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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**  14th Meeting: Vienna, AT, 25 July – 2 Aug. 2013 | Document: JCTVC-N0327 |

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| *Title:* | **RCE3: Cross-check of JCTVC-N0205 (Test 3.3)** | | |
| *Status:* | Input Document to JCT-VC | | |
| *Purpose:* | Information | | |
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# Abstract

This contribution reports the cross-check results performed by Huawei on JCTVC-N0205. The verification tests were carried out using the test sequences and conditions specified in JCTVC-M1123. Our test results matched, in terms of bitrates, with those presented in the contribution documents.

# Description

The algorithm proposed by JCTVC-N0205 is a CU-level intra motion compensation tool. When this mode is enabled, motion search can be done horizontally or vertically. Two conditions have been tested: first, search range of horizontal and vertical motions is limited from 0 ~ -63; second, search range of vertical motion is further limited in one LCU.

# Results

The test conditions for 3.3 Intra Motion Compensation in RCE3 as specified in JCTVC-M1123 were used in the verification tests. The simulations were run on a 64-bit Windows cluster. Our results matched, in terms of bitrate, those reported by the proponents. The complete cross-check results are provided in the accompanying spread-sheets. Below shows the summary of the test results.

## Lossless results

**Table 1. horizontal search range: 0 to -63 and vertical search range: 0 to -63**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **All Intra Main** | | | **Random Access Main** | | | **Low delay B Main** | | |
|  | **compression ratio** | | Bit-rate saving | **compression ratio** | | Bit-rate saving | **compression ratio** | | Bit-rate saving |
|  | Reference | Tested | Reference | Tested | Reference | Tested |
| Class F | 5.2 | 5.4 | -2.5% | 31.7 | 32.8 | -1.4% | 49.8 | 50.7 | -0.7% |
| Class B | 2.2 | 2.2 | 0.0% | 2.6 | 2.6 | 0.0% | 2.6 | 2.6 | 0.0% |
| SC RGB 444 | 10.1 | 15.2 | -25.2% | 100.4 | 154.4 | -19.9% | 381.6 | 572.1 | -16.6% |
| SC YUV 444 | 11.4 | 18.2 | -20.7% | 128.9 | 204 | -18.9% | 325.6 | 524.4 | -17.0% |
| RangeExt | 2.4 | 2.4 | 0.0% | 2.5 | 2.5 | 0.0% | 2.5 | 2.5 | 0.0% |
| Enc Time[%] | 138% | | | 110% | | | 107% | | |
| Dec Time[%] | 90% | | | 106% | | | 101% | | |

**Table 2. horizontal search range: 0 to -63 and vertical search range within LCU**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **All Intra Main** | | | **Random Access Main** | | | **Low delay B Main** | | |
|  | **compression ratio** | | Bit-rate saving | **compression ratio** | | Bit-rate saving | **compression ratio** | | Bit-rate saving |
|  | Reference | Tested | Reference | Tested | Reference | Tested |
| Class F | 5.2 | 5.4 | -2.3% | 31.7 | 32.8 | -1.4% | 49.8 | 50.6 | -0.6% |
| Class B | 2.2 | 2.2 | 0.0% | 2.6 | 2.6 | 0.0% | 2.6 | 2.6 | 0.0% |
| SC RGB 444 | 10.1 | 14.1 | -21.5% | 100.4 | 143.1 | -17.0% | 381.6 | 555.6 | -14.8% |
| SC YUV 444 | 11.4 | 16.7 | -18.5% | 128.9 | 187.8 | -16.6% | 325.6 | 510.7 | -16.1% |
| RangeExt | 2.4 | 2.4 | 0.0% | 2.5 | 2.5 | 0.0% | 2.5 | 2.5 | 0.0% |
| Enc Time[%] | 136% | | | 109% | | | 107% | | |
| Dec Time[%] | 93% | | | 105% | | | 103% | | |

## Lossy results

**Table 3. horizontal search range: 0 to -63 and vertical search range: 0 to -63**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **All Intra HE Main-tier** | | | **All Intra HE High-tier** | | | **All Intra HE Super-High-tier** | | |
|  | Y | U | V | Y | U | V | Y | U | V |
| Class F | -8.5% | -8.4% | -8.4% | -7.3% | -7.4% | -7.3% | -6.3% | -6.4% | -6.3% |
| Class B | -0.1% | -0.2% | -0.2% | -0.1% | -0.1% | -0.1% | 0.0% | -0.1% | -0.1% |
| SC RGB 444 | -31.8% | -31.7% | -32.0% | -31.1% | -31.2% | -31.3% | -30.6% | -30.5% | -30.5% |
| SC YUV 444 | -26.7% | -26.5% | -26.9% | -26.0% | -25.9% | -26.2% | -25.4% | -25.3% | -25.3% |
| RangeExt | 0.0% | -0.1% | -0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Enc Time[%] | 129% | | | 130% | | | 131% | | |
| Dec Time[%] | 85% | | | 85% | | | 85% | | |
|  |  |  |  |  |  |  |  |  |  |
|  | **Random Access HE Main-tier** | | | **Random Access HE High-tier** | | |  |  |  |
|  | Y | U | V | Y | U | V |  |  |  |
| Class F | -6.2% | -6.6% | -6.4% | -5.5% | -5.7% | -5.8% |  |  |  |
| Class B | 0.0% | -0.2% | -0.1% | 0.0% | 0.0% | 0.0% |  |  |  |
| SC RGB 444 | -25.9% | -25.6% | -25.8% | -25.0% | -24.8% | -24.9% |  |  |  |
| SC YUV 444 | -22.9% | -23.1% | -23.4% | -22.5% | -22.6% | -22.7% |  |  |  |
| RangeExt | -0.1% | -0.1% | -0.1% | 0.0% | -0.1% | -0.1% |  |  |  |
| Enc Time[%] | 113% | | | 113% | | |  |  |  |
| Dec Time[%] | 106% | | | 106% | | |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  | **Low delay B HE Main-tier** | | | **Low delay B HE High-tier** | | |  |  |  |
|  | Y | U | V | Y | U | V |  |  |  |
| Class F | -3.9% | -4.3% | -4.3% | -3.4% | -3.7% | -3.7% |  |  |  |
| Class B | 0.0% | -0.3% | -0.2% | 0.0% | -0.1% | 0.0% |  |  |  |
| SC RGB 444 | -20.1% | -19.1% | -19.2% | -19.6% | -18.6% | -18.6% |  |  |  |
| SC YUV 444 | -17.5% | -17.0% | -17.2% | -17.3% | -16.6% | -16.8% |  |  |  |
| RangeExt | 0.0% | -0.1% | -0.1% | 0.0% | 0.0% | -0.1% |  |  |  |
| Enc Time[%] | 109% | | | 110% | | |  |  |  |
| Dec Time[%] | 103% | | | 103% | | |  |  |  |

**Table 4. horizontal search range: 0 to -63 and vertical search range within LCU**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **All Intra HE Main-tier** | | | **All Intra HE High-tier** | | | **All Intra HE Super-High-tier** | | |
|  | Y | U | V | Y | U | V | Y | U | V |
| Class F | -7.9% | -7.8% | -7.8% | -6.9% | -6.9% | -6.8% | -5.9% | -6.0% | -5.9% |
| Class B | -0.1% | -0.1% | -0.1% | -0.1% | -0.1% | -0.1% | 0.0% | 0.0% | 0.0% |
| SC RGB 444 | -27.5% | -27.5% | -27.8% | -27.0% | -27.1% | -27.3% | -26.6% | -26.6% | -26.6% |
| SC YUV 444 | -24.1% | -24.0% | -24.3% | -23.5% | -23.6% | -23.7% | -23.0% | -23.0% | -22.9% |
| RangeExt | 0.0% | 0.0% | -0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Enc Time[%] | 128% | | | 129% | | | 130% | | |
| Dec Time[%] | 88% | | | 88% | | | 88% | | |
|  |  |  |  |  |  |  |  |  |  |
|  | **Random Access HE Main-tier** | | | **Random Access HE High-tier** | | |  |  |  |
|  | Y | U | V | Y | U | V |  |  |  |
| Class F | -5.8% | -6.1% | -6.0% | -5.1% | -5.4% | -5.3% |  |  |  |
| Class B | 0.0% | -0.1% | -0.2% | 0.0% | 0.0% | -0.1% |  |  |  |
| SC RGB 444 | -22.2% | -22.0% | -22.3% | -21.5% | -21.4% | -21.5% |  |  |  |
| SC YUV 444 | -20.5% | -20.7% | -21.0% | -20.2% | -20.2% | -20.4% |  |  |  |
| RangeExt | 0.0% | -0.1% | -0.1% | 0.0% | 0.0% | -0.1% |  |  |  |
| Enc Time[%] | 112% | | | 113% | | |  |  |  |
| Dec Time[%] | 107% | | | 106% | | |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  | **Low delay B HE Main-tier** | | | **Low delay B HE High-tier** | | |  |  |  |
|  | Y | U | V | Y | U | V |  |  |  |
| Class F | -3.5% | -3.9% | -3.4% | -3.1% | -3.2% | -3.1% |  |  |  |
| Class B | 0.0% | -0.1% | -0.3% | 0.0% | 0.0% | -0.1% |  |  |  |
| SC RGB 444 | -17.3% | -16.4% | -16.5% | -17.0% | -16.0% | -16.0% |  |  |  |
| SC YUV 444 | -15.8% | -15.3% | -15.5% | -15.9% | -15.4% | -15.5% |  |  |  |
| RangeExt | 0.0% | -0.1% | -0.1% | 0.0% | 0.0% | -0.1% |  |  |  |
| Enc Time[%] | 109% | | | 109% | | |  |  |  |
| Dec Time[%] | 104% | | | 104% | | |  |  |  |

# Conclusions

Our verification test results confirmed the reported coding efficiency gain in JCTVC-N0205.