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| *Title:* | **Non-CE1: Cross verification of JCTVC-I0168 from MediaTek on SAO mismatch.** | | |
| *Status:* | Input Document to JCT-VC | | |
| *Purpose:* | Information | | |
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# Abstract

This document is a crosscheck report of the contribution JCTVC-I0168 about the bug-fix of offset coding in SAO interleaving mode. This contribution proposes one solution to easily fix the mismatch between HM-6.0 and CD for the offset coding in SAO.

The results provided by Mediatek in I0168 are confirmed and corresponds to 0.0% average in Main-LDB and HE10-LDB conditions.

# Introduction

In HM-6.0, the band offset (BO) is signed, while the edge offset (EO) is unsigned and CABAC initialization, binarization, and context formation processes for BO are different from those for EO.

In HEVC CD, BO and EO are both described by sao\_offset syntax in the syntax table of Section 7.3.4.2 and shared the same CABAC processes despite their big differences.

In order to fix this mismatch between HM-6.0 and CD, a straightforward solution is to change the CD according to HM-6.0, but it might be necessary to change hundreds of lines in CD.

In that I0168 contribution, the sign of BO is decoupled from sao\_offset syntax element, and the signs of the four offsets in BO are grouped and bypass coded. Then, the magnitude of BO and the unsigned EO can be represented by the same syntax element, sao\_offset, and use the same CABAC processes.

The JCTVC-I0168 contribution adds a new syntax element to signal the SAO offset sign as shown in Table 1.

# Source code/CD text analysis

The context initialization of the sao\_offset syntax element has been modified by proponent and there exists a mismatch between the context initialization reported in the CD changes proposal and the source code provided by MediaTek for the crosscheck.

**Table 1. Syntax change in offset coding**

|  |  |
| --- | --- |
| sao\_offset\_cabac( rx, ry, cIdx ) { | Descriptor |
| **sao\_type\_idx**[ cIdx ][ rx ][ ry ] | ae(v) |
| if( sao\_type\_idx[ cIdx ][ rx ][ ry ] = =5 ) { |  |
| **sao\_band\_position**[ cIdx ][ rx ][ ry ] | ae(v) |
| for( i = 0; i < 4; i++ ) |  |
| **sao\_offset\_sign** [ cIdx ][ rx ][ ry ][ i ] | ae(v) |
| } |  |
| if( sao\_type\_idx[ cIdx ][ rx ][ ry ] != 0 ) |  |
| for( i = 0; i < 4; i++ ) |  |
| **sao\_offset**[ cIdx ][ rx][ ry ][ i ] | ae(v) |
| } |  |

# Results

Here are the results of our cross-check by using different LCU size. The anchors are those used in CE1 [1].

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|  |  | **Low delay B Main – LCU16x16** | | | **Low delay B HE10 – LCU16x16** | | |
|  |  | 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** | 0,0% | 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% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% |
|  | Enc Time[%] | 100% | | | 100% | | |
|  | Dec Time[%] | 99% | | | 101% | | |
|  |  |  |  |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
|  |  | **Low delay B Main – LCU 32x32** | | | **Low delay B HE10 – LCU 32X32** | | |
|  |  | 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** | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% |
|  |  | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% |
|  | Class F | 0,1% | 0,1% | 0,1% | 0,0% | 0,0% | 0,0% |
|  | Enc Time[%] | 100% | | | 100% | | |
|  | Dec Time[%] | 100% | | | 101% | | |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  | **Low delay B Main – LCU 64x64** | | | **Low delay B HE10 – LCU64x64** | | |
|  |  | 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** | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% |
|  |  | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% |
|  | Class F | 0,1% | 0,1% | 0,1% | 0,0% | 0,0% | 0,0% |
|  | Enc Time[%] | 100% | | | 100% | | |
|  | Dec Time[%] | 101% | | | 101% | | |

# Conclusion

The BD-rate results provided by Mediatek in I0168 are confirmed by this cross-check. However, we found a mismatch in the CABAC initialization context between source codes provided and proposed CD changes of JCTVC-I0168. This mismatch should be easily corrected by the authors of JCTVC-I0168.

# References

1. Y.-W. Huang**,** E. Alshina, I. S. Chong, W. Wan, M. Zhou,“Description of Core Experiment 1 (CE1): Sample adaptive offset filtering”, Document of Joint Collaborative Team on Video Coding, JCTVC-H1101, February, 2012.