

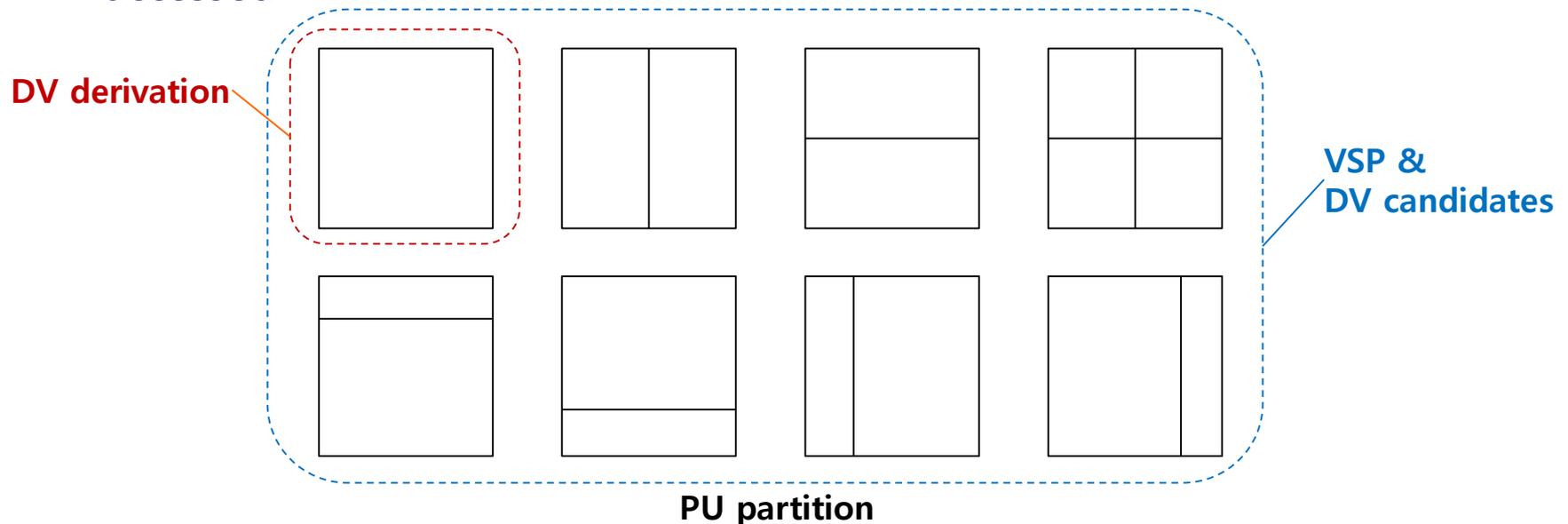
JCT3V-H0067 – CE1 related: CU-level VSP and DV Candidates

Min Woo Park

Multimedia Platform Lab.
DMC R&D Center
Samsung Electronics

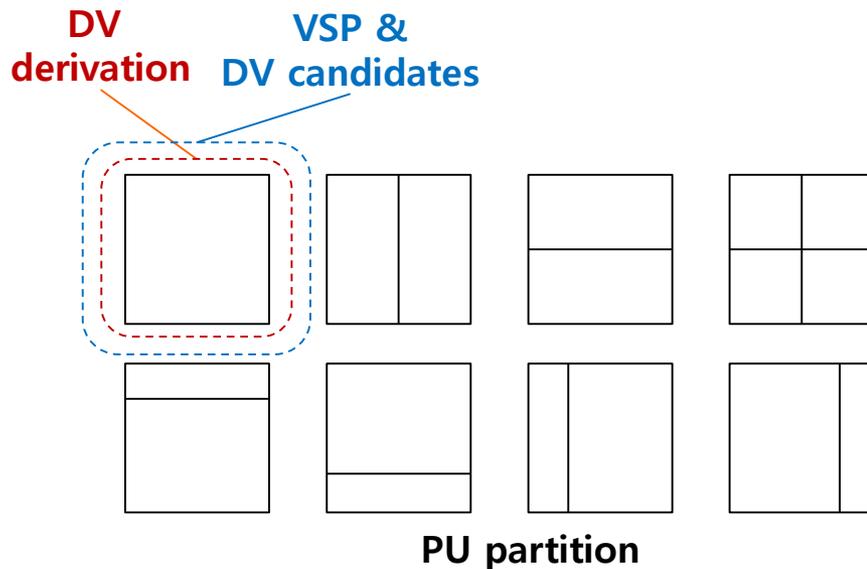
Introduction

- ❖ Currently, DV (e.g. NBDV and DoNBDV) is derived in CU-level
- ❖ CU-level DV is used for VSP and DV candidates
- ❖ But, VSP and DV candidates are allowed in every PU partition mode
 - Since the same DV is used in all PU partition, sometimes, this could be a little redundant
 - For the partition decision of VSP, AMP (asymmetric motion partition) mode need to be considered and PU-level depth block need to be accessed



CU-level VSP and DV candidates

- ❖ Therefore, we propose to apply VSP and DV candidates only to 2Nx2N PU partition mode
 - The unit of DV derivation can be aligned with VSP and DV candidates
 - It is not necessary to consider AMP (Asymmetric motion partition) modes any more in the VSP process
 - It is not necessary to access a PU level depth block in the VSP process



Current

```

if (PU Width % 8 != 0)
    8x4 partitoin
else if (PU Height % 8 != 0)
    4x8 partition
else
    Partition Decision in PU-level
    
```



Proposed

```

if (PU Width % 8 != 0)
    8x4 partitoin
else if (PU Height % 8 != 0)
    4x8 partition
else
    Partition Decision in CU-level
    
```

Partition Decision of VSP

Simulation Results (Test 1)

- ❖ Based on CTC with HTM 10.0r1 software
- ❖ **Test 1:** Applying VSP candidates only to 2Nx2N PU partition mode
 - No coding loss

	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	0.00%	0.00%	0.15%	0.03%	0.03%	0.01%	100.2%	99.1%	100.5%
Kendo	0.00%	-0.07%	-0.05%	-0.04%	-0.03%	-0.01%	100.0%	98.1%	101.8%
Newspaper_CC	0.00%	-0.05%	-0.19%	-0.05%	-0.06%	-0.03%	100.0%	105.4%	100.0%
GT_Fly	0.00%	0.32%	0.17%	0.04%	0.04%	0.02%	101.2%	96.6%	100.9%
Poznan_Hall2	0.00%	-0.05%	-0.37%	-0.08%	-0.12%	-0.13%	97.7%	95.6%	92.4%
Poznan_Street	0.00%	0.04%	0.13%	0.03%	0.04%	0.03%	98.5%	92.3%	95.4%
Undo_Dancer	0.00%	0.48%	0.52%	0.13%	0.13%	0.11%	99.5%	92.2%	94.6%
Shark	0.00%	0.18%	0.15%	0.03%	0.03%	0.02%	100.0%	99.6%	103.8%
1024x768	0.00%	-0.04%	-0.03%	-0.02%	-0.02%	-0.01%	100.1%	100.9%	100.8%
1920x1088	0.00%	0.20%	0.12%	0.03%	0.02%	0.01%	99.4%	95.3%	97.4%
average	0.00%	0.11%	0.06%	0.01%	0.01%	0.00%	99.6%	97.4%	98.7%

Simulation Results (Test 2)

- ❖ Based on CTC with HTM 10.0r1 software
- ❖ **Test 2:** Applying DV candidates only to 2Nx2N PU partition mode
 - No coding loss
 - 0.02% bit-saving for video and coded views

	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	0.00%	0.11%	-0.03%	0.00%	-0.01%	0.01%	101.0%	100.8%	100.5%
Kendo	0.00%	-0.25%	-0.07%	-0.06%	-0.06%	0.03%	99.2%	100.4%	100.8%
Newspaper_CC	0.00%	-0.01%	-0.08%	-0.01%	-0.01%	-0.06%	99.9%	107.8%	100.4%
GT_Fly	0.00%	0.14%	0.19%	0.02%	0.03%	0.07%	100.4%	98.0%	102.8%
Poznan_Hall2	0.00%	-0.16%	-0.23%	-0.05%	-0.06%	-0.15%	99.5%	95.7%	94.5%
Poznan_Street	0.00%	-0.08%	0.20%	0.01%	0.01%	0.03%	99.6%	94.7%	99.1%
Undo_Dancer	0.00%	-0.18%	-0.07%	-0.06%	-0.07%	0.01%	100.4%	92.9%	94.5%
Shark	0.00%	0.26%	0.33%	0.04%	0.03%	0.03%	99.5%	98.6%	99.2%
1024x768	0.00%	-0.05%	-0.06%	-0.03%	-0.03%	-0.01%	100.0%	103.0%	100.6%
1920x1088	0.00%	0.00%	0.08%	-0.01%	-0.01%	0.00%	99.9%	96.0%	98.0%
average	0.00%	-0.02%	0.03%	-0.02%	-0.02%	0.00%	99.9%	98.6%	99.0%

Simulation Results (Test 3)

- ❖ Based on CTC with HTM 10.0r1 software
- ❖ Test 3: Combining Test 1 and Test 2
 - No coding loss

	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	0.00%	0.26%	-0.05%	0.01%	0.02%	0.01%	101.0%	102.7%	99.0%
Kendo	0.00%	-0.20%	-0.02%	-0.07%	-0.09%	0.01%	100.2%	98.4%	102.0%
Newspaper_CC	0.00%	-0.01%	-0.12%	-0.03%	-0.05%	-0.02%	100.0%	102.9%	101.1%
GT_Fly	0.00%	0.55%	0.49%	0.12%	0.13%	0.09%	100.5%	98.9%	101.5%
Poznan_Hall2	0.00%	-0.24%	-0.30%	-0.13%	-0.14%	-0.17%	99.5%	92.9%	94.9%
Poznan_Street	0.00%	-0.03%	0.16%	0.02%	0.02%	-0.01%	99.5%	103.5%	99.3%
Undo_Dancer	0.00%	0.51%	0.46%	0.13%	0.13%	0.07%	100.5%	93.5%	96.0%
Shark	0.00%	0.34%	0.61%	0.10%	0.10%	0.08%	99.7%	100.3%	103.3%
1024x768	0.00%	0.01%	-0.06%	-0.03%	-0.04%	0.00%	100.4%	101.4%	100.7%
1920x1088	0.00%	0.23%	0.28%	0.05%	0.05%	0.01%	99.9%	97.8%	99.0%
average	0.00%	0.15%	0.15%	0.02%	0.01%	0.01%	100.1%	99.1%	99.6%

Conclusion

- ❖ We proposed to apply VSP and DV candidates only to 2Nx2N PU partition mode
 - The unit of DV derivation, and VSP and DV candidates can be aligned
 - The complexity of the VSP process can be reduced
 - No coding loss
- ❖ We recommend to adopt the proposed methods into next 3D-HEVC WD

Thanks **NTT** for the cross checking (JCT3V-H0142).

