

JCTVC-J0184

On Transform Skip

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Agenda

- Introduction
- Transmission of transform_skip_enable_flag in PPS or Slice Header rather than in SPS
- Applying flat quantization matrices for TransformSkip TUs
- Conclusion

Introduction

- Transform Skip proposed by JCTVC-I0408 has been adopted into HEVC specification.
- This contribution claims two modifications with Transform Skip as follows:
 - Transmission of transform_skip_enable_flag in PPS or Slice Header rather than in SPS
 - Applying flat quantization matrices for TransformSkip TUs

Transmission of transform_skip_enable_flag in PPS or Slice Header rather than in SPS

- Under current specification, transform_skip_enable_flag is transmitted in SPS.
- It is proposed to move it into PPS or SliceHeader to enable on/off at Picture-level.

Use Case: Intelligent encoder in BD-recorder (like TiVo)

Sequence



Programme: Cartoon
TransformSkip should be applied

Can be detected with EPG

CM: most likely camera-captured video
TransformSkip should not be applied

CM detection

Applying flat quantization matrices for TransformSkip TUs [1/]

- JCTVC-I0408 proposed that flat quantization matrices be applied for TransformSkip TUs, however this proposal has not been adopted.
- Data with non-TransformSkip TUs are in frequency domain and elements of QMs are weighting factors for each component in frequency domain.
- However, with TransformSkip TUs data are in spatial (or differential-of-spatial) domain so it is a bug that weighting factors be applied for TransformSkip TUs.
- We request this bug be fixed!!

Applying flat quantization matrices for TransformSkip TUs [2/]

- The reasons why the proposal of flat-QM has not been adopted:
 - Reason -1: Switching quantization matrices in the unit of 4x4 requires increase in complexity
 - Switching of quantization matrix may occur if intra and inter TUs are concatenated.
 - Therefore current HEVC specification already includes switching of QM by 8x8-level with luma and **4x4-level** with chroma.
 - Reason -2: Transform Skipping is effective for ClassF-type sequences. It may be OK that flat quantization matrices be set for such sequences as an encoder issue.
 - **See the next slide**

With sequences like F:BasketballDrillText some areas within a picture will be coded with TransformSkip while other areas not.

Where TransformSkip will not be applied
Quantization Matrix is necessary



Where TransformSkip will be applied
Quantization Matrix is not necessary

Current HEVC specification does not allow such usage of QM.

Applying flat quantization matrices for TransformSkip TUs [3/]

- The meaning of “flat quantization matrix” can be interpreted as follow:
 - **Solution 1**: Does not apply quantization matrices to Transform-Skip TUs
 - **Solution 2**: Quantization factors (not matrices!) for Transform-Skip TUs are additionally transmitted in the scaling_list syntax
 - More flexible than Solution 1
 - Transform_skip_enabled_flag should be transmitted at PPS with this solution
 - **Solution 3**: DC component of the quantization matrix are applied to all components in Transform-Skip TUs
 - With this solution no switching of loading QM for 4x4 occurs.
 - For non-TS TUs all QM components are used, while for TS TUs only DC components are used.
- We propose either one of these solutions be adopted.

Conclusion

- This contribution claims 2 modifications on Transform Skipping as follow:
 - Transmission of transform_skip_enable_flag in PPS or Slice Header rather than in SPS
 - Applying flat quantization matrices for TransformSkip TUs
- It is recommended that the first modification be adopted into HEVC DIS.
- With regard to the second modification there are three possible solutions, and it is recommended to adopt one of them into HEVC DIS.
- **Sony and Panasonic are willing to volunteer implementing the suggested modifications on HM-8.0.**