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| *Title:* | **Description of Core Experiment 5 (CE5) on Inter-view/motion prediction** | | |
| *Status:* | Output Document | | |
| *Purpose:* | Core Experiment Description | | |
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# Abstract

This document defines Core Experiment 5 on motion/mode parameter prediction to be performed for the 2nd JCT-3V meeting.

# Introduction

The goal of this Core Experiment (CE) is to investigate the methods for motion/mode parameter prediction proposed at the 2nd JCT-3V meeting. Tools under test will be evaluated according to their impact on compression efficiency and implementation complexity

# Participants

## CE5

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# Tools under Test

## CE5

### AMVP/Merge List Construction

#### [JCT3V-B0048](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=237) 3D-CE5.h: Merge candidates derivation from disparity vector [L. Zhang, Y. Chen, L. He (Qualcomm)]

When inter-view motion prediction is enabled, the current HTM design of the merge candidate list includes an inter-view predicted motion candidate from a corresponding block in a reference view if available. However, such a candidate might be identical to existing spatial merging candidates in the merge candidate list. In addition, the disparity vector is converted to a disparity motion vector only when the inter-view predicted motion candidate located by the disparity vector is unavailable. It is proposed to:

1) remove duplicated candidates with limited additional number of pruning operations;

2) add disparity motion vector candidate before spatial merging candidates regardless the availability of inter-view predicted motion candidate;

3) add up to two more candidates derived with two horizontally shifted disparity motion vectors.

**🡪 The coding performance of item 3 will be tested.**

[JCT3V-B0050](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=239) 3D-CE5.h related: Improved temporal motion vector prediction for merge [L. Zhang, Y. Chen, M. Karczewicz (Qualcomm)]

In current 3D-HEVC, a target reference index for temporal merging candidate is set according to the neighboring prediction unit. When the target reference index corresponds to a reference picture in the same view while the motion vector of the co-located prediction unit (PU) points to an inter-view reference picture and vice versa, temporal motion vector prediction (TMVP) candidate is considered as unavailable. To address this issue, it is proposed that one additional target reference index is used, so that TMVP candidate can be supported for the above cases. For 3D-HEVC, the proposed method provides about 0.3% average bitrate saving for the all the coded views and 0.7% bitrate saving for the non-base views.

**🡪 The proposed improved temporal motion vector prediction scheme will be tested.**

[JCT3V-B0080](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=285) 3D-CE5.h: Merge candidate list for disparity compensated prediction [Thomas Guionnet, Laurent Guillo, Christine Guillemot (INRIA)]

HEVC implements a candidate vector list for merge and skip modes. The construction of this list has been extensively studied in the JCT-VC group (see for instance JCTVC-G039). It has been shown in JCTVC-I0293 that it is possible to improve the HEVC coding performance by adding in the merge list copies of the first candidate shifted by an arbitrary offset. The same basis is considered in this document and applied to disparity compensation. A gain of 0.3% is obtained on average on side views, and 0.1% on gain on all coded views.

**🡪 In the upcoming HTM 5.0 software, the Merge list construction will be modified. More specifically, a disparity motion vector should always be available either in first or second position in the list. Therefore, the proposed method will be tested by applying proposed offsets to this disparity vector.**

### Parsing Dependency Removal: B0093

[JCT3V-B0093](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=298) Removal of the parsing dependency of inter-view residual prediction [Jicheng An, Kai Zhang, Jian-Liang Lin, Shawmin Lei (Mediatek)]

In this contribution, two methods are proposed to improve the inter-view residual prediction in HTM. Firstly, an approach to solve the parsing problem related to the inter-view residual prediction is proposed. The experimental results reportedly show 5% encoding time saving and 0.1-0.2% BD-rate reduction for video1 and video2, while the parsing dependency of the inter-view residual prediction is removed. Secondly, the interpolation in inter-view residual prediction is further removed to reduce the complexity, and the disparity vector is directly rounding to a nearest integer pixel.

**🡪 The proposed parsing dependency removal scheme will be tested.**

### Interview SAO Process

[JCT3V-B0130](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=339) Inter-view SAO process in 3DV coding [[Taesup Kim](mailto:taesup.kim@lge.com), [Jin Heo](mailto:jin78.heo@lge.com), [Sehoon Yea](mailto:sehoon.yea@lge.com) (LGE)]

In the current 3DV coding scheme [1], SAO process is modeled to independently implement on each view. Although some common properties between neighbored views could be observed, each view’s SAO parameters are derived and signaled without any sharing action between neighbored views. To understand and utilize these correlations between neighbored views on SAO process in the 3DV coding, this contribution presents an approach for SAO process in the 3DV coding to remove SAO parameters’ redundancies by sharing information between neighbored views that reportedly shows around 1.5% gains on dependent views.

**🡪 Compare the performances of the scheme in the interleaved mode (non-CTC) vs. the non-interleaved mode (CTC) in HTM 5.0 (based on HM6.1)**

**🡪 Compare the performances of the scheme in the interleaved mode (non-CTC) in HTM 5.0 vs. the interleaved mode in a modified HTM 5.0 which reflects all the SAO-related updates in the latest HM. This modified HTM 5.0 will be provided by the proponent and be cross-checked by the participants in the CE.**

# Mandates

## CE5

The mandates of this core experiment are as follows:

1. To further investigate ways to improve AMVP/Merge list construction *[JCT3V-B0048, JCT3V-B0050, JCT3V-B0080]*
2. To compare different solutions for parsing dependency removal: *[JCT3V-B0093]*
3. To confirm the benefit and compatibility of Interview SAO Process to current HM: *[JCT3V-B0130]*

# Software, Configuration and Evaluation

## Software

### CE5

Experiments in CE5 will use the 3D-HTM 5.0 software that is recommended in JCT3V-B1100. Proponents are requested to provide software that can be compiled under Windows and Linux platforms.

## Test Sequences, Bit Rates and Coding Conditions

The CE will use the test sequences, configuration and conditions that are recommended in JCT3V-B1100. Moreover, proponents and cross checkers are required to provide simulation results for the Random access configuration as specified in JCT3V-B1100.

## Evaluation of CE Results

1. Measure impact on bitrate/PSNR. PSNR shall be calculated for the decoded texture views, relative to original texture views and for the synthesized views relative to uncompressed synthesized views. Use 4-point BD-PSNR and BD-Rate according to common conditions. The anchors will be generated according to common test conditions.
2. Measure impact on encoding and decoding runtimes for all test cases relative to the unmodified test model software.
3. Report comments of subjective visual quality according to common conditions.

# Timelines

## CE5

2013/01/07 Make source code, simulation results and draft text available for ALL proponents and cross-checks.

2013/01/14 Register documents for the 3rd JCT-3V meeting

2013/01/14 Upload simulation and cross check results to the JCT-3V document repository

# References

1. D. Rusanovksyy, A. Vetro, and K. Müller, "Common Test Conditions for 3D Video Extensions Development," Joint Collaborative Team on 3D Video Coding Extension Development (JCT-3V) of ITU-T VCEG and ISO/IEC MPEG, JCT3V-B1100, Shanghai, Oct., 2012.

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