JCTVC-M0039: On lossless coding with SHVC

K. Ugur, H. Lavasani
Nokia

NOKIA
Connecting People

Introduction

Coding a picture / video in two layers, where enhancement layer is coded in a lossless manner could be useful for many applications (mostly still picture related):

- **Serving low-bitrate thumbnails for fast browsing**: If lossless coded image needs to be transmitted, the receiver could request first the thumbnail to save bandwidth and only after the thumbnail is analyzed, request the full lossless version.
- **Serving multiple clients:** Lossless version send to clients with higher bandwidth, whereas BL is sent to clients with lower bandwidth.
- **Dynamically adjusting bitrate:** When scalable coding is used the encoder / router could dynamically adjust the bitrate.

Proposal:
- We propose high level features indicating that enhancement layer is used to achieve lossless coding operation for SHVC.
- Efficient lossless methods can be used also for EL for increased coding efficiency with backwards compatibility.

NOKIA

Proposal

SHVC already includes a mechanism for coding EL as lossless, with **cu_transquant_bypass_flag** .

It is asserted that this mechanism cannot be easily used for indicating EL is coded losslessly:

- This operation is known to decoder after decoding the entire enhancement layer CUs and parsing the corresponding transquant_bypass_cu_flag syntax elements.

We propose a flag in SPS extension to indicate EL is coded losslessly (**cu_transquant_bypass_flag** is 1 for all the CUs in EL)

- Alternatively, this could be indicated in a SEI message as well.

NOKIA

Results

We encoded first picture of Class-F sequences with three different configurations:

- Simulcast: For each picture, both lossless and lossy versions (QP = 22, 27, 32, 37) are coded separately.
- Single-layer: Each picture is coded losslessly.
- Scalable: For each picture, base layer is coded with different QPs (QP = 22, 27, 32, 37) and enhancement layer is coded lossless.

Compared to single layer the additional bitrate scalable bitstream uses is very small (on average 2.7% additional bitrate is needed).

- This means the use-cases mentioned in Section 1 can be supported with very small penalty (at low QPs, the additional penalty is actually very low, around 0.3% additional bitrate)
- Compared to simulcast, the proposed method improves the coding efficiency more than 15%.

NOKIA