JCT3V-J0036: Reduction of Worst Case Memory Bandwidth in 3D-HEVC

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Memory Bandwidth for 3D-HEVC

❖ In the worst case,
- Memory bandwidth of 3D-HEVC **>** Memory bandwidth of HEVC
  - Since 3D-HEVC needs to additionally access a depth map
- **114%** memory bandwidth compared to the worst case of HEVC
  - when 8x2 memory pattern is used

❖ To reduce the worst case memory bandwidth in 3D-HEVC,
- when CU size is 8x8, DoNBDV is not derived and use NBDV instead of DoNBDV (for deriving IVMC, IVDC, shifted IVMC and shifted IVDC)

❖ With the proposed method,
- Worst case memory bandwidth of 3D-HEVC becomes the same as the worst case of HEVC (114% → 100%)

Tool	Current	Proposed
IVMC	114%	100%
ARP	108%	94%
Merge	114%	100%

Memory bandwidth comparison (8x2 memory pattern)

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Simulation Results

❖ Based on CTC and HTM 12 reference software

  ▪ 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%	0.05%	0.18%	0.05%	0.04%	0.06%	102.0%	99.1%	103.7%
Kendo	0.00%	0.11%	0.21%	0.07%	0.04%	0.08%	102.8%	96.7%	103.2%
Newspaper_CC	0.00%	0.06%	0.20%	0.03%	0.00%	0.01%	101.1%	92.9%	101.2%
GT_Fly	0.00%	0.09%	0.12%	0.02%	0.00%	0.00%	99.2%	95.9%	100.1%
Poznan_Hall2	0.00%	0.04%	0.33%	0.04%	0.02%	0.10%	101.2%	99.9%	103.2%
Poznan_Street	0.00%	0.12%	-0.05%	0.01%	0.01%	-0.01%	100.0%	105.0%	101.3%
Undo_Dancer	0.00%	0.00%	-0.04%	0.01%	0.01%	0.00%	99.5%	100.1%	98.8%
Shark	0.00%	0.25%	0.03%	0.03%	0.03%	0.02%	99.2%	100.2%	100.3%
1024x768	0.00%	0.07%	0.20%	0.05%	0.03%	0.05%	102.0%	96.2%	102.7%
1920x1088	0.00%	0.10%	0.08%	0.02%	0.01%	0.02%	99.8%	100.2%	100.7%
average	**0.00%**	**0.09%**	**0.12%**	**0.03%**	**0.02%**	**0.03%**	**100.6%**	**98.7%**	**101.5%**

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Conclusion

❖ We proposed, when CU size is 8x8, not to derive DoNBDV and to use NBDV instead of DoNBDV

  ▪ The worst case memory bandwidth becomes the same as the worst case of HEVC (114% → 100%) while maintaining the coding performance

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

Thanks Sharp for the cross check (JCT3V-J0078).