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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**  2nd Meeting: Shanghai, CN, 13–19 Oct. 2012 | Document: JCT3V-B0081 |

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| *Title:* | **3D-CE5.a related: Unification of the depth to DV conversion** | | |
| *Status:* | Input Document | | |
| *Purpose:* | Proposal | | |
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# Abstract

In the AVC-based 3D video coding, ATM-5.1r2, in order to derive a disparity vector (DV) to indicate the inter-view corresponding block for the inter-view candidate derivation in Skip and Direct modes, the depth values of the central pixel within the associated depth block is converted to a DV. However, this conversion is different from the one used in Inter mode, which uses the maximum depth value of four corner depth samples within the associated depth block. In this contribution, the depth to DV conversion is unified by using the maximum depth value of four corner depth samples within the associated depth block. The simulation results reportedly show that the proposed method brings 0.2% BD-rate reduction while the depth to DV conversions is unified.

# Introduction

In the AVC-based 3D video coding, ATM-5.1r2 [1], the direction-separate motion vector prediction is applied in Inter mode. If the target reference picture is a temporal prediction picture, the temporal motion vectors of the adjacent blocks around the current block Cb such as A, B, and C in Fig. 1 are employed in the derivation of the motion vector prediction. If a temporal motion vector is unavailable, a zero vector is used. The motion vector prediction is then derived as the median of the motion vectors of the adjacent blocks A, B, and C.

On the contrary, if the target reference picture is an inter-view prediction picture, the inter-view motion vectors of the neighboring blocks are employed for the inter-view prediction. If an inter-view motion vector is unavailable, a disparity vector which is derived from the maximum depth value of four corner depth samples within the associated depth block is used. The motion vector predictor is then derived as the median of the inter-view motion vector of the adjacent blocks A, B, and C.



Figure 1. The direction-separated motion vector prediction in Inter mode

In Skip and Direct mode, a MVP candidate is derived based on a predefined derivation order: inter-view candidate and the three spatial candidates derived from the neighboring blocks A, B, and C (D is used only when C is unavailable) as shown in Figure 2. The inter-view MV candidate derivation is also shown in Figure 2. The central point of the current block in the dependent view and its disparity vector are used to find the corresponding point in the base view. After that, the MV of the corresponding block is used as the inter-view candidate of the current block. The disparity vector (DV) can be derived from the neighboring blocks or the depth value of the central point. Specifically, if one of the neighboring blocks has a DV, the DV is used as the disparity. Otherwise, the depth-based disparity vector which is derived using the depth value of the central point and camera parameters is used.



Figure 2. The priority based MVP candidate derivation in Skip and Direct modes.

# Proposed Method

In current priority based MVP candidate derivation for Skip and Direct mode, to derive a DV to indicate the inter-view corresponding block when none of the neighboring blocks has a DV , the depth values of the central pixel within the associated depth block is converted to a DV. However, this conversion is different from the one used in Inter mode, which uses the maximum depth value of four corner depth samples within the associated depth block.

In this contribution, we propose to unify the depth to DV conversion in Skip/Direct mode and Inter mode. With this proposed unification, the maximum depth value of four corner depth samples within the associated depth block is used to derive the DV for both Skip/Direct and Inter modes.

# Experimental Results

The proposed method is integrated into ATM-5.1r2 [1] and the simulations are run under the common test conditions [2]. The results of the unified depth to DV conversion are illustrated in Table 1. The experimental results reportedly show that the proposed method brings about 0.2% BD-rate saving along with the benefit of unified depth to DV conversion.

Table 1 Results of the unified depth to DV conversion



# Conclusion

In this contribution, we propose to unify the depth to DV conversion in Skip/Direct and Inter modes. The maximum depth value of four corner depth samples within the associated depth block is used to derive the DV for both Skip/Direct and Inter modes. The results reportedly showed that the proposed method brings 0.2% BD-rate reduction while the depth to DV conversion is unified.

# 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

[1] ATM-5.1r2, <http://mpeg3dv.research.nokia.com/svn/mpeg3dv/tags/3DV-ATMv5.1r2/>

[2] Dmytro Rusanovskyy, Karsten Müller, Anthony Vetro, “Common Test Conditions of 3DV Core Experiments”, 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, JCT3V-A1100, July 2012, Stockholm.