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| **Joint Collaborative Team on Video Coding (JCT-VC)**  **of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11**  13th Meeting: Incheon, KR, 18–26 Apr. 2013 | Document: JCTVC-M0365 |

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| *Title:* | **Cross-verification of Modified Motion Vector Signaling and Prediction Under Reference Index Based SHVC** | | |
| *Status:* | Input Document to JCT-VC | | |
| *Purpose:* | Information | | |
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# Abstract

This contribution reports the cross-verification results of JCTVC-M0258 on the modified motion vector signalling and prediction for the reference index based SHVC from Sharp. The software implementation is compliant with the corresponding description of the proposal. The simulation results perfectly match the results provided by the proponents.

# Introduction

In JCTVC-M0258 [1], the current TMVP and motion vector signalling are modified for the reference index based solution by the following changes.

* Given that the MVs are fixed to zero when the inter-layer prediction (ILP) is applied in the reference index based SHVC, the motion information, including the motion vector predictor (MVP) index and motion vector difference (MVD), are skipped for the EL PUs that make reference to ILP pictures.
* In the current reference index based SHVC, the ILP picture is used as the co-located picture for the EL TMVP derivation. In JCTVC-M0258, it is proposed to use the EL temporal reference picture as the co-located picture. If the co-located PU in the EL temporal reference picture refers to its ILP picture, then an alternative motion vector obtained from the corresponding BL picture of the current EL picture to be coded, is scaled appropriately and used as TMVP predictor.

# Simulation results

The common test conditions of the AI, RA, LDP and LDB configurations as specified in [2] are followed for the cross-verification.

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|  | **AI HEVC 2x** | | | **AI HEVC 1.5x** | | |
|  | Y | U | V | Y | U | V |
| Class A | -0.1% | 0.1% | 0.1% |  |  |  |
| Class B | -0.1% | 0.1% | 0.1% | -0.1% | 0.1% | 0.1% |
| **Overall (Test vs Ref)** | -0.1% | 0.1% | 0.1% | -0.1% | 0.1% | 0.1% |
| **Overall (Test vs single layer)** | 12.7% | 15.2% | 14.9% | 10.4% | 10.1% | 9.6% |
| **EL only (Test vs Ref)** | -0.2% | 0.1% | 0.1% | -0.2% | 0.1% | 0.1% |
| Enc Time[%] | #DIV/0! | | | #DIV/0! | | |
| Dec Time[%] | #DIV/0! | | | #DIV/0! | | |
| Enc Mem[%] | #DIV/0! | | | #DIV/0! | | |
| BL Match | Matched | | | Matched | | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **RA HEVC 2x** | | | **RA HEVC 1.5x** | | | **RA HEVC SNR** | | |
|  | Y | U | V | Y | U | V | Y | U | V |
| Class A | -0.9% | -0.5% | -0.5% |  |  |  | -0.5% | -0.3% | -0.3% |
| Class B | -0.8% | -0.4% | -0.5% | -0.6% | -0.5% | -0.5% | -0.6% | -0.4% | -0.5% |
| **Overall (Test vs Ref)** | -0.8% | -0.5% | -0.5% | -0.6% | -0.5% | -0.5% | -0.6% | -0.4% | -0.4% |
| **Overall (Test vs single layer)** | 19.1% | 32.5% | 33.5% | 16.7% | 27.5% | 29.9% | 15.1% | 29.5% | 34.1% |
| **EL only (Test vs Ref)** | -1.1% | -0.7% | -0.7% | -0.6% | -0.5% | -0.6% | -0.8% | -0.6% | -0.7% |
| Enc Time[%] | #DIV/0! | | | #DIV/0! | | | #DIV/0! | | |
| Dec Time[%] | #DIV/0! | | | #DIV/0! | | | #DIV/0! | | |
| Enc Mem[%] | #DIV/0! | | | #DIV/0! | | | #DIV/0! | | |
| BL Match | Matched | | | Matched | | | Matched | | |
|  |  |  |  |  |  |  |  |  |  |
|  | **LD-P HEVC 2x** | | | **LD-P HEVC 1.5x** | | | **LD-P HEVC SNR** | | |
|  | Y | U | V | Y | U | V | Y | U | V |
| Class A | -0.5% | -0.1% | -0.2% |  |  |  | 0.2% | 0.5% | 0.6% |
| Class B | -0.4% | 0.3% | 0.4% | -0.1% | 0.1% | 0.2% | 0.0% | 0.4% | 0.7% |
| **Overall (Test vs Ref)** | -0.4% | 0.2% | 0.2% | -0.1% | 0.1% | 0.2% | 0.0% | 0.4% | 0.6% |
| **Overall (Test vs single layer)** | 26.1% | 38.0% | 39.4% | 22.7% | 33.0% | 36.0% | 23.5% | 35.2% | 40.4% |
| **EL only (Test vs Ref)** | -0.5% | 0.1% | 0.1% | -0.2% | 0.1% | 0.2% | 0.1% | 0.5% | 0.7% |
| Enc Time[%] | #DIV/0! | | | #DIV/0! | | | #DIV/0! | | |
| Dec Time[%] | #DIV/0! | | | #DIV/0! | | | #DIV/0! | | |
| Enc Mem[%] | #DIV/0! | | | #DIV/0! | | | #DIV/0! | | |
| BL Match | Matched | | | Matched | | | Matched | | |

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|  | **LD-B HEVC 2x** | | | **LD-B HEVC 1.5x** | | | **LD-B HEVC SNR** | | |
|  | Y | U | V | Y | U | V | Y | U | V |
| Class A | -0.4% | -0.1% | -0.2% |  |  |  | 0.3% | 0.4% | 0.5% |
| Class B | -0.4% | 0.2% | -0.1% | -0.1% | 0.2% | 0.2% | 0.0% | 0.2% | 0.1% |
| **Overall (Test vs Ref)** | -0.4% | 0.1% | -0.2% | -0.1% | 0.2% | 0.2% | 0.0% | 0.2% | 0.2% |
| **Overall (Test vs single layer)** | 28.0% | 38.8% | 39.9% | 24.7% | 33.4% | 35.9% | 24.4% | 34.9% | 39.8% |
| **EL only (Test vs Ref)** | -0.5% | 0.0% | -0.3% | -0.1% | 0.2% | 0.2% | 0.1% | 0.3% | 0.3% |
| Enc Time[%] | #DIV/0! | | | #DIV/0! | | | #DIV/0! | | |
| Dec Time[%] | #DIV/0! | | | #DIV/0! | | | #DIV/0! | | |
| Enc Mem[%] | #DIV/0! | | | #DIV/0! | | | #DIV/0! | | |
| BL Match | Matched | | | Matched | | | Matched | | |

# Conclusion

In this cross-check report, the results of the modified motion vector signalling and prediction for the reference index based SHVC from Sharp have been verified. The software implementation is compliant with the corresponding description in the proposal and the simulation results also perfectly match the results provided from proponents.

# References

1. [K. Misra](mailto:misrak@sharplabs.com), [J. Zhao](mailto:jzhao@sharplabs.com), [A. Segall](mailto:asegall@sharplabs.com), “Modified Motion Vector Signalling and Prediction Under Reference Index Based SHVC”, JCTVC document JCTVC-M0258, Incheon, South Korea, April, 2013.
2. X. Li, J. Boyce, P. Onno and Y. Ye, “Common Test Conditions and Software Reference Configurations for the Scalable Test Model”, JCTVC document JCTVC-L1009, Geneva, Switzerland, January, 2013.