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| *Title:* | **SCCE3: Test B.10 - Palette index value mapping** | | |
| *Status:* | Input Document to JCT-VC | | |
| *Purpose:* | Proposal | | |
| *Author(s) or Contact(s):* | Chia-Ming Tsai, Yuwen He, Xiaoyu Xiu, Yan Ye 9710 Scranton Rd, #250 San Diego, CA 92121, USA | Tel: Email: | +1-858-210-4819/-4830/-4803 kevin190@gmail.com [yuwen.he@interdigital.com](mailto:yuwen.he@interdigital.com) [xiaoyu.xiu@interdigital.com](mailto:xiaoyu.xiu@interdigital.com) [yan.ye@interdigital.com](mailto:yan.ye@interdigital.com) |
| *Source:* | InterDigital Communications, Inc. | | |

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# Abstract

This proposal reports the simulation results with palette index value mapping method (SCCE3 Test B.10) for palette coding. The technologies were originally proposed in the response of SCC CfP (JCTVC-Q0037) from InterDigital. The palette index is mapped before coding. Compared to SCCE3 2CTU IntraBC anchors, the proposed technologies achieve average BD rate gain up to -1.0%, -0.6%, -0.5% for lossy AI, RA and LDB coding for Y component excluding categories of animation and camera captured.

# Introduction

Palette index mapping method was first proposed in JCTVC-Q0037 [2]. To reduce the magnitude of the coded palette index value, the palette index value is mapped before being coded. The proposed palette index value mapping consists of two main steps: 1) reduce palette index value by comparing to the last compared palette index (LCPI), and 2) mapping of escape color index. In the first step, the palette index value is reduced by 1 if the palette index value is larger than its LCPI. In the second step, the index value of escape color pixels is set to the index 1, and the other entries in the palette table are shifted backward by 1. Figure 1 shows the escape color mapping.



Figure . Escape color index mapping.

# Simulation results

The compression performance is measured using BD rate compared with SCCE3 anchors, using the SCCE3 test conditions [1]. Table 1 and Table 2 gives the detailed average BD rate reduction for lossless and lossy coding with palette index value mapping method compared with SCCE3 2CTU IntraBC anchors, respectively. The full test results are provided with the accompanying spreadsheets for details.

As shown in Table 1, compared with SCCE3 anchors, the lossless coding achieves total bit-rate saving of 2.4%, 0.9% and 0.7% for the category (RGB, text & graphics with motion, 1080p) for AI, RA and LDB, respectively. As shown in Table 2, the lossy coding achieves average {Y, U, V} BD rate gain of {-2.5%, -2.5%, -2.5%}, {-1.2%, -1.3%, -1.3%} and {-0.8%, -0.9%, -0.9%} for the category (RGB, text & graphics with motion, 1080p) for AI, RA and LDB, respectively.

Table 1. Average BD rate reduction for lossless coding compared with SCCE3 2CTU IntraBC 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 | 2.4% | 2.5% | 1.9% | 3.0% |
| RGB, text & graphics with motion,720p | 0.7% | 0.8% | 0.0% | 1.8% |
| RGB, mixed content, 1440p | 0.4% | 0.4% | 0.3% | 0.4% |
| 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 | 2.4% | 2.6% | 1.2% | 3.8% |
| YUV, text & graphics with motion,720p | 0.6% | 0.9% | 0.0% | 2.2% |
| YUV, mixed content, 1440p | 0.4% | 0.4% | 0.4% | 0.5% |
| YUV, mixed content, 1080p | 0.3% | 0.3% | 0.3% | 0.3% |
| 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[%] | 96% | | | |
| Dec Time[%] | 97% | | | |
|  |  |  |  |  |
|  | **Random Access** | | | |
|  | Bit-rate saving (Total) | Bit-rate saving (Average) | Bit-rate saving (Min) | Bit-rate saving (Max) |
|  |
| RGB, text & graphics with motion, 1080p | 0.9% | 1.3% | 0.8% | 2.1% |
| RGB, text & graphics with motion,720p | 0.1% | 0.4% | 0.0% | 1.4% |
| RGB, mixed content, 1440p | 0.1% | 0.1% | 0.0% | 0.1% |
| 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 | 0.7% | 1.3% | 0.5% | 2.2% |
| YUV, text & graphics with motion,720p | 0.1% | 0.5% | 0.0% | 1.8% |
| YUV, mixed content, 1440p | 0.1% | 0.1% | 0.0% | 0.1% |
| YUV, mixed content, 1080p | 0.0% | 0.0% | 0.0% | 0.0% |
| 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[%] | 100% | | | |
|  |  |  |  |  |
|  |  |  |  |  |
|  | **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 | 0.7% | 1.0% | 0.6% | 1.7% |
| RGB, text & graphics with motion,720p | 0.1% | 0.2% | 0.0% | 0.6% |
| RGB, mixed content, 1440p | 0.0% | 0.0% | 0.0% | 0.0% |
| RGB, mixed content, 1080p | 0.0% | 0.0% | 0.0% | 0.0% |
| 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 | 0.5% | 0.9% | 0.4% | 1.7% |
| YUV, text & graphics with motion,720p | 0.1% | 0.3% | 0.0% | 0.7% |
| YUV, mixed content, 1440p | 0.0% | 0.0% | 0.0% | 0.0% |
| YUV, mixed content, 1080p | 0.0% | 0.0% | 0.0% | 0.0% |
| 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[%] | 100% | | | |
| Dec Time[%] | 100% | | | |

Table 2. Average BD rate reduction for lossy coding compared with SCCE3 2CTU IntraBC anchors

|  |  |  |  |
| --- | --- | --- | --- |
|  | **All Intra** | | |
|  | G/Y | B/U | R/V |
| RGB, text & graphics with motion, 1080p | -2.5% | -2.5% | -2.5% |
| RGB, text & graphics with motion,720p | -1.2% | -1.2% | -1.1% |
| RGB, mixed content, 1440p | -0.2% | -0.1% | -0.2% |
| RGB, mixed content, 1080p | -0.4% | -0.3% | -0.3% |
| RGB, Animation, 720p | 0.0% | 0.0% | 0.0% |
| RGB, camera captured, 1080p | 0.0% | 0.0% | 0.0% |
| YUV, text & graphics with motion, 1080p | -2.6% | -2.6% | -2.5% |
| YUV, text & graphics with motion,720p | -0.9% | -1.3% | -1.5% |
| YUV, mixed content, 1440p | -0.2% | -0.3% | -0.4% |
| YUV, mixed content, 1080p | -0.4% | -0.6% | -0.7% |
| YUV, Animation, 720p | 0.0% | 0.0% | 0.0% |
| YUV, camera captured, 1080p | 0.0% | 0.0% | 0.0% |
| Enc Time[%] | 99% | | |
| Dec Time[%] | 100% | | |
|  |  |  |  |
|  | **Random Access** | | |
|  | G/Y | B/U | R/V |
| RGB, text & graphics with motion, 1080p | -1.2% | -1.3% | -1.3% |
| RGB, text & graphics with motion,720p | -1.1% | -1.0% | -1.0% |
| RGB, mixed content, 1440p | -0.2% | -0.2% | -0.2% |
| RGB, mixed content, 1080p | -0.2% | -0.2% | -0.3% |
| RGB, Animation, 720p | 0.0% | -0.1% | 0.0% |
| RGB, camera captured, 1080p | 0.0% | 0.0% | 0.0% |
| YUV, text & graphics with motion, 1080p | -1.2% | -1.4% | -1.3% |
| YUV, text & graphics with motion,720p | -0.8% | -1.2% | -1.5% |
| YUV, mixed content, 1440p | -0.2% | -0.3% | -0.4% |
| YUV, mixed content, 1080p | -0.3% | -0.5% | -0.6% |
| YUV, Animation, 720p | 0.0% | 0.2% | 0.0% |
| YUV, camera captured, 1080p | 0.0% | 0.1% | 0.0% |
| Enc Time[%] | 101% | | |
| Dec Time[%] | 102% | | |
|  |  |  |  |
|  | **Low delay B** | | |
|  | G/Y | B/U | R/V |
| RGB, text & graphics with motion, 1080p | -0.8% | -0.9% | -0.9% |
| RGB, text & graphics with motion,720p | -0.9% | -0.9% | -0.9% |
| RGB, mixed content, 1440p | -0.3% | -0.1% | -0.3% |
| RGB, mixed content, 1080p | -0.2% | -0.5% | -0.1% |
| RGB, Animation, 720p | 0.0% | -0.1% | 0.0% |
| RGB, camera captured, 1080p | 0.0% | 0.0% | 0.0% |
| YUV, text & graphics with motion, 1080p | -0.6% | -0.9% | -0.9% |
| YUV, text & graphics with motion,720p | -0.5% | -0.9% | -0.8% |
| YUV, mixed content, 1440p | -0.2% | -0.5% | -0.5% |
| YUV, mixed content, 1080p | -0.4% | -1.3% | -0.8% |
| YUV, Animation, 720p | -0.1% | -0.2% | -0.2% |
| YUV, camera captured, 1080p | 0.0% | -0.1% | 0.1% |
| Enc Time[%] | 100% | | |
| Dec Time[%] | 101% | | |

# Patent rights declaration(s)

**InterDigital Communications, 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).**

# References

1. Y.-W. Huang, P. Onno, R. Joshi, R. Cohen, X. Xiu, Z. Ma, “HEVC Screen Content Core Experiment 3 (SCCE3): Palette mode”, JCTVC-Q1123, Apr. 2014.
2. X. Xiu, C.-M. Tsai, Y. He, Y. Ye, “Description of screen content coding technology proposal by InterDigital”, JCTVC-Q1014, Apr. 2014.