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| **Joint Collaborative Team on 3D Video Coding Extension Development**  **of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11**  3rd Meeting: Geneva, CH, 17–23 Jan. 2013 | Document: JCT3V-C0137 |

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| *Title:* | **3D-CE3.h results on removal of parsing dependency and picture buffers for motion parameter inheritance** | | |
| *Status:* | Input Document | | |
| *Purpose:* | Proposal | | |
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# Abstract

This contribution presents results of CE3.h experiment related to the removal of parsing dependency and picture buffers for motion parameter inheritance (MPI) in JCT3V-B0085. In HTM 5.0.1, MPI can be enabled for a depth CU to reuse the CU and PU structures and motion data of the corresponding texture CU. Since parsing transform coefficients is dependent on the CU structure, MPI causes a parsing dependency problem, where parsing transform coefficients of the depth CU is dependent on the CU structure of the texture CU. Besides, additional buffers for CU and PU structures of the entire texture picture are required. As an alternative to MPI, an additional texture merging candidate, which only reuses the motion vectors and reference indices of the corresponding texture block, is proposed for merge mode and skip mode of each depth PU. The experimental results reportedly show that the proposed scheme achieves 0.2% BD-rate savings for overall coded and synthesized views compared to HTM-5.0.1, while the parsing dependency problem is solved, the picture-level buffers for the CU and PU structures are removed, and the run times are reduced at both the encoder and the decoder.

# Introduction

In HTM-5.0.1 [1], the motion parameter inheritance (MPI) for depth coding causes a parsing dependency issue due to the requirement of accessing the texture coding unit (CU) split information during parsing of the depth CU. Besides, extra buffers are required to store CU structures and prediction unit (PU) structures of the corresponding texture picture. In JCT3V-B0085 [2], as an alternative and a simplification to the MPI, we proposed a texture merging candidate for each depth PU to solve the parsing dependency problem and to remove the extra buffer storage.

# Proposed method

As experiment M1 of CE3 [3], we tested the proposed method in JCT3V-B0085 again. In the proposed method, the MPI design is replaced with adding one additional texture merging candidate into the merge candidate set for the merge mode and skip mode of each depth PU.

In the texture coding, the motion vectors (MVs) and reference indices of the corresponding block in the base view are reused as an inter-view merging candidate. Similar to the concept of the inter-view merging candidate, the proposed texture merging candidate for the depth PU directly reuses the MVs and reference indices of the corresponding texture block. As shown in Figure 1, the corresponding texture block is selected as the 4x4 block located to the right bottom of the center of the current PU in the corresponding texture picture, where the current PU is 16x16 as an example. With the proposed scheme, the merge operations for the texture and depth can also be unified due to removal of the special case of MPI, as shown in Table 1, which helps to simplify of software and hardware designs. Note that, since the texture merging candidate directly reuses the motion parameters from the corresponding texture block, no MV scaling is required.



**Figure 1. The derivation of corresponding texture block**

**Table 1. Comparison of merge candidate sets**

|  |  |  |  |
| --- | --- | --- | --- |
| Merge candidate set in HTM-4.0.1 | | Merge candidate set in the proposed scheme | |
| Texture | Depth | Texture | Depth |
| 1. Inter-view candidate  2. Spatial candidate  3. Temporal candidate  4. Additional candidate | 1. MPI  2. Spatial candidate  3. Temporal candidate  4. Additional candidate | 1. Inter-view candidate  2. Spatial candidate  3. Temporal candidate  4. Additional candidate | 1. Texture candidate  2. Spatial candidate  3. Temporal candidate  4. Additional candidate |

# Experimental results

The proposed scheme is integrated into HTM-5.0.1[1], and all tests are conducted under the common test conditions [4]. The experimental results are shown in Table 2. It shows that the proposed scheme achieves on average 0.2% BD-rate savings for overall coded and synthesized views, while the parsing dependency problem and the additional buffer problem are solved. The run times are also reduced.

**Table 2. The results of replacing MPI with texture merging candidate**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Video 1 | Video 2 | Video only | video/total bitrate | synth / total bitrate | Enc time | Dec time | Ren time |
| Balloons | 0.0% | 0.0% | 0.0% | -0.3% | -0.3% | 97.7% | 95.1% | 101.8% |
| Kendo | 0.0% | 0.0% | 0.0% | -0.1% | -0.1% | 95.2% | 97.6% | 101.4% |
| Newspapercc | 0.0% | 0.0% | 0.0% | -0.1% | 0.1% | 96.7% | 100.8% | 94.7% |
| GhostTownFly | 0.0% | 0.0% | 0.0% | -0.1% | -0.3% | 98.6% | 99.4% | 102.1% |
| PoznanHall2 | 0.0% | 0.0% | 0.0% | -0.6% | -0.5% | 97.1% | 99.2% | 99.8% |
| PoznanStreet | 0.0% | 0.0% | 0.0% | -0.1% | -0.2% | 98.3% | 97.0% | 97.4% |
| UndoDancer | 0.0% | 0.0% | 0.0% | 0.1% | 0.1% | 98.5% | 97.7% | 98.2% |
| 1024x768 | 0.0% | 0.0% | 0.0% | -0.2% | -0.1% | 96.5% | 97.8% | 99.3% |
| 1920x1088 | 0.0% | 0.0% | 0.0% | -0.2% | -0.2% | 98.1% | 98.3% | 99.3% |
| **average** | 0.0% | 0.0% | 0.0% | -0.2% | -0.2% | 97.4% | 98.1% | 99.3% |

# Conclusion

In this proposal, a texture merging candidate is added to the merge candidate set for depth coding, as an alternative and a simplification to the MPI, to remove the parsing dependency and the additional picture buffers for storing CU and PU structures. The experimental results reportedly show that the proposed scheme introduces on average 0.2% BD-rate savings for coded and synthesized views with reduced encoding time and decoding time.

# 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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