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| *Title:* | **SCE1: Results of Test 4.2.3 on Simplification of Difference Intra prediction** | | |
| *Status:* | Input Document to JCT-VC | | |
| *Purpose:* | Proposal | | |
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# Abstract

This document reports SHVC SCE1 results of Test 4.2.3 on simplified two mode difference domain prediction. Difference domain Intra Prediction (DIP) is a predictive coding tool which uses reconstructed pixels from spatial neighbors of current enhancement layer and co-located base layer to predict the current enhancement layer block. In this contribution only two intra prediction modes, namely, horizontal and vertical are enabled for DIP and the best mode of these two is signaled using a flag. In addition, MDIS and pixel filtering in horizontal and vertical prediction modes are disabled. It is reported that It is reported that for this test a luma BD-rate reduction (EL+ BL) of 0.4% and 0.3% is obtained for AI 2x and AI 1.5x spatial scalability cases respectively.

# Technical description

## Difference Domain Intra Prediction

The Difference Domain intra Prediction (DIP) was proposed in [1][2] to improve the coding efficiency of SHVC. In the DIP, as shown in Figure 1, the difference between the pixels of current neighbors and that of collocated BL neighbors are used to generate a difference prediction based on the intra prediction mode. The generated difference prediction signal is added to the collocated BL block signal to form the final prediction.

The difference domain prediction mode is indicated by a flag *intra\_resi\_pred\_flag* at CU level.



Figure 1 Difference Domain Intra Prediction

## Simplified DIP with only two Intra Prediction Modes

In this method, only two intra prediction modes, namely, horizontal and vertical are enabled for DIP. The best modes of these two are signaled using a flag at PU level. In Addition, MDIS and pixel filtering for horizontal and vertical modes are disabled for DIP mode. As a result, the DIP process at the enhancement layer is shown as follows,

Pf(x,y) = B(x,y) + (Pe(xR,yR) - Pb(xR,yR))

where,

P­f(x,y) : Final Prediction Pixels for the enhancement layer block

B(x,y) : Collocated Base layer pixels (INTRA-BL Prediction)

Pe(xR,yR) : Spatial reference pixels for the enhancement layer block based on intra prediction direction

Pb(xR,y­R) : Corresponding spatial reference pixels for the collocated base layer block based on intra prediction direction

Since MDIS and Intra Filtering for horizontal and vertical mode are disabled, the intra prediction pixel generation for Pe(xR,yR) and Pb(xR,yR) can be by-passed in DIP.

# Test Results

The proposed method is implemented on SHM-1.0 intraBL framework and experimentally verified under SHVC common test conditions defined by JCTVC-L1009 and the results are summarized in the following tables for AI 2x and 1.5x spatial scalability cases. Thanks to LG Electronics for crosschecking the tests.

**Table 1: Experimental results of Difference Domain Intra Prediction for AI configuration**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **AI HEVC 2x** | | | **AI HEVC 1.5x** | | |
|  | Y | U | V | Y | U | V |
| Class A | -0.3% | -0.2% | -0.2% |  |  |  |
| Class B | -0.4% | -0.3% | -0.3% | -0.3% | 0.0% | 0.0% |
| **Overall (Test vs Ref)** | -0.4% | -0.2% | -0.3% | -0.3% | 0.0% | 0.0% |
| **Overall (Test vs single layer)** | 12.0% | 13.4% | 13.0% | 9.9% | 10.3% | 9.7% |
| **EL only (Test vs Ref)** | -0.5% | -0.4% | -0.4% | -0.6% | -0.2% | -0.2% |
| Enc Time[%] | 124.9% | | | 121.1% | | |
| Dec Time[%] | 100.2% | | | 100.6% | | |
| Enc Mem[%] | 100.3% | | | 100.1% | | |
| BL Match | Matched | | | Matched | | |

# References

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