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| *Title:* | **3D-CE3 related:** **Simplification on NBDV derivation in 3D-HEVC** | | |
| *Status:* | Input Document | | |
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# Abstract

In the current 3D-HEVC, the neighboring block disparity vector (NBDV) derivation process needs to access the left and above neighboring blocks and the collocated blocks to find an available disparity vector (DV). In order to reduce the complexity of the NBDV derivation, it is proposed to remove the above block in the derivation process. An additional test is also conducted to combine this simplification with a default DV converted from the middle depth value. The experimental results reportedly show that this proposed simplification causes no coding efficiency loss.

# Introduction

In 3D-HEVC [1], the neighboring block disparity vector (NBDV) derivation process needs to access two spatial neighboring blocks, A1 and B1, and the collocated blocks in two reference pictures as shown in Figure 1.



Figure 1. Spatial and temporal candidates for NBDV process

The NBDV derivation process includes three steps. In the first step, the collocated blocks are searched to find an available DV, i.e., to find a disparity compensated block. In the second step, the two spatial neighboring blocks are searched. If none of the collocated blocks and spatial neighboring blocks has a DV, i.e., none of the blocks is disparity compensated, the DV-MCP searching process is performed to search the DV-MCP block in these two spatial neighboring blocks, A1 and B1. In addition, in the DV-MCP searching process, it needs to further check whether the above neighboring block, B1, is within current CTU. If B1 is located in the above CTU row, it will be considered as not available.

If no DV can be found in these three steps, a default zero DV will be used. The three step search procedure in the NBDV derivation process is illustrated in Table 1. Once a first available DV is found, the NBDV search procedure is terminated.

**Table 1. The NBDV derivation in HTM-9.0 and the proposed scheme.**

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| HTM-9.0 | Proposed Simplification |
| 1. Search collocated block: Ctr 2. Search spatial block: A1 and B1 3. Search DV-MCP block: A1 and B1 4. Check whether B1 is located in current CTU. If B1 is located in the above CTU, it is considered as not available. | 1. Search collocated block: Ctr 2. Search spatial block: A1 3. Search DV-MCP block: A1 |

# Proposed scheme

For the DV-MCP search, in order to reduce the complexity of the NBDV derivation process, it is proposed to remove the above neighboring block in the NBDV derivation process as shown in Figure 2. The simplified NBDV derivation process is illustrated in Table 1.



Figure 2. Spatial and temporal candidates for simplified NBDV process

This contribution further tests to replace the default zero DV by using the DV converted from the middle depth value (128) when no available DV can be found in the NBDV derivation process.

# Experimental results

The proposed schemes are integrated into HTM-9.0r1 [2], and the tests are conducted under the common test conditions [3]. Table 2 shows the experimental results under the common test conditions (CTC), compared to the anchor, the proposed simplification (Test 1) show no coding performance loss. In Test 2, the simplification on NBDV derivation is further combined with the simplification on DV-MCP searching process proposed in JCT3V-G0049 [4]. The simulation results of the combination of these two simplifications under the CTC and under the BVSP off test conditions are shown in Table 3 and Table 4, respectively. As shown in the results, removing the above spatial block and removing the DV-MCP flag cause no BD-rate increase, while the complexity and memory storage required in NBDV derivation can be reduced.

In Test 3, the default zero DV if further replaced by the DV converted from the middle depth value (128). The experimental results under the common test conditions are shown in Table 5.

**Table 2.** **The results of Test 1 (remove above block in NBDV derivation)**



**Table 3. The results of Test 2 under CTC (removing the above block and removing the DV-MCP flag in NBDV derivation)**



**Table 4. The results of Test 2 under BSVP off test conditions (removing the above block and removing the DV-MCP flag in NBDV derivation)**



**Table 5. The results of Test 3 (Test1 + replace default DV)**



# Conclusion

In this contribution, it is proposed to simplify the NBDV derivation process by removing the above neighboring block. The experimental results show this simplification brings no coding loss while the complexity of NBDV derivation process could be reduced.

# Patent rights declaration(s)

**MediaTek Inc****. may have current or pending patent rights 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

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