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| **Joint Collaborative Team on Video Coding (JCT-VC)**  **of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11**  7th Meeting: Geneva, 21-30 November, 2011 | Document: JCTVC-G385 |

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| *Title:* | Cross check of Panasonic's JCTVC-G638 and JCTVC-G639 on Deblocking | | |
| *Status:* | Input Document to JCT-VC | | |
| *Purpose:* | Information | | |
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# Abstract

Cross check results of Panasonic’s deblocking related proposals JCTVC-G638 and JCTVC-G639 are reported. The source codes correspond to the proposal descriptions. The BD-rate results match perfectly and the execution times are approximately similar to the HM4.0 anchor times.

# Objective Results

The BD-rate results are obtained according to the HM4 common test conditions (JCTVC-F900). The execution times were measured in a heterogeneous computing environment.

## JCTVC-G639: “Deblocking simplification and rounding optimization”

### Results for “Delta Simplification and Rounding”

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **All Intra HE** | | | **All Intra LC** | | |
|  | Y | U | V | Y | U | V |
| Class A | -0.5% | -0.1% | -0.1% | -0.3% | -0.4% | -0.3% |
| Class B | -0.3% | 0.0% | 0.0% | -0.2% | -0.3% | -0.2% |
| Class C | -0.2% | 0.0% | 0.0% | -0.2% | -0.2% | -0.2% |
| Class D | -0.2% | 0.0% | 0.0% | -0.2% | -0.2% | -0.2% |
| Class E | -0.3% | 0.1% | 0.0% | -0.2% | 0.0% | -0.1% |
| **Overall** | -0.3% | 0.0% | 0.0% | -0.2% | -0.2% | -0.2% |
|  | -0.3% | 0.0% | 0.0% | -0.2% | -0.2% | -0.2% |
| Enc Time[%] | 100% | | | 96% | | |
| Dec Time[%] | 101% | | | 102% | | |
|  |  |  |  |  |  |  |
|  | **Random Access HE** | | | **Random Access LC** | | |
|  | Y | U | V | Y | U | V |
| Class A | -0.2% | -0.2% | -0.2% | -0.1% | -0.3% | -0.1% |
| Class B | -0.1% | 0.0% | 0.1% | 0.0% | -0.2% | -0.2% |
| Class C | 0.0% | -0.1% | 0.0% | 0.0% | -0.1% | -0.1% |
| Class D | 0.0% | 0.1% | 0.0% | 0.0% | -0.4% | -0.2% |
| Class E |  |  |  |  |  |  |
| **Overall** | -0.1% | 0.0% | 0.0% | 0.0% | -0.2% | -0.1% |
|  | -0.1% | 0.0% | 0.0% | 0.0% | -0.2% | -0.1% |
| Enc Time[%] | 93% | | | 94% | | |
| Dec Time[%] | 97% | | | 101% | | |
|  |  |  |  |  |  |  |
|  | **Low delay B HE** | | | **Low delay B LC** | | |
|  | Y | U | V | Y | U | V |
| Class A |  |  |  |  |  |  |
| Class B | 0.1% | 0.0% | -0.2% | 0.1% | -0.1% | 0.1% |
| Class C | 0.0% | 0.0% | -0.1% | -0.1% | 0.0% | -0.3% |
| Class D | 0.0% | 0.0% | 0.0% | -0.1% | 0.0% | 0.1% |
| Class E | -0.2% | 0.0% | 0.5% | -0.2% | 0.2% | -0.5% |
| **Overall** | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | -0.1% |
|  | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | -0.2% |
| Enc Time[%] | 91% | | | 92% | | |
| Dec Time[%] | 100% | | | 100% | | |
|  |  |  |  |  |  |  |
|  | **Low delay P HE** | | | **Low delay P LC** | | |
|  | Y | U | V | Y | U | V |
| Class A |  |  |  |  |  |  |
| Class B | 0.1% | 0.2% | 0.3% | 0.3% | -0.1% | -0.1% |
| Class C | 0.0% | 0.1% | 0.0% | 0.0% | -0.1% | 0.1% |
| Class D | 0.1% | -0.7% | -0.6% | 0.0% | 0.0% | -0.2% |
| Class E | 0.0% | 0.5% | 0.2% | 0.0% | -0.5% | -0.1% |
| **Overall** | 0.1% | 0.0% | 0.0% | 0.1% | -0.1% | -0.1% |
|  | 0.1% | 0.0% | 0.0% | 0.1% | -0.1% | -0.1% |
| Enc Time[%] | 94% | | | 93% | | |
| Dec Time[%] | 101% | | | 103% | | |

### Results for “Delta Simplification”

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **All Intra HE** | | | **All Intra LC** | | |
|  | Y | U | V | Y | U | V |
| Class A | -0.5% | 0.0% | 0.0% | -0.3% | 0.0% | 0.0% |
| Class B | -0.3% | 0.0% | 0.0% | -0.1% | 0.0% | 0.0% |
| Class C | -0.2% | 0.0% | 0.0% | -0.1% | 0.0% | 0.0% |
| Class D | -0.2% | 0.0% | 0.0% | -0.1% | 0.0% | 0.0% |
| Class E | -0.3% | 0.0% | 0.0% | -0.1% | 0.0% | 0.0% |
| **Overall** | -0.3% | 0.0% | 0.0% | -0.1% | 0.0% | 0.0% |
|  | -0.3% | 0.0% | 0.0% | -0.1% | 0.0% | 0.0% |
| Enc Time[%] | 98% | | | 95% | | |
| Dec Time[%] | 101% | | | 99% | | |
|  |  |  |  |  |  |  |
|  | **Random Access HE** | | | **Random Access LC** | | |
|  | Y | U | V | Y | U | V |
| Class A | -0.2% | -0.2% | -0.1% | 0.0% | 0.2% | 0.1% |
| Class B | 0.0% | -0.1% | 0.0% | 0.1% | 0.0% | 0.0% |
| Class C | 0.0% | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% |
| Class D | 0.0% | 0.1% | 0.1% | 0.0% | -0.1% | -0.1% |
| Class E |  |  |  |  |  |  |
| **Overall** | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
|  | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Enc Time[%] | 93% | | | 95% | | |
| Dec Time[%] | 98% | | | 100% | | |
|  |  |  |  |  |  |  |
|  | **Low delay B HE** | | | **Low delay B LC** | | |
|  | Y | U | V | Y | U | V |
| Class A |  |  |  |  |  |  |
| Class B | 0.1% | -0.1% | -0.3% | 0.2% | 0.0% | 0.0% |
| Class C | 0.1% | -0.1% | 0.0% | 0.1% | 0.2% | -0.2% |
| Class D | 0.0% | 0.1% | 0.0% | 0.0% | 0.1% | -0.3% |
| Class E | -0.1% | 0.2% | 0.6% | 0.0% | 0.9% | 0.0% |
| **Overall** | 0.0% | 0.0% | 0.0% | 0.0% | 0.2% | -0.1% |
|  | 0.0% | 0.0% | -0.1% | 0.0% | 0.2% | -0.1% |
| Enc Time[%] | 92% | | | 92% | | |
| Dec Time[%] | 101% | | | 98% | | |
|  |  |  |  |  |  |  |
|  | **Low delay P HE** | | | **Low delay P LC** | | |
|  | Y | U | V | Y | U | V |
| Class A |  |  |  |  |  |  |
| Class B | 0.1% | 0.1% | 0.2% | 0.3% | 0.1% | -0.1% |
| Class C | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% | 0.0% |
| Class D | 0.1% | 0.1% | -0.1% | 0.0% | 0.2% | -0.2% |
| Class E | 0.1% | 0.0% | 0.0% | 0.0% | -0.1% | 0.1% |
| **Overall** | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% | -0.1% |
|  | 0.1% | 0.0% | 0.0% | 0.1% | 0.1% | -0.1% |
| Enc Time[%] | 95% | | | 93% | | |
| Dec Time[%] | 99% | | | 97% | | |

### Results for “Rounding”

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **All Intra HE** | | | **All Intra LC** | | |
|  | Y | U | V | Y | U | V |
| Class A | 0.0% | -0.1% | -0.1% | -0.1% | -0.4% | -0.3% |
| Class B | 0.0% | -0.1% | 0.0% | -0.1% | -0.3% | -0.2% |
| Class C | 0.0% | 0.0% | 0.0% | -0.1% | -0.2% | -0.2% |
| Class D | 0.0% | 0.0% | 0.0% | -0.1% | -0.2% | -0.2% |
| Class E | 0.0% | 0.1% | 0.0% | -0.1% | 0.0% | -0.1% |
| **Overall** | 0.0% | 0.0% | 0.0% | -0.1% | -0.2% | -0.2% |
|  | 0.0% | 0.0% | 0.0% | -0.1% | -0.2% | -0.2% |
| Enc Time[%] | 98% | | | 94% | | |
| Dec Time[%] | 100% | | | 99% | | |
|  |  |  |  |  |  |  |
|  | **Random Access HE** | | | **Random Access LC** | | |
|  | Y | U | V | Y | U | V |
| Class A | 0.0% | -0.2% | -0.3% | -0.1% | -0.2% | -0.3% |
| Class B | 0.0% | -0.1% | 0.0% | -0.1% | -0.2% | -0.1% |
| Class C | 0.0% | -0.1% | 0.1% | -0.1% | -0.1% | -0.1% |
| Class D | 0.0% | 0.0% | 0.0% | 0.0% | -0.2% | -0.3% |
| Class E |  |  |  |  |  |  |
| **Overall** | 0.0% | -0.1% | -0.1% | -0.1% | -0.2% | -0.2% |
|  | 0.0% | -0.1% | -0.1% | -0.1% | -0.2% | -0.2% |
| Enc Time[%] | 91% | | | 93% | | |
| Dec Time[%] | 95% | | | 102% | | |
|  |  |  |  |  |  |  |
|  | **Low delay B HE** | | | **Low delay B LC** | | |
|  | Y | U | V | Y | U | V |
| Class A |  |  |  |  |  |  |
| Class B | 0.0% | -0.1% | -0.1% | -0.1% | -0.1% | 0.0% |
| Class C | 0.0% | -0.1% | -0.2% | -0.1% | 0.0% | -0.1% |
| Class D | 0.0% | -0.1% | -0.2% | -0.1% | -0.2% | -0.1% |
| Class E | -0.2% | 0.4% | 0.3% | -0.3% | -0.1% | -0.5% |
| **Overall** | 0.0% | 0.0% | -0.1% | -0.1% | -0.1% | -0.1% |
|  | 0.0% | 0.0% | -0.1% | -0.1% | -0.1% | -0.1% |
| Enc Time[%] | 91% | | | 91% | | |
| Dec Time[%] | 96% | | | 102% | | |
|  |  |  |  |  |  |  |
|  | **Low delay P HE** | | | **Low delay P LC** | | |
|  | Y | U | V | Y | U | V |
| Class A |  |  |  |  |  |  |
| Class B | 0.0% | 0.0% | 0.1% | 0.0% | 0.1% | -0.2% |
| Class C | 0.0% | 0.1% | -0.1% | -0.1% | 0.0% | 0.0% |
| Class D | 0.0% | 0.5% | 0.0% | -0.1% | -0.2% | -0.3% |
| Class E | 0.0% | 0.0% | 0.1% | -0.1% | -0.1% | -0.6% |
| **Overall** | 0.0% | 0.2% | 0.0% | -0.1% | 0.0% | -0.2% |
|  | 0.0% | 0.2% | 0.0% | -0.1% | 0.0% | -0.3% |
| Enc Time[%] | 94% | | | 92% | | |
| Dec Time[%] | 101% | | | 102% | | |

## JCTVC-G638: “Deblocking boundary strength and filtering process simplifications”

This proposal has no impact on the HM4.0 bitstreams, so the decoding of the HM4.0 anchor was verified and confirmed. The source code corresponds to the proposal description.

# Patent rights declaration(s)

**Qualcomm Inc. may have IPR 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).**