|  |  |
| --- | --- |
| **Joint Collaborative Team on 3D Video Coding Extension Development**  **of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11**  6th Meeting: Geneva, CH, 25 Oct. – 1 Nov. 2013 | Document: JCT3V-F1104 |

|  |  |  |  |
| --- | --- | --- | --- |
| *Title:* | **Description of Core Experiment 4 (CE4) on Residual Prediction** | | |
| *Status:* | Output Document | | |
| *Purpose:* | Core Experiment Description | | |
| *Author(s) or Contact(s):* | Li Zhang Jian-Liang Lin | Tel: Email: | +1-858-651-6660 [lizhang@qti.qualcomm.com](mailto:lizhang@qti.qualcomm.com)  +886-3-5670766 ext. 25555  jl.lin@mediatek.com |
| *Source:* | CE coordinators | | |

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Abstract

This document defines Core Experiment (CE) 4 on residual prediction to be performed for the 7th JCT-3V meeting.

# Introduction

The goal of this CE is to investigate the methods for advanced residual prediction (ARP) proposed at the 6th JCT-3V meeting. Tools under test will be evaluated according to their impact on both compression efficiency and implementation complexity.

# Participants

|  |  |  |  |
| --- | --- | --- | --- |
| ***Participant*** | ***Contact*** | ***Email*** | ***Type*** |
| Qualcomm | Li Zhang  Ying Chen | [lizhang@qti.qualcomm.com](mailto:lizhang@qti.qualcomm.com)  cheny@qti.qualcomm.com | P |
| MediaTek | Jian-Liang Lin  Jicheng An  Kai Zhang  Yu-Lin Chang  Yu-Wen Huang | [jl.lin@mediatek.com](mailto:jl.lin@mediatek.com)  [jicheng.an@mediatek.com](mailto:jicheng.an@mediatek.com)  [Kai.zhang@mediatek.com](mailto:Kai.zhang@mediatek.com)  [yulin.chang@mediatek.com](mailto:yulin.chang@mediatek.com)  [yuwen.huang@mediatek.com](mailto:yuwen.huang@mediatek.com) | P |
| Samsung | [M. W. Park](mailto:m.w.park@samsung.com)  Jin Young Lee | [m.w.park@samsung.com](mailto:m.w.park@samsung.com)  [jinyoung79.lee@samsung.com](mailto:jinyoung79.lee@samsung.com) | P |
| Sharp | Tomohiro Ikai | [ikai.tomohiro@sharp.co.jp](mailto:ikai.tomohiro@sharp.co.jp) | P |
| LG | Jin Heo | [jin78.heo@lge.com](mailto:jin78.heo@lge.com) | P |
| NTT | Shiori Sugimoto  Shinya Shimizu | [sugimoto.shiori@lab.ntt.co.jp](mailto:sugimoto.shiori@lab.ntt.co.jp)  [shimizu.shinya@lab.ntt.co.jp](mailto:shimizu.shinya@lab.ntt.co.jp) | P |
| Zhejiang  University | Yichen Zhang  Peng Lu | [felixzyc@gmail.com](mailto:felixzyc@gmail.com)  [yiqiu8932@gmail.com](mailto:yiqiu8932@gmail.com) |  |

(P=proponent, C=crosss checker)

# Tools under Investigation

## Coding tools related to temporal ARP

### Advanced temporal residual prediction [JCT3V-F0108]

An adaptive disparity vector derivation (ADVD) method is proposed for the temporal ARP. In ADVD, a disparity vector candidate list with three entries is constructed wherein the candidates are derived from temporal/spatial neighbouring blocks, and default disparity vector from Do-NBDV process. Each new candidate is appended into the list only if it is not equal to any other candidates already in the list. The index of the best candidate is selected according to RDO criterion and signaled in the bitstream.

In addition, the following methods are also suggested to be provided:

* More accurate disparity vectors with and without half weighting factor.
* Simplification of the disparity vector candidate list construction process.
* Coding results under the BVSP off case.

### Further improvements on advanced residual prediction [JCT3V-F0123]

In this proposal, a disparity vector refinement method is proposed. More specifically, a disparity motion vector associated with the reference block of current block, if available, is used during ARP, to replace the derived disparity vector.

## Coding tools related to inter-view ARP

### Explicit disparity vector oriented inter-view motion prediction and residual prediction [[JCT3V-F0189](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=1158)]

An explicit disparity vector oriented inter-view motion prediction and residual prediction is proposed. The disparity motion vector (DMV) associated with current block and the temporal motion information of the reference block identified by the DMV are utilized in the ARP process. Furthermore, the residual and residual predictor are calculated as temporal residuals from current view, and the reference view, respectively.

## Joint optimization of IC flag and ARP weighting factor signalling

### Further improvements on advanced residual prediction [JCT3V-F0123]

It is proposed that the signalling of Illumination Compensation (IC) flag and ARP weighting factors are jointly considered wherein the ic\_flag is not signalled when the ARP weighting factor is unequal to 0.

### Further improvements on advanced residual prediction [JCT3V-F0104]

It is proposed that the ic\_flag is not signalled when the ARP weighting factor is unequal to 0.

### Further improvements on advanced residual prediction [JCT3V-F0145]

It is proposed that the signalling of Illumination Compensation (IC) flag and ARP weighting factors are jointly considered. In one method, the ic\_flag is not signalled when the ARP weighting factor is unequal to 0. In another method, the ARP weighting factors are not signalled when ic\_flag is is equal to 1.

# Mandates

Mandates for the CE are as follows:

1. To study the coding efficiency improvement and compleixty issues as in JCT3V-F0104, JCT3V-F0108, JCT3V-F0123, JCT3V-F0145 and JCT3V-F0189 in 3D-HEVC.

# Software, Configuration and Evaluation

## Software

Experiments in CE4 will use the HTM version 9.0 software that is recommended in JCT3V-F1100. 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-F1100.

## Evaluation of CE Results

The performance measurements are evaluated by switching on and off individual tools to identify their relative performance. The following measurements are considered to be used in this core experiment.

1. **Coding Performance Measurements:** 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. **Complexity measurements:** For the complexity measurement, the reference software and the reference software with the proposed method implemented will be executed on the same machine with the same configuration and the computational time will be measured. A time ratio will then be calculated between the reference software and the reference software with the proposed method implemented.

# Timelines

2014/12/01 Release HTM version 9.0

2014/12/16 Make source code, simulation results and draft text available for all proponents and cross-checkers.

2013/01/03 Register documents for the 7th JCT-3V meeting

2014/01/03 Upload contributions to 7th JCT-3V meeting

2014/01/11-2014/01/17 The 7th JCT-3V meeting