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| --- | --- | --- | --- |
| *Title:* | **Cross-verification of JCTVC-L0313 on P2M and P2M+SAP as lossless coding tools for screen content coding** | | |
| *Status:* | Input Document to JCT-VC | | |
| *Purpose:* | Information | | |
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# Abstract

This contribution reports cross-check results of JCTVC-L0313 on P2M and P2M+SAP as lossless coding tools for screen content coding. JCTVC-L0313 advocates using P2M (Pseudo-2D-matching) as lossless coding tools for screen content coding. In addition, the SAP (Sample adaptive angular intra prediction) is also integrated so that the combined P2M and SAP method can be efficient for a variety of screen content sequences. The experimental results of Main configurations reported in this document match those provided by the proponents in JCTVC-L0313. The HE10 configuration results provided in this document serve as supplemental information. The source code has been checked to verify that the switch between P2M and SAP in the combined method is at LCU level.

# Test Settings and Conditions

The simulations of this document have used the software provided by proponents, the simulation platform is LSF equipped with Intel(R) Xeon(R) CPU X5570 64 bits Linux machines of different frequencies, the common test conditions specified by AHG7 are followed.

# Experimental results

The experimental results are summarized in Table 1 and Table 2. The “Main” configuration results match the ones reported in JCTVC-L0313. The HE10 results here serve as supplemental information, as they are not available in JCTVC-L0313. Please be advised the run time reported in Table 1 and Table 2 might not be accurate.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **All Intra Main** | | | **All Intra HE10** | | |
|  | **compression ratio** | | Bit-rate saving | **compression ratio** | | Bit-rate saving |
|  | Reference | Tested | Reference | Tested |
| Class F | 4.6 | 4.9 | -4.9% | 3.9 | 4.9 | -16.5% |
| SC (YUV) | 9.2 | 31.3 | -51.0% | 8.5 | 38.3 | -60.6% |
| SC(GBR) | 7.5 | 29.4 | -56.3% | 7.2 | 37.6 | -66.4% |
| **Overall (w/o F)** | 8.3 | 30.4 | -53.7% | 7.8 | 38.0 | -63.5% |
| **Overall (w/ F)** | 7.7 | 26.1 | -45.5% | 7.2 | 32.4 | -55.7% |
| Enc Time[%] | 109% | | | 109% | | |
| Dec Time[%] | 57% | | | 52% | | |
|  |  |  |  |  |  |  |
|  | **Random Access Main** | | | **Random Access HE10** | | |
|  | **compression ratio** | | Bit-rate saving | **compression ratio** | | Bit-rate saving |
|  | Reference | Tested | Reference | Tested |
| Class F | 29.3 | 31.6 | -2.9% | 24.4 | 30.7 | -8.6% |
| SC (YUV) | 105.1 | 335.4 | -41.5% | 96.6 | 399.4 | -50.2% |
| SC(GBR) | 88.8 | 302.3 | -46.1% | 85.5 | 378.6 | -55.9% |
| **Overall (w/o F)** | 96.9 | 318.9 | -43.8% | 91.0 | 389.0 | -53.0% |
| **Overall (w/ F)** | 85.7 | 271.0 | -37.0% | 79.9 | 329.3 | -45.6% |
| Enc Time[%] | 101% | | | 105% | | |
| Dec Time[%] | 90% | | | 89% | | |
|  |  |  |  |  |  |  |
|  | **Low delay B Main** | | | **Low delay B HE10** | | |
|  | **compression ratio** | | Bit-rate saving | **compression ratio** | | Bit-rate saving |
|  | Reference | Tested | Reference | Tested |
| Class F | 47.4 | 48.7 | -1.0% | 39.2 | 43.1 | -3.8% |
| SC (YUV) | 338.3 | 1039.4 | -36.5% | 320.6 | 1229.0 | -44.9% |
| SC(GBR) | 301.7 | 972.4 | -40.6% | 300.0 | 1190.3 | -50.2% |
| **Overall (w/o F)** | 320.0 | 1005.9 | -38.5% | 310.3 | 1209.7 | -47.6% |
| **Overall (w/ F)** | 274.6 | 846.4 | -32.3% | 265.1 | 1015.2 | -40.3% |
| Enc Time[%] | 104% | | | **102%** | | |
| Dec Time[%] | 100% | | | 91% | | |
|  |  |  |  |  |  |  |
|  | **Low delay P Main** | | | **Low delay P HE10** | | |
|  | **compression ratio** | | Bit-rate saving | **compression ratio** | | Bit-rate saving |
|  | Reference | Tested | Reference | Tested |
| Class F | 47.1 | 48.5 | -1.0% | 39.1 | 43.1 | -3.9% |
| SC (YUV) | 339.1 | 1039.7 | -36.2% | 320.8 | 1229.0 | -44.9% |
| SC(GBR) | 302.9 | 974.3 | -40.5% | 300.1 | 1190.3 | -50.2% |
| **Overall (w/o F)** | 321.0 | 1007.0 | -38.4% | 310.4 | 1209.7 | -47.5% |
| **Overall (w/ F)** | 275.4 | 847.3 | -32.1% | 265.2 | 1015.2 | -40.2% |
| Enc Time[%] | 103% | | | 101% | | |
| Dec Time[%] | 93% | | | 88% | | |

**Table 1. BD-rate gain (%) of P2M relative to HM9.0 lossless coding mode**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **All Intra Main** | | | **All Intra HE10** | | |
|  | **compression ratio** | | Bit-rate saving | **compression ratio** | | Bit-rate saving |
|  | Reference | Tested | Reference | Tested |
| Class F | 4.9 | 5.5 | -10.6% | 4.9 | 5.3 | -7.5% |
| SC (YUV) | 31.3 | 32.2 | -5.2% | 38.3 | 38.6 | -1.9% |
| SC(GBR) | 29.4 | 29.7 | -3.6% | 37.6 | 37.7 | -0.6% |
| **Overall (w/o F)** | 30.4 | 31.0 | -4.4% | 38.0 | 38.1 | -1.3% |
| **Overall (w/ F)** | 26.1 | 26.7 | -5.4% | 32.4 | 32.7 | -2.3% |
| Enc Time[%] | 103% | | | 103% | | |
| Dec Time[%] | 100% | | | 102% | | |
|  |  |  |  |  |  |  |
|  | **Random Access Main** | | | **Random Access HE10** | | |
|  | **compression ratio** | | Bit-rate saving | **compression ratio** | | Bit-rate saving |
|  | Reference | Tested | Reference | Tested |
| Class F | 31.6 | 33.5 | -6.1% | 30.7 | 32.1 | -6.1% |
| SC (YUV) | 335.4 | 344.3 | -4.1% | 399.4 | 404.3 | -2.1% |
| SC(GBR) | 302.3 | 306.5 | -2.2% | 378.6 | 380.1 | -0.8% |
| **Overall (w/o F)** | 318.9 | 325.4 | -3.2% | 389.0 | 392.2 | -1.4% |
| **Overall (w/ F)** | 271.0 | 276.8 | -3.6% | 329.3 | 332.2 | -2.2% |
| Enc Time[%] | 101% | | | 97% | | |
| Dec Time[%] | 99% | | | 97% | | |
|  |  |  |  |  |  |  |
|  | **Low delay B Main** | | | **Low delay B HE10** | | |
|  | **compression ratio** | | Bit-rate saving | **compression ratio** | | Bit-rate saving |
|  | Reference | Tested | Reference | Tested |
| Class F | 48.7 | 50.8 | -5.3% | 43.1 | 45.5 | -6.3% |
| SC (YUV) | 1039.4 | 1069.8 | -4.3% | 1229.0 | 1247.0 | -2.5% |
| SC(GBR) | 972.4 | 1005.4 | -3.0% | 1190.3 | 1213.9 | -1.5% |
| **Overall (w/o F)** | 1005.9 | 1037.6 | -3.6% | 1209.7 | 1230.4 | -2.0% |
| **Overall (w/ F)** | 846.4 | 873.1 | -3.9% | 1015.2 | 1032.9 | -2.7% |
| Enc Time[%] | 102% | | | **100%** | | |
| Dec Time[%] | 98% | | | 102% | | |
|  |  |  |  |  |  |  |
|  | **Low delay P Main** | | | **Low delay P HE10** | | |
|  | **compression ratio** | | Bit-rate saving | **compression ratio** | | Bit-rate saving |
|  | Reference | Tested | Reference | Tested |
| Class F | 48.5 | 50.6 | -5.3% | 43.1 | 45.5 | -6.4% |
| SC (YUV) | 1039.7 | 1075.7 | -4.6% | 1232.0 | 1247.0 | -2.4% |
| SC(GBR) | 974.3 | 1006.7 | -2.9% | 1162.9 | 1213.9 | -1.6% |
| **Overall (w/o F)** | 1007.0 | 1041.2 | -3.7% | 1197.4 | 1230.4 | -2.0% |
| **Overall (w/ F)** | 847.3 | 876.1 | -4.0% | 1005.0 | 1032.9 | -2.7% |
| Enc Time[%] | 101% | | | 102% | | |
| Dec Time[%] | 101% | | | 101% | | |

**Table 2. BD-rate gain (%) of P2M + SAP relative to P2M**

# References

[1] F. Bossen, “Common HM test conditions and software reference configurations,” JCT-VC Document, JCTVC-K1100, Shanghai, China, October 2012.

[2] [B. Bross](mailto:benjamin.bross@hhi.fraunhofer.de), [W.-J. Han](mailto:wjhan.han@samsung.com), [J.-R. Ohm](mailto:ohm@ient.rwth-aachen.de), [G. J. Sullivan](mailto:garysull@microsoft.com), [T. Wiegand](mailto:thomas.wiegand@hhi.fraunhofer.de) “High Efficiency Video Coding (HEVC) text specification draft 9 (SoDIS)” JCT-VC Document, JCTVC-K1003, Shanghai, China, October 2012.

[3] Peijun Zhang, [Tao Lin](mailto:lintao@tongji.edu.cn), Shuhui Wang, Kailun Zhou, “AHG8: P2M and P2M+SAP as lossless coding tools for screen content coding,” JCT-VC Document, JCTVC-L0313, Geneva, CH, 14 -23 January, 2013