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| **Joint Collaborative Team on Video Coding (JCT-VC)**  **of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11**  8th Meeting: San Jose, 1-10 Feb, 2012 | Document: JCTVC-H0607 |

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| *Title:* | **Cross-check of JCTVC-H0497:** **Improving coeff\_abs\_level\_minus3**  **coding performance under high bitrate** | | | |
| *Status:* | Input Document to JCT-VC | | | |
| *Purpose:* | Informational | | | |
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# Abstract

This document reports the test results of JCTVC-H0497: Improving coeff\_abs\_level\_minus3

coding performance under high bitrate from Motorola. The proposed techniques have been studied. The provided software has been checked, compiled and the results reported by the proponents can be confirmed.

1. Introduction of the proposed methods

In the current CABAC of HEVC, syntax coeff\_ab\_level\_minu3 is used to represent the absolute value of a quantized transform coefficient level minus 3. Adaptive truncated Golomb-Rice code with parameter 0, 1, 2, and 3 are used. For some large values, truncated Rice code and 0-th order Exp-Golomb code are used together.

JCTVC-H0497 proposes to add another parameter 4 to improve the coding performance under high bitrate as following.

|  |  |
| --- | --- |
| cRiceParam | cTRMax |
| 0 | 7 |
| 1 | 20 |
| 2 | 42 |
| 3 | 70 |
| 4 | 126 |

# Experimental Results

Simulations were conducted following common test conditions defined in JCTVC-1000 [1]. Anchor data was generated using HM5.0 software [2]. In the JCTVC-H0497 software, one macro has been introduced to integrate the proposed methods:

* MMI\_NEW\_RICE\_UPDATE\_TABLE

Table 1 reports the results by using common test conditions.

Table 1. Results with common test conditions

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **All Intra HE** | | | **All Intra LC** | | | **All Intra HE-10** | | |
|  | Y | U | V | Y | U | V | Y | U | V |
| Class A (8bit) | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |  |  |  |
| Class B | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |  |  |  |
| Class C | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |  |  |  |
| Class D | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |  |  |  |
| Class E | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |  |  |  |
| **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% |  |  |  |
| Class F | 0.0% | -0.1% | 0.0% | 0.0% | 0.0% | 0.0% |  |  |  |
| Enc Time[%] | 100% | | | 100% | | |  | | |
| Dec Time[%] | 100% | | | 100% | | |  | | |
|  |  |  |  |  |  |  |  |  |  |
|  | **Random Access HE** | | | **Random Access LC** | | | **Random Access HE-10** | | |
|  | Y | U | V | Y | U | V | Y | U | V |
| Class A (8bit) | 0.0% | 0.0% | -0.2% | 0.0% | 0.1% | 0.1% | 0.0% | 0.1% | 0.2% |
| Class B | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Class C | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |  |  |  |
| Class D | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% |  |  |  |
| Class E |  |  |  |  |  |  |  |  |  |
| **Overall** | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% |
|  | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.1% |
| Class F | -0.1% | -0.1% | 0.0% | 0.1% | 0.0% | 0.0% |  |  |  |
| Enc Time[%] | 100% | | | 100% | | | 100% | | |
| Dec Time[%] | 100% | | | 100% | | | 100% | | |
|  |  |  |  |  |  |  |  |  |  |
|  | **Low delay B HE** | | | **Low delay B LC** | | | **Low delay B HE-10** | | |
|  | Y | U | V | Y | U | V | Y | U | V |
| Class A |  |  |  |  |  |  |  |  |  |
| Class B | 0.0% | 0.1% | 0.1% | 0.0% | -0.1% | -0.2% |  |  |  |
| Class C | 0.0% | -0.1% | -0.1% | 0.0% | 0.0% | -0.1% |  |  |  |
| Class D | 0.0% | 0.0% | -0.1% | 0.0% | -0.1% | 0.1% |  |  |  |
| Class E | 0.1% | -0.2% | -0.4% | 0.0% | 0.1% | 0.3% |  |  |  |
| **Overall** | 0.0% | 0.0% | -0.1% | 0.0% | 0.0% | 0.0% |  |  |  |
|  | 0.0% | 0.0% | -0.1% | 0.0% | 0.0% | 0.0% |  |  |  |
| Class F | 0.0% | -0.1% | -0.3% | -0.1% | -0.3% | -0.7% |  |  |  |
| Enc Time[%] | 100% | | | 100% | | |  | | |
| Dec Time[%] | 100% | | | 100% | | |  | | |

Table 2 reports the results by using low QP: 2, 7, 12, 17. The proponents provided anchor data. The cross check confirmed the BD rate.

Table 2. Results with low QP: 2, 7, 12, 17

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **All Intra HE** | | | **All Intra LC** | | | **All Intra HE-10** | | |
|  | Y | U | V | Y | U | V | Y | U | V |
| Class A (8bit) | -0.3% | -0.2% | -0.3% | -0.3% | -0.2% | -0.2% |  |  |  |
| Class B | -0.2% | -0.2% | -0.2% | -0.2% | -0.2% | -0.2% |  |  |  |
| Class C | -0.4% | -0.3% | -0.3% | -0.4% | -0.2% | -0.2% |  |  |  |
| Class D | -0.7% | -0.6% | -0.6% | -0.7% | -0.4% | -0.4% |  |  |  |
| Class E | -0.2% | -0.2% | -0.2% | -0.2% | -0.2% | -0.2% |  |  |  |
| **Overall** | -0.36% | -0.31% | -0.32% | -0.35% | -0.23% | -0.24% |  |  |  |
|  | -0.3% | -0.3% | -0.3% | -0.3% | -0.2% | -0.2% |  |  |  |
| Class F | -2.48% | -2.20% | -2.21% | -2.42% | -1.88% | -1.88% |  |  |  |
| Enc Time[%] |  | | |  | | |  | | |
| Dec Time[%] |  | | |  | | |  | | |
|  |  |  |  |  |  |  |  |  |  |
|  | **Random Access HE** | | | **Random Access LC** | | | **Random Access HE-10** | | |
|  | Y | U | V | Y | U | V | Y | U | V |
| Class A (8bit) | -0.1% | -0.1% | 0.0% | 0.0% | 0.0% | -0.1% | 0.0% | -0.1% | -0.1% |
| Class B | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Class C | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |  |  |  |
| Class D | -0.1% | -0.1% | -0.1% | -0.1% | 0.0% | 0.0% |  |  |  |
| Class E |  |  |  |  |  |  |  |  |  |
| **Overall** | -0.04% | -0.04% | -0.04% | -0.04% | -0.03% | -0.03% | -0.04% | -0.05% | -0.06% |
|  | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | -0.1% | -0.1% |
| Class F | -1.51% | -1.28% | -1.32% | -1.44% | -1.09% | -1.12% |  |  |  |
| Enc Time[%] |  | | |  | | |  | | |
| Dec Time[%] |  | | |  | | |  | | |
|  |  |  |  |  |  |  |  |  |  |
|  | **Low delay B HE** | | | **Low delay B LC** | | | **Low delay B HE-10** | | |
|  | Y | U | V | Y | U | V | Y | U | V |
| Class A |  |  |  |  |  |  |  |  |  |
| Class B | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |  |  |  |
| Class C | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |  |  |  |
| Class D | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |  |  |  |
| Class E | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |  |  |  |
| **Overall** | -0.01% | -0.02% | 0.00% | -0.01% | 0.00% | -0.01% |  |  |  |
|  | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |  |  |  |
| Class F | -0.73% | -0.60% | -0.56% | -0.64% | -0.48% | -0.44% |  |  |  |
| Enc Time[%] |  | | |  | | |  | | |
| Dec Time[%] |  | | |  | | |  | | |

# References

1. Frank Bossen, “Common test conditions and software reference configurations”, JCTVC-G1000, Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T VCEG and ISO/IEC MPEG, Geneva, Switzerland, Nov 2011.
2. HM 5.0 Software, <http://hevc.kw.bbc.co.uk/trac/browser/tags/HM-5.0>.