JCT3V-I0081: CE1 related: Reduction of Worst Case Memory Bandwidth for ARP

Min Woo Park

Multimedia Platform Lab.
DMC R&D Center
Samsung Electronics

Memory Bandwidth for ARP

❖ In the worst case, ARP needs to additionally fetch one depth block in addition to the motion compensation

- Since the inter-view candidates (IVMC, IVDC, shifted IVMC/IVDC) use DoNBDV, which is derived from the depth block and ARP can be performed with these candidates
- The worst case memory bandwidth of ARP is 132% ~ 172% depending on used memory pattern

❖ So, we propose to use NBDV for the inter-view candidates when ARP is enabled so that the depth access is not needed

- The worst case memory bandwidth becomes 122% ~ 158

❖ Comparison the worst case memory bandwidth

Memory Pattern	Current	Proposed
1x1	132%	122%
4x2	148%	135%
8x2	172%	158%

SAMSUNG

Simulation Results

❖ Based on CTC and HTM 11

- ▪ 0.1% bit-saving for dependent views
- ▪ 0.03% bit-saving for coded and synthesized views in spite of the simplification

	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%	-0.19%	-0.04%	-0.04%	-0.05%	-0.06%	96.0%	93.8%	94.5%
Kendo	0.00%	0.00%	0.07%	0.01%	-0.04%	0.01%	96.1%	95.6%	95.5%
Newspaper_CC	0.00%	-0.12%	-0.08%	-0.04%	-0.01%	-0.04%	95.1%	92.3%	94.3%
GT_Fly	0.00%	-0.10%	-0.17%	-0.02%	-0.02%	-0.06%	96.3%	104.4%	96.7%
Poznan_Hall2	0.00%	-0.21%	-0.32%	-0.10%	-0.08%	-0.06%	95.2%	93.5%	95.8%
Poznan_Street	0.00%	0.14%	-0.02%	0.02%	0.02%	0.03%	96.9%	98.0%	96.3%
Undo_Dancer	0.00%	0.02%	-0.02%	0.01%	0.01%	-0.01%	95.9%	94.6%	96.0%
Shark	0.00%	-0.15%	-0.17%	-0.03%	-0.04%	-0.03%	96.3%	99.2%	96.9%
1024x768	0.00%	-0.10%	-0.02%	-0.02%	-0.03%	-0.03%	95.7%	93.9%	94.8%
1920x1088	0.00%	-0.06%	-0.14%	-0.03%	-0.02%	-0.03%	96.1%	97.9%	96.3%
average	**0.00%**	**-0.08%**	**-0.09%**	**-0.02%**	**-0.03%**	**-0.03%**	**96.0%**	**96.4%**	**95.7%**

Conclusion

❖ We proposed to use NBDV for inter-view candidates to reduce the worst case memory bandwidth for ARP

- No need to access depth block
- Worst case memory bandwidth is reduced by 10% ~ 14%

❖ We recommend to adopt the proposed method into next 3D-HEVC WD

Thanks Sharp for the cross check (JCT3V-I0157).