additional technical improvements include Adaptive Motion Vector Prediction, which increases compression efficiency by locating more inter-frame redundancies and Wavefront parallel processing, which allows parallel processing to be efficiently harnessed in multi-core HPC or GPU-based environments.

HEVC currently includes two profiles:

- Main: 8-bits per color with 4:2:0 chroma format
- Main 10: 10-bits per color with 4:2:0 chroma format, which significantly reduces banding over 8-bit

Like other compression standards, HEVC will continue to advance technically, as work on a 12-bits per color profile with 4:2:2 and 4:4:4 chroma formats is already underway. There is also an HEVC Main Still Picture profile for digital still pictures that can cut the bit rate by more than 50% over JPEG.

What Markets Will Benefit from HEVC?

Because HEVC is the next generation of compression technology, any business that uses video can benefit from HEVC once the standard is adopted–particularly those in the video distribution business. This includes:

- Broadcasters
- IPTV companies
- Satellite and cable companies
- OTT program suppliers like Netflix
- New Ultra HD program networks
- Wireless companies for TV on mobile devices
- Teleconferencing services

As the standard is adopted, everyone who watches videos and posts them online is likely to benefit from HEVC. Those who pay for bandwidth may stand to benefit the most due to the reduced costs incurred for the delivery of each movie or program.

Adoption: What Issues Are Yet to Be Resolved?

Already there are over 1 billion smart phones and tablets capable of playing HEVC video simply by upgrading their software-based video codecs. However, for more entrenched technologies, such as set-top cable and satellite boxes, new hardware will be required. The same is true for any Ultra-HD services that may emerge.

It is for those reasons that the earliest adopters of HEVC are likely to be wireless providers for the delivery of HDTV. Not only are there HEVC-capable devices already in users' hands, these devices turn over much more rapidly than TVs and other residence-based video platforms and certainly more than cable boxes replaced. Additionally, wireless operators face increasing bandwidth challenges as video becomes more ubiquitous on their LTE networks, so HEVC can provide a real solution.

For broadcasters, HEVC is not expected to supplant MPEG-2 until ATSC 3.0 is released in late 2015.

The rate of adoption may also be affected by business factors, such as whether HEVC is included in upgrades to popular Internet media players such as the Flash Player and the current lack of royalty or licensing structures by the standards bodies.

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