|  |  |
| --- | --- |
| **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-M0326 |

|  |  |  |  |
| --- | --- | --- | --- |
| *Title:* | **SCE1: Results of Test 4.3.3 and 4.3.2 on Inter layer Intra Mode prediction** | | |
| *Status:* | Input Document to JCT-VC | | |
| *Purpose:* | Proposal | | |
| *Author(s) or Contact(s):* | Krishna Rapaka  Jianle Chen  Vadim Seregin  Marta Karczewicz  Jungsun Kim  Joonyoung Park  Byeongmoon Jeon | Tel: Email: | [krapaka@qti.qualcomm.com](mailto:krapaka@qti.qualcomm.com)  [cjianle@qti.qualcomm.com](mailto:cjianle@qti.qualcomm.com)  [vseregin@qti.qualcomm.com](mailto:vseregin@qti.qualcomm.com)  [martak@qti.qualcomm.com](mailto:martak@qti.qualcomm.com)  [jungsun.kim@lge.com](mailto:jungsun.kim@lge.com) |
| *Source:* | Qualcomm Incorporated  LG Electronics | | |

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

This document reports the results of SCE1-4.3.3 and 4.3.2 on inter-layer intra mode prediction. In the tested method, at enhancement layer (EL) only the setting of the inputs to the MPM generation process are modified using the intra mode of the co-located base layer (BL) unit and HEVC MPM list generation process is unchanged. It is reported that for this test when MDCS is enabled, a luma BD-rate reduction (EL+ BL) of 0.35% and 0.10% is obtained for AI 2x and AI 1.5x spatial scalability cases respectively. It is also reported that for this test when MDCS is disabled, a luma BD-rate reduction (EL+ BL) of 0.23% and 0.10% is obtained for AI 2x and AI 1.5x spatial scalability cases respectively

# Technical description

In this method, only the setting of the inputs to the MPM generation process namely intraPredModeA and intraPredModeB is modified using the intra mode of the co-located unit. The MPM list generation process is kept unchanged.

The proposed MPM list generation procedure is as follows,

If the co-located BL block is available and intra coded, both intraPredModeA and intraPredModeB is set equal to co-located BL Intra Mode (iColBaseDir).

Else, intraPredModeA and intraPredModeB is derived from left and above block based on HEVC process.

Then HEVC MPM list generation process is used without any modifications.

# Test Results

The proposed method is implemented on SHM-1.0 intraBL framework and experimentally verified under SHVC common test conditions defined by [4] and the results are summarized in the following tables for AI 2x and 1.5x spatial scalability cases. In this contribution, the results are provided for both configurations when MDCS is enabled and disabled. Thanks to MediaTek for crosschecking the tests.

**Table 1: Experimental results of inter-layer intra mode prediction (MDCS ON)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **AI HEVC 2x** | | | **AI HEVC 1.5x** | | |
|  | Y | U | V | Y | U | V |
| Class A | -0.29% | -0.15% | -0.07% |  |  |  |
| Class B | -0.37% | -0.25% | -0.29% | -0.10% | 0.04% | 0.01% |
| **Overall (Test vs Ref)** | -0.35% | -0.22% | -0.22% | -0.10% | 0.04% | 0.01% |
| **Overall (Test vs single layer)** | 12.03% | 13.39% | 13.12% | 10.19% | 10.33% | 9.72% |
| **EL only (Test vs Ref)** | -0.50% | -0.37% | -0.38% | -0.08% | 0.08% | 0.05% |
| Enc Time[%] | 100.46% | | | 100.79% | | |
| Dec Time[%] | 99.87% | | | 99.50% | | |
| Enc Mem[%] | 100.04% | | | 100.01% | | |
| BL Match | Matched | | | Matched | | |

**Table 2: Experimental results of inter-layer intra mode prediction (MDCS OFF)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **AI HEVC 2x** | | | **AI HEVC 1.5x** | | |
|  | Y | U | V | Y | U | V |
| Class A | -0.23% | -0.04% | -0.01% |  |  |  |
| Class B | -0.23% | -0.08% | -0.04% | -0.10% | 0.01% | 0.02% |
| **Overall (Test vs Ref)** | -0.23% | -0.07% | -0.03% | -0.10% | 0.01% | 0.02% |
| **Overall (Test vs single layer)** | 12.16% | 13.57% | 13.35% | 10.19% | 10.30% | 9.72% |
| **EL only (Test vs Ref)** | -0.36% | -0.18% | -0.15% | -0.10% | 0.03% | 0.04% |
| Enc Time[%] | 100.16% | | | 100.46% | | |
| Dec Time[%] | 100.12% | | | 99.93% | | |
| Enc Mem[%] | 100.02% | | | 100.00% | | |
| BL Match | Matched | | | Matched | | |

# References

1. J. Chen, K. Rapaka, X. Li, V. Seregin, L. Guo, M. Karczewicz, G. Van der Auwera, J. Sole, X. Wang, C. J. Tu, Y. Chen, “Description of scalable video coding technology proposal by Qualcomm (configuration 1) JCTVC-K0035”, 11th Meeting of Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, Shanghai, China, 10-19 Oct., 2012
2. J. Chen, K. Rapaka, X. Li, V. Seregin, L. Guo, M. Karczewicz, G. Van der Auwera, J. Sole, X. Wang, C. J. Tu, Y. Chen, “Description of scalable video coding technology proposal by Qualcomm (configuration 2) JCTVC-K0036”, 11th Meeting of Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, Shanghai, China, 10-19 Oct., 2012
3. M. Guo, S. Liu, S. Lei (MediaTek), J. Park, J. Kim, B. Jeon, “Non-TE5.1: Inter-layer Intra mode prediction”, JCTVC-L0260, 12th JCT-VC Meeting, Geneva, CH, Jan. 2013

1. [X. Li](mailto:lxiang@qti.qualcomm.com), [J. Boyce](mailto:jill@vidyo.com), [P. Onno](mailto:patrice.onno@crf.canon.fr), [Y. Ye](mailto:yan.ye@interdigital.com), “Common SHM test conditions and software reference configurations”, JCTVC-L1009, Geneva, Switzerland, 14–23 Jan. 2013

# Patent rights declaration(s)

**Qualcomm Incorporated may have current or pending patent rights relating to the technology described in this contribution and, conditioned on reciprocity, is prepared to grant licenses under reasonable and non-discriminatory terms as necessary for implementation of the resulting ITU-T Recommendation | ISO/IEC International Standard (per box 2 of the ITU-T/ITU-R/ISO/IEC patent statement and licensing declaration form).**

**LG Electronics Incorporated may have current or pending patent rights relating to the technology described in this contribution and, conditioned on reciprocity, is prepared to grant licenses under reasonable and non-discriminatory terms as necessary for implementation of the resulting ITU-T Recommendation | ISO/IEC International Standard (per box 2 of the ITU-T/ITU-R/ISO/IEC patent statement and licensing declaration form).**