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| **Joint Collaborative Team on 3D Video Coding Extensions**  **of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11**  6th Meeting: Geneva, CH, 25 Oct. – 1 Nov. 2013 | Document: JCT3V-F0104 |

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| *Title:* | **CE3-related: Removal of redundancy on VSP, ARP and IC** | | |
| *Status:* | Input Document to JCT-3V | | |
| *Purpose:* | Proposal | | |
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# Abstract

Since VSP, ARP and IC are mutually exclusive, allowing that combination is redundant. That results in coding efficiency degration, especially prominent when ARP or IC is enabled but VSP merge mode is inserted in vain. In this proposal, it is proposed to insert VSP merge candidate on the condition that ARP and IC is not enabled in the CU. IC flag is also not signalled when ARP is enabled. The experimental result reportedly shows 0.1 %, 0.1 %, and 0.1 % gain in texture, video and synthesis respectively.

# Introduction

In the current design, when the PU is a VSP merge mode, ARP and IC is not utilized in motion compensation process although ARP flag or IC flag is equal to 0. So VSP, ARP and IC are mutually exclusive. Reversely, when ARP or IC is utilized, inserting VSP merge mode wastes one merge mode.

# Proposal

We propose to insert VSP merge candidate on the condition that ARP and IC is not enabled in the CU.

Also IC flag is not signalled when ARP is enabled. The exclusiveness of IC flag doesn’t produce much coding efficiency but removing redundancy is reasonable and encoder can be speed up without loss.

# Proposed Text

**H.8.5.2.1.1 Derivation process for luma motion vectors for merge mode**

6. Depending on view\_synthesis\_pred\_flag[ nuh\_layer\_id ], the following applies.

* + - If view\_synthesis\_pred\_flag[ nuh\_layer\_id ] is equal to 0 or iv\_res\_pred\_weight\_idx is larger than 0 or ic\_flag is equal to 1, the flag availableFlagVSP is set equal to 0.
    - Otherwise (view\_synthesis\_pred\_flag[ nuh\_layer\_id ] is equal to 1), the derivation process for a view synthesis prediction merge candidate as specified in subclause H.8.5.3.2.13 is invoked with the luma locations ( xCb, yCb ) as input and the outputs are the availability flag availableFlagVSP, the reference indices refIdxL0VSP and refIdxL1VSP, the prediction list utilization flags predFlagL0VSP and predFlagL1VSP, and the motion vectors mvL0VSP and mvL1VSP.

…

|  |  |
| --- | --- |
| coding\_unit( x0, y0, log2CbSize , ctDepth) { | **Descriptor** |
| if( transquant\_bypass\_enable\_flag ) { |  |
| **cu\_transquant\_bypass\_flag** | ae(v) |
| } |  |
| if( slice\_type != I ) |  |
| **skip\_flag**[ x0 ][ y0 ] | ae(v) |
| if( skip\_flag[ x0 ][ y0 ] ) { |  |
| prediction\_unit( x0, y0, log2CbSize ) |  |
| if ( iv\_res\_pred\_flag[ nuh\_layer\_id ] && TempRefPicInListsFlag ) |  |
| **iv\_res\_pred\_weight\_idx** | ae(v) |
| if ( icEnableFlag && iv\_res\_pred\_weight\_idx == 0 ) |  |
| **ic\_flag** | ae(v) |
| } |  |
| else { |  |
| nCbS = ( 1 << log2CbSize ) |  |
| if( slice\_type != I ) |  |
| **pred\_mode\_flag** | ae(v) |
| if( ( PredMode[ x0 ][ y0 ] ! = MODE\_INTRA | | log2CbSize = = Log2MinCbSize ) &&  !predPartModeFlag) |  |
| **part\_mode** | ae(v) |
| if( PredMode[ x0 ][ y0 ] = = MODE\_INTRA ) { |  |
| … |  |
| } else { |  |
| if( PartMode = = PART\_2Nx2N ) { |  |
| prediction\_unit( x0, y0, nCbS, nCbS ) |  |
| if ( iv\_res\_pred\_flag[ nuh\_layer\_id ] && TempRefPicInListsFlag ) |  |
| **iv\_res\_pred\_weight\_idx** | ae(v) |
| } else if( PartMode = = PART\_2NxN ) { |  |
| … |  |
| } |  |
| } |  |
| if ( icEnableFlag && iv\_res\_pred\_weight\_idx == 0) |  |
| **ic\_flag** | ae(v) |

# Simulation results

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | video 0 | video 1 | video 2 | video PSNR / video bitrate | video PSNR / total bitrate | synth PSNR / total bitrate | enc time | dec time | ren time |
| Balloons | 0.0% | -0.8% | -0.6% | -0.2% | -0.1% | -0.2% | 97.5% | 101.9% | 100.6% |
| Kendo | 0.0% | -0.8% | -0.8% | -0.2% | -0.1% | -0.2% | 97.1% | 100.7% | 100.4% |
| Newspaper\_CC | 0.0% | -0.6% | -0.4% | -0.1% | -0.1% | -0.1% | 98.0% | 100.7% | 99.7% |
| GT\_Fly | 0.0% | -0.1% | -0.1% | 0.0% | 0.0% | 0.0% | 100.1% | 100.5% | 100.0% |
| Poznan\_Hall2 | 0.0% | -0.2% | -0.7% | -0.2% | -0.2% | -0.2% | 97.9% | 99.6% | 99.8% |
| Poznan\_Street | 0.0% | -0.3% | -0.5% | 0.0% | 0.0% | -0.1% | 98.0% | 98.6% | 99.7% |
| Undo\_Dancer | 0.0% | -0.3% | -0.4% | -0.1% | 0.0% | -0.1% | 98.2% | 100.5% | 99.7% |
| 1024x768 | 0.0% | -0.7% | -0.6% | -0.2% | -0.1% | -0.2% | 97.5% | 101.1% | 100.2% |
| 1920x1088 | 0.0% | -0.2% | -0.4% | -0.1% | -0.1% | -0.1% | 98.6% | 99.8% | 99.8% |
| **average** | **0.0%** | **-0.4%** | **-0.5%** | **-0.1%** | **-0.1%** | **-0.1%** | **98.1%** | **100.4%** | **100.0%** |
|  |  |  |  |  |  |  |  |  |  |
| Shark | 0.0% | -0.3% | -0.2% | 0.0% | 0.0% | 0.0% | 100.4% | 95.0% | 98.1% |

# Conclusion

In this proposal, it is proposed to insert VSP merge candidate on the condition that ARP and IC is not enabled in the CU. IC flag is also not signalled when ARP is enabled. The experimental result reportedly shows 0.1 %, 0.1 %, and 0.1 % gain in texture, video and synthesis respectively.

# References

[1] F. Zou, D. Tian, A. Vetro, S. Shimizu, S. Sugimoto, H. Kimata, CE1.h: Results on View Synthesis Prediction, JCT3V-B0102

[2] [T. Kim](mailto:taesup.kim@lge.com), [J. Nam](mailto:junghak.nam@lge.com), S. Yea, CE1.h related : BVSP mode inheritance”, JCT3V-D0092

[3] S. Shimizu, S. Sugimoto, “3D-CE1.h: Adaptive block partitioning for VSP”, JCT3V-E0207, JCT3V 5th Meeting: Vienna, AT, 27 July – 2 Aug. 2013

# Patent rights declaration(s)

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