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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-A0176 |

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| *Title:* | **BoG Report on HEVC-based RD Optimization** **(CE8.h)** | | |
| *Status:* |  | | |
| *Purpose:* | Report | | |
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| *Source:* | BoG chair | | |

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# Introduction

This BoG was formed to consider potential adoption and discuss future CE plans for CE8.h.

The BoG meeting took place on July 19, 2012 from 12:30 pm to 13:10 pm with about 9 participants including representatives of all proposals.

# Overview (w/o crosschecks)

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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 |
| 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 |
| 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 |

# Proposals

All proposals and related proposals were discussed w.r.t. the AHG report and notes.

[**JCT2-A0033**](http://phenix.int-evry.fr/jct2/doc_end_user/current_document.php?id=25)**/**[**m25896**](http://phenix.int-evry.fr/mpeg/doc_end_user/current_document.php?id=39056&id_meeting=153) **3D-CE8.h results on view synthesis optimization [Byung Tae Oh, Jaejoon Lee, Du Sik Park (Samsung), Gerhard Tech, Karsten Müller, Thomas Wiegand (Fraunhofer HHI)]**

Remarks:

Proposals JCT2-A0093 and JCT2-A0119 are base on this proposal.

Modifications:

1. run-time optimization of VSO algorithm implementation
2. increase of number of views regarded for error computation by a factor of three
3. model-based view synthesis distortion estimation for some encoder decisions

RD-performance:

2.7% bit rate reduction for synthesized views compare to anchors.

Encoding time:

90% encoding time (linux)

Suggestion:

It was agreed to adopt all three modification a-c.

[**JCT2-A0093**](http://phenix.int-evry.fr/jct2/doc_end_user/current_document.php?id=85)**/**[**m26048**](http://phenix.int-evry.fr/mpeg/doc_end_user/current_document.php?id=39208&id_meeting=153) **3D-CE8.h results on view synthesis optimization by Samsung, HHI and LG-PKU [H. Liu (LG Electronics)]**

Remarks:

Same as A0033 + Simplification (however: can be done independent from A0033)

Modifications:

1. run-time optimization of VSO algorithm implementation (same as A0033)
2. increase of number of views regarded for error computation by a factor of three (same as A0033)
3. model-based view synthesis distortion estimation for some encoder decisions (same as A0033)
4. early detection if distortion is zero and skip of distortion computation

RD-performance:

2.6% bit rate reduction for synthesized views compared to anchors

Encoding time:

77% (linux)

Suggestion:

It was agreed to adopt all four modification a-d.

[**JCT2-A0119**](http://phenix.int-evry.fr/jct2/doc_end_user/current_document.php?id=135)**/**[**m26106**](http://phenix.int-evry.fr/mpeg/doc_end_user/current_document.php?id=39267&id_meeting=153) **CE8.h Depth distortion metric with a weighted depth fidelity term [Jiwook Jung, Sehoon Yea (LG), Seungchul Ryu, Kwanghoon Sohn (Yonsei Univ.)]**

Remarks:

Same as A0033 + depth fidelity term (however: might be done independent from A0033)

Modifications:

1. run-time optimization of VSO algorithm implementation (same as A0033)
2. increase of number of views regarded for error computation by a factor of three (same as A0033)
3. model-based view synthesis distortion estimation for some encoder decisions (same as A0033)
4. additive depth distortion term, weights (SV/depth): 1:1 for decisions modified in (c) 10:1 for other decisions

RD-performance (not cross checked):

0.4% bit rate increase for synthesized views compared to A0033 with VSRS 1D-fast

2.4% bit rate reduction for synthesized views compared to A0033 with VSRS 3.5

Depth quality is better preserved.

Encoding time:

101% (linux/windows??)

Comments:

Strong support for this proposal.

Suggestion:

Adopt proposal to HTM and further evaluate weighting between SV-distortion and depth distortion. Continue study in CE8 before using in CTC.

[**JCT2-A0083**](http://phenix.int-evry.fr/jct2/doc_end_user/current_document.php?id=75)**/**[**m26034**](http://phenix.int-evry.fr/mpeg/doc_end_user/current_document.php?id=39194&id_meeting=153) **CE8.h: Results of Simplification of View Synthesis Optimization by Detection of Zero Distortion Change in Synthesized View [S. Wang (Peking Univ.), S. Ma (Peking Univ.), H. Liu (LG Electronics), J. Jia (LG Electronics)]**

Remarks:

One of the proposed modifications corresponds to modification A0093-d

Suggestion:

No further action.

[**JCT2-A0057**](http://phenix.int-evry.fr/jct2/doc_end_user/current_document.php?id=49)**/**[**m25935**](http://phenix.int-evry.fr/mpeg/doc_end_user/current_document.php?id=39095&id_meeting=153) **3D-CE8.h results on JRDO [Li Wang, Lu Yu (Zhejiang Univ.)] [late]**

Remarks: Similar to A0033-(c)

RD-performance:

0.1% reduction for VSRS 1-d fast compared to anchor

1.1% reduction for VSRS 3.5 compared to anchor

Modifications:

1. model-based view synthesis distortion estimation for some encoder decisions

Encoding time:

Not fully tested. (about 80%)

Suggestion:

Study further harmonization on top of adopted changes.

# Other remarks

Several participants recommended to use modifications proposed in A0119 already now for some CEs as an additional option.

Some participants recommended using different renderers for evaluation of CE8.

# Conclusion

The BOG suggests

* to adopt proposals A0033 and A0093 in HTM software and for CTC.
* to adopt proposals A0119 to HTM software for further studies.
* to further study harmonization of A0057 with adopted changes.