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| *Title:* | **CE2: Crosscheck of Test1 – Unification of IBC to inter** | | |
| *Status:* | Input Document to JCT-VC | | |
| *Purpose:* | Report | | |
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# Abstract

This documents reports the crosscheck results for CE2 Test 1 on unification of IBC to inter (JCTVC-S0080). The source code provided by the proponents was verified to be consistent with the description in JCTVC-R1102. The rate-distortion performance was evaluated for CE2 test conditions JCTVC-R1102 and matches the one provided in JCTVC-S0080.

# Introduction

JCTVC-S0080 [2] describes a technique where IBC is signaled at PU level as inter mode. Block vector (BV) and motion vector (MV) are mixed in inter merge mode. The BV is coded in MV prediction and MVD entropy coding method. The intra block copy prediction mode is differentiated from inter prediction mode by checking if the POC value of reference picture is equal to the POC value of current picture.

# Simulation results

The performance of the CE2 test 1 is cross-checked according to CE2 test conditions [1] and is summarized below. The detailed results can be found in the attached excel datasheets.

Table 1. Average BD rate reduction for lossless coding compared with CE2 anchors

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **All Intra** | | | |
|  | Bit-rate saving (Total) | Bit-rate saving (Average) | Bit-rate saving (Min) | Bit-rate saving (Max) |
|  |
| RGB, text & graphics with motion, 1080p | 1.5% | 1.5% | 1.1% | 1.9% |
| RGB, text & graphics with motion,720p | 0.3% | 0.4% | 0.0% | 0.9% |
| RGB, mixed content, 1440p | 1.5% | 1.3% | 0.3% | 2.3% |
| RGB, mixed content, 1080p | 1.4% | 1.4% | 1.4% | 1.4% |
| RGB, Animation, 720p | 0.0% | 0.0% | 0.0% | 0.0% |
| RGB, camera captured, 1080p | 0.0% | 0.0% | 0.0% | 0.0% |
| YUV, text & graphics with motion, 1080p | 0.7% | 0.7% | 0.1% | 1.3% |
| YUV, text & graphics with motion,720p | 0.3% | 0.4% | 0.0% | 0.9% |
| YUV, mixed content, 1440p | 1.3% | 1.2% | 0.2% | 2.1% |
| YUV, mixed content, 1080p | 1.1% | 1.1% | 1.1% | 1.1% |
| YUV, Animation, 720p | 0.0% | 0.0% | 0.0% | 0.0% |
| YUV, camera captured, 1080p | 0.0% | 0.0% | 0.0% | 0.0% |
| Enc Time[%] | 117% | | | |
| Dec Time[%] | 100% | | | |
|  |  |  |  |  |
|  | **Random Access** | | | |
|  | Bit-rate saving (Total) | Bit-rate saving (Average) | Bit-rate saving (Min) | Bit-rate saving (Max) |
|  |
| RGB, text & graphics with motion, 1080p | 2.5% | 2.3% | 1.1% | 3.0% |
| RGB, text & graphics with motion,720p | 0.2% | 0.3% | 0.0% | 0.6% |
| RGB, mixed content, 1440p | 0.3% | 0.3% | 0.0% | 0.6% |
| RGB, mixed content, 1080p | 0.3% | 0.3% | 0.3% | 0.3% |
| RGB, Animation, 720p | 0.0% | 0.0% | 0.0% | 0.0% |
| RGB, camera captured, 1080p | 0.0% | 0.0% | 0.0% | 0.0% |
| YUV, text & graphics with motion, 1080p | 2.5% | 2.1% | 1.1% | 2.8% |
| YUV, text & graphics with motion,720p | 0.2% | 0.2% | 0.0% | 0.3% |
| YUV, mixed content, 1440p | 0.3% | 0.3% | 0.0% | 0.6% |
| YUV, mixed content, 1080p | 0.2% | 0.2% | 0.2% | 0.2% |
| YUV, Animation, 720p | 0.0% | 0.0% | 0.0% | 0.0% |
| YUV, camera captured, 1080p | 0.0% | 0.0% | 0.0% | 0.0% |
| Enc Time[%] | 104% | | | |
| Dec Time[%] | 93% | | | |
|  |  |  |  |  |
|  | **Low Delay B** | | | |
|  | Bit-rate saving (Total) | Bit-rate saving (Average) | Bit-rate saving (Min) | Bit-rate saving (Max) |
|  |
| RGB, text & graphics with motion, 1080p | 2.7% | 2.4% | 0.8% | 3.5% |
| RGB, text & graphics with motion,720p | 0.1% | 0.1% | 0.0% | 0.4% |
| RGB, mixed content, 1440p | 0.2% | 0.2% | 0.0% | 0.3% |
| RGB, mixed content, 1080p | 0.1% | 0.1% | 0.1% | 0.1% |
| RGB, Animation, 720p | 0.0% | 0.0% | 0.0% | 0.0% |
| RGB, camera captured, 1080p | 0.0% | 0.0% | 0.0% | 0.0% |
| YUV, text & graphics with motion, 1080p | 2.5% | 2.3% | 1.0% | 3.2% |
| YUV, text & graphics with motion,720p | 0.1% | 0.1% | 0.0% | 0.5% |
| YUV, mixed content, 1440p | 0.1% | 0.1% | 0.0% | 0.2% |
| YUV, mixed content, 1080p | 0.1% | 0.1% | 0.1% | 0.1% |
| YUV, Animation, 720p | 0.0% | 0.0% | 0.0% | 0.0% |
| YUV, camera captured, 1080p | 0.0% | 0.0% | 0.0% | 0.0% |
| Enc Time[%] | 104% | | | |
| Dec Time[%] | 97% | | | |

Table 2. Average BD rate reduction for lossy coding compared with CE2 anchors

|  |  |  |  |
| --- | --- | --- | --- |
|  | **All Intra** | | |
|  | G/Y | B/U | R/V |
| RGB, text & graphics with motion, 1080p | -2.1% | -3.7% | -3.8% |
| RGB, text & graphics with motion,720p | -1.1% | -2.1% | -2.0% |
| RGB, mixed content, 1440p | -1.6% | -2.0% | -2.2% |
| RGB, mixed content, 1080p | -1.2% | -1.9% | -1.9% |
| RGB, Animation, 720p | 0.1% | 0.1% | 0.1% |
| RGB, camera captured, 1080p | 0.1% | 0.1% | 0.1% |
| YUV, text & graphics with motion, 1080p | -0.5% | -2.0% | -2.0% |
| YUV, text & graphics with motion,720p | -0.4% | -1.3% | -1.6% |
| YUV, mixed content, 1440p | -0.8% | -1.5% | -1.8% |
| YUV, mixed content, 1080p | -0.7% | -2.1% | -2.2% |
| YUV, Animation, 720p | 0.0% | 0.1% | 0.0% |
| YUV, camera captured, 1080p | 0.1% | 0.2% | 0.1% |
| Enc Time[%] | 121% | | |
| Dec Time[%] | 99% | | |
|  |  |  |  |
|  | **Random Access** | | |
|  | G/Y | B/U | R/V |
| RGB, text & graphics with motion, 1080p | -3.7% | -5.6% | -5.6% |
| RGB, text & graphics with motion,720p | -1.2% | -2.6% | -2.6% |
| RGB, mixed content, 1440p | -1.2% | -2.4% | -2.5% |
| RGB, mixed content, 1080p | -1.1% | -2.6% | -2.8% |
| RGB, Animation, 720p | 0.0% | -0.1% | -0.1% |
| RGB, camera captured, 1080p | -0.2% | -0.1% | -0.2% |
| YUV, text & graphics with motion, 1080p | -3.7% | -5.4% | -5.5% |
| YUV, text & graphics with motion,720p | -0.7% | -2.2% | -2.2% |
| YUV, mixed content, 1440p | -0.9% | -2.5% | -2.4% |
| YUV, mixed content, 1080p | -0.9% | -3.3% | -3.3% |
| YUV, Animation, 720p | 0.0% | 0.0% | 0.0% |
| YUV, camera captured, 1080p | -0.1% | 0.1% | 0.0% |
| Enc Time[%] | 110% | | |
| Dec Time[%] | 94% | | |
|  |  |  |  |
|  | **Low delay B** | | |
|  | G/Y | B/U | R/V |
| RGB, text & graphics with motion, 1080p | -3.8% | -5.3% | -5.2% |
| RGB, text & graphics with motion,720p | -0.8% | -2.0% | -2.1% |
| RGB, mixed content, 1440p | -1.0% | -2.1% | -2.1% |
| RGB, mixed content, 1080p | -1.1% | -2.8% | -2.6% |
| RGB, Animation, 720p | 0.1% | 0.0% | 0.2% |
| RGB, camera captured, 1080p | 0.0% | 0.0% | 0.0% |
| YUV, text & graphics with motion, 1080p | -4.0% | -5.6% | -5.4% |
| YUV, text & graphics with motion,720p | -0.8% | -1.6% | -2.3% |
| YUV, mixed content, 1440p | -0.9% | -2.5% | -2.1% |
| YUV, mixed content, 1080p | -1.1% | -4.6% | -5.4% |
| YUV, Animation, 720p | 0.2% | -0.1% | 0.6% |
| YUV, camera captured, 1080p | 0.0% | 0.0% | 0.0% |
| Enc Time[%] | 108% | | |
| Dec Time[%] | 97% | | |

# References

1. J. Xu, S. Liu, K. Rapaka, X. Xiu, “Description of Core Experiment 2 (CE2): IBC signalling and partitioning”, JCTVC-R1102, Jul. 2014, Sapporo, JP.
2. B. Li, J. Xu, X. Xu, S. Liu, S. Lei, “CE2: Result of Test 1”, JCTVC-S0080, Oct. 2014.