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| *Title:* | **CE1: Summary Report on Improved Depth Coding** | | |
| *Status:* | Input Document | | |
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# Abstract

This document is the summary report of Core Experiment 1 (CE1) on improved depth coding. Tools under test will be evaluated according to their impact on compression efficiency and implementation complexity.

# Participants

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1. **List of contribution**

CE1 Proposals

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| **Doc No.** | **Title** | **Type** |
| [JCT3V-K0031](http://phenix.int-evry.fr/jct3v/doc_end_user/current_document.php?id=2443) | 3D-CE1: Segmental prediction in 3D-HEVC | Proposal |
| [JCT3V-K0034](http://phenix.int-evry.fr/jct3v/doc_end_user/current_document.php?id=2446) | 3D-CE1: Cross check of segmental prediction (JCT3V-K0031) | Crosscheck |
| [JCT3V-K0056](http://phenix.int-evry.fr/jct3v/doc_end_user/current_document.php?id=2468) | 3D-CE1: Crosscheck of Segmental prediction in 3D-HEVC (JCT3V-K0031) | Crosscheck |
| [JCT3V-K0033](http://phenix.int-evry.fr/jct3v/doc_end_user/current_document.php?id=2445) | 3D-CE1: Depth intra skip (DIS) mode | Proposal |
| [JCT3V-K0040](http://phenix.int-evry.fr/jct3v/doc_end_user/current_document.php?id=2452) | 3D-CE1: Cross check of depth Intra skip mode (JCT3V-K0033) | Crosscheck |
| [JCT3V-K0046](http://phenix.int-evry.fr/jct3v/doc_end_user/current_document.php?id=2458) | 3D-CE1: Cross check of Depth intra skip (DIS) mode(JCT3V-K0033) | Crosscheck |
| [JCT3V-K0055](http://phenix.int-evry.fr/jct3v/doc_end_user/current_document.php?id=2467) | 3D-CE1: Crosscheck of Depth intra skip (DIS) mode (JCT3V-K0033) | Crosscheck |
| [JCT3V-K0067](http://phenix.int-evry.fr/jct3v/doc_end_user/current_document.php?id=2481) | 3D-CE1: Crosscheck of Depth Intra Skip (DIS) mode - Enabling intra CBF (JCT3V-K0033) | Crosscheck |

CE1-related Proposals

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| **Doc No.** | **Title** | **Type** |
| [JCT3V-K0041](http://phenix.int-evry.fr/jct3v/doc_end_user/current_document.php?id=2453) | CE1-related: Simplification of segmental prediction | Proposal |
| [JCT3V-K0066](http://phenix.int-evry.fr/jct3v/doc_end_user/current_document.php?id=2480) | 3D-CE1 related: Crosscheck on simplification of segmental prediction (JCT3V-K0041) | Crosscheck |

# Summary of proposals & results

* 1. ***Segmental prediction (K0031)***

In this contribution, a segmental prediction method is proposed in depth coding. When the segmental prediction is enabled, two steps are applied to obtain the reconstructed block from the prediction block.

1. In the first step, samples in the current block are classified into two segments and only four corner samples are used to derive the threshold.
2. In the second step, a single value is derived for each segment in the reconstructed block

Two tests are conducted under the common test condition (CTC). In Test1, the segmental prediction method is implemented. In Test2, a simplified method which only uses one out of 4 samples to derive a prediction value for each segment is applied. The results of Test1 and Test2 are summarized in Table1.

Table 1. Experimental results of segmental prediction

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Test* | *Video 1* | *Video 2* | *Video/video BR* | *Video/total BR* | *Synthesized/total BR* |
| Test 1 | -0.1% | 0.0% | 0.0% | 0.0% | -0.5% |
| Test 2 | -0.1% | 0.0% | 0.0% | 0.0% | -0.5% |

## Encoder complexity analysis

### Encoder strategies for Inter-SDC, Intra-SDC and Seg-SDC are analyzed.

|  |  |
| --- | --- |
| Mode | Checking offests |
| Inter-SDC | 5 times (*K*-2, *K*-1, *K*, *K*+1 and *K*+2) |
| Intra-SDC | 6 times (*K*-2, *K*-1, *K*, *K*+1, *K*+2, and 0) |
| Seg-SDC | 2 times (*K* and 0) |

## Decoder complexity analysis

Table 2. Complexity comparison



Table 3. Complexity comparison without considering transform.



* 1. ***Depth intra skip mode (K0033)***

A depth intra skip (DIS) coding mode is proposed for the efficient depth coding. The proposed DIS coding mode uses the vertical and horizontal prediction modes. The residual information is not coded and the best prediction mode is determined through RDO.

The following four tests were studied in this context:

- Test1: Test the coding performance of the depth intra skip mode on top of single depth mode.

- Test2: Test the coding performance of the depth intra skip mode replacing single depth mode.

- Test3: Enable root CBF flag in depth intra mode coding to identify whether it can achieve coding gain.

- Test4: Reduce the number of intra modes for depth maps to identify whether it can achieve coding gain.

Table 4. Results of DIS-related tests under CTC

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Test* | *Video 1* | *Video 2* | *Video/video BR* | *Video/total BR* | *Synthesized/total BR* |
| Test 1 | -0.1% | 0.0% | 0.0% | -0.2% | -0.3% |
| Test 2 | -0.1% | 0.0% | 0.0% | -0.2% | -0.2% |
| Test 3 | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% |
| Test 4 | 0.0% | 0.1% | 0.0% | 0.1% | 0.1% |

Table 4. Results of DIS-related tests under All-Intra test conditions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Test* | *Video 1* | *Video 2* | *Video/video BR* | *Video/total BR* | *Synthesized/total BR* |
| Test 1 | 0.0% | 0.0% | 0.0% | -0.2% | -0.1% |
| Test 2 | 0.0% | 0.0% | 0.0% | -0.2% | -0.1% |
| Test 3 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Test 4 | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% |