

NTT Press Releases

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First Ever HEVC Software Encoder Engine Supporting Range Extensions

--Enabling transmission of video contributions using HEVC--

Nippon Telegraph & Telephone Corp. (NTT Head Office: Chiyoda-ku, Tokyo; President and CEO: Hiroo Unoura) has developed a new software encoder engine for the latest international video coding standard called High Efficiency Video Coding (HEVC)¹, which supports Range Extensions.

HEVC Range Extensions handle formats used for on-site video contributions, such as more accurate chrominance sub-sampling (4:2:2 format) and higher bit-depth (12-bit). Contribution video involves 30% more data than distribution video, so shorter compression time and higher compression rates are needed. Accordingly, a new HEVC software encoder engine was developed to support range extensions, introducing new technologies to increase speed and image quality.

HEVC Range Extensions are needed to compress contribution video. With our software encoder, contribution video of broadcasters and content providers can be compressed using HEVC, enabling reduction of storage cost and network traffic. By taking the lead in implementing an encoder engine supporting range extensions, we have contributed to invigorating future markets for 4K and 8K video, and to developing delivery services for even better-quality video.

This encoder engine is being exhibited in the NTT booth (South Hall Upper Level, SU5021) at NAB 2014², the largest broadcasting technology trade show in the industry, held April 7 to 10 in Las Vegas.

1. Research and Development Background

The demand for high-resolution video, in 4K and Super Hi-Vision (8K) has been increasing recently. More-accurate chrominance formats (4:2:2)³ and higher bit depth (12-bit)⁴ reduce the effects of editing and other processing, so they are used for contribution video in particular. However, this type of video involves a very large amount of data, and transmitting contributions consumes a large amount of time without compression (Fig. 1⁵). HEVC Range Extensions are essential for handling contribution video efficiently, and the work on creating an international standard for them is advancing.

2. Main Research Results

The HEVC software encoder engine we have developed is capable of compressing 8K video with a 4:2:2 color format and 12-bit quantization. The encoder that we developed last year was applicable mainly for compression of video for distribution by broadcasters and content providers, but this encoder if for a wider range of applications, including transmission of contribution video (Fig. 2⁶).

3. Key Technologies

Contribution video involves much more data than distribution video, making it necessary to reduce the time required for compression and increase compression rates, so NTT developed proprietary technologies to increase both speed and image quality.

High-speed

As the amount of video data increases, the amount of computation required for video compression increases, so faster compression technology is needed. NTT developed our own technology to determine intra prediction direction at high speed (Fig. 3⁷) and optimized the encoder program, achieving speed increases of up to 40% compared with the software encoder engine we developed last year.

High compression rate

As the amount of video data increases, the amount of compressed data also increases, so technology to increase image quality while increasing the compression rate is also needed. We developed a technology to optimize block sizes used in video encoding so that the boundaries between foreground and background are partitioned appropriately (Fig. 4⁸), increasing the subjective image quality while improving compression rates up to 18%.

Faster compression times and higher compression rates realized by these technologies apply not only to video contributions but also to video for distribution.





4. Future Plans

This product is scheduled for commercial release in the second half of 2014. In the future, we will continue to advance R&D, increasing the speed and image quality of this video compression technology and contributing to further development of IPTV, VOD and other video services delivering even greater realism.

Terminology

- *1 H.265/HEVC (High Efficiency Video Coding) Range Extensions
HEVC Range Extensions is the latest international standard and was standardized in June, 2014.
- *2 NAB
The largest trade show for television and radio broadcasting equipment and applications in the world, held every year in April in Las Vegas.
- *3 4:2:2 format
A type of format in the YUV representation of video that represents video with luma signals(Y) and chrominance signals (U, V). Raw data size of the chrominance signals are doubled compared to the 4:2:0 format used in distribution of videos.
- *4 High bit-depth
Number of bits used in sampling of luminance and chrominance pixel values. By using high bit-depth, signal space can be sampled densely, enabling smooth gradation and high contrast.

Attachment-Reference

- ▶ [Fig. 1: Benefits of using HEVC](#) 
- ▶ [Fig. 2: Application Domain for HEVC](#) 
- ▶ [Fig. 3: Fast Intra Prediction-Direction Decision Technology](#) 
- ▶ [Fig. 4: Optimizing Block Partitioning to Improve Subjective Image Quality](#) 

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