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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**  1st Meeting: Stockholm, SE, 16–20 July 2012 | Document: JCT2-A0077r1 |

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| *Title:* | **CE8 Summary Report : RD-Optimization** | | |
| *Status:* | Input Document | | |
| *Purpose:* | Report | | |
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# Abstract

A summary of proposals and cross-check results of 3DV-CE8 is reported.

1. **Introduction**

A summary of proposals and cross-check results of 3DV-CE8 is reported.

The mandates of the CE included:

* To perform comprehensive tests in order to investigate issues raised in m25010. More specifically, the following aspects of each RD-optimization algorithm shall be investigated:
  + Objective and subjective qualities of synthesized views

- Fluctuation of qualities at various intermediate view positions

- Fluctuation of qualities using different DIBR SWs

* + How it balances the fidelity of coded depth with that of synthesized views. Various QP settings should be tested in order to better understand the fundamental tradeoffs inherent in each algorithm.
* To integrate proposals m24830(Samsung), m24865(HHI), and m24899(Zhejiang) into the reference SW to compare them in terms of their impacts on compression efficiency and complexity. In addition, efforts to harmonize the three proposals will be made. In the process of evaluation & harmonization, additional/special attention will be paid to the performances of the proposals regarding the aspects listed in mandate 1.

Participants with proposals at this meeting in CE8 are as follows:

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1. **List of input documents**

There are 5 input proposals.

* A0033 and A0083 propose to simplify & improve the anchor scheme – VSO. These two proposals were combined into A0093 (cross-check is underway).
* A0057 proposes to harmonize JRDO with VSO.
* A0119 proposes to add a depth-fidelity term to better preserve depth and improve rendering quality with alternative view-renderers.

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| **Participants** | **Doc No.** | **Title** | **Type** |
| Samsung/HHI | [JCT2-A0033](http://phenix.it-sudparis.eu/jct2/doc_end_user/current_document.php?id=25) | 3D-CE8.h results on view synthesis optimization | Proposal |
| Zhejiang | [JCT2-A0057](http://phenix.it-sudparis.eu/jct2/doc_end_user/current_document.php?id=49) | 3D-CE8.h results on JRDO | Proposal |
| PKU/LG | [JCT2-A0083](http://phenix.it-sudparis.eu/jct2/doc_end_user/current_document.php?id=75) | CE8.h: Results of Simplification of View Synthesis Optimization by Detection of Zero Distortion Change in Synthesized View | Proposal |
| Samsung/HHI/LG/PKU | [JCT2-A0093](http://phenix.it-sudparis.eu/jct2/doc_end_user/current_document.php?id=85) | 3D-CE8.h results on view synthesis optimization by Samsung, HHI and LG-PKU | Proposal |
| LG/Yonsei | [JCT2-A0119](http://phenix.it-sudparis.eu/jct2/doc_end_user/current_document.php?id=135) | CE8.h Depth distortion metric with a weighted depth fidelity term | Proposal |
| Qualcomm | [JCT2-A0135](http://phenix.it-sudparis.eu/jct2/doc_end_user/current_document.php?id=151) | 3D-CE8.h: Cross check on simplification of view synthesis optimization of PKU and LG | Cross-Check |

1. **Summary of proposals & results**

* **JCT2-A0083 [PKU/LG]** **CE8.h: Results of Simplification of View Synthesis Optimization by Detection of Zero Distortion Change in Synthesized View (Cross-Checked by JCT2-A0135/A0123)**

This contribution proposes a simplification of view synthesis optimization (VSO) method by detection of zero distortion change in synthesized view. In the proposed scheme, three aspects are taken into account: smoothness of texture, information of occlusion and mapping from depth to disparity. It is reported that an average of 15.6% encoding time is saved, with 0.2 % BD-rate increase on average.

* **JCT2-A0033 [Samsung/HHI] 3D-CE8.h results on view synthesis optimization (Cross-Check N/A)**

Modifications of VSO (View Synthesis Optimization, M22570) as reported M24830 and M24865are proposed to reduce encoder runtime and increase coding gains. Coding experiments for CE8.h (Modified Distortion Measure) as defined in N12745 and N12746 using a version of HTM-3.1 including proposed modifications have been conducted and are reported in this document. Additionally an alternative VSO configuration using further modification to decrease runtime is presented. However, results for this configuration have not been cross evaluated.

* **JCT2-A0093 [Samsung/HHI/LG-PKU] 3D-CE8.h results on view synthesis optimization by Samsung, HHI and LG-PKU (Cross-Check N/A)**

Modifications of VSO (View Synthesis Optimization, M22570) as reported in M24830, M24865 and M24765 are proposed to reduce encoder runtime and increase coding gains. Coding experiments for CE8.h (Modified Distortion Measure) as defined in N12745 and N12746 using a version of HTM-3.1 including proposed modifications have been conducted and are reported in this document. Additionally an alternative VSO configuration using further modification to decrease runtime is presented. However, results for this configuration have not been cross evaluated.

* **JCT2-A0119 [LG/Yonsei] CE8.h Depth distortion metric with a weighted depth fidelity term (Cross-Check N/A)**

This contribution proposes to *add* a depth-fidelity term in the distortion metric currently used for RD-optimization at the encoder for depth coding. Comparisons between the cases with and without the proposed depth-fidelity term are provided to highlight how the proposed change can mitigate the abovementioned potential problems. The average change of luma BD-Rate (BDR) in synthesized result is 1.6% on CTC. And, on 3DVC Cfp conditions using VSRS3.5, the average change of luma BDR is -0.9%. Specially, the luma BDR of Undo\_Dancer and GT\_Fly is -8.8% and -3.7%, respectively.

* **JCT2-A0057 [Zhejiang] 3D-CE8.h results on JRDO (Cross-Check N/A)**

This document presents the RD performance of JRDO implemented on HTM3.1, evaluated with two view synthesis tools. A harmonization scheme of JRDO and VSO is also proposed. The harmonized scheme achieves better RD performance than JRDO and VSO on both VSRS and VSRS-1D-Fast.

1. **Closing Remarks**

It is recommended the CE be continued and investigate technical issues.