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Title: **AHG5 Cross-Check of MV-HEVC Software for HTM**

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Abstract

This contribution reports an cross-check result of MV-HEVC Software for HTM described in JCT3V-B0046 [1] related to works of AHG5, that has been obtained by Poznan University of Technology.

1 Introduction

Mandate of AHG5 was to provide software aligned with MV-HEVC text specification. [2]. Two configurations were tested: with and without temporal scalability.

2 Cross-check results

The simulations results were generated on a ~80 core cluster system. The cluster platform's processing units have the following specifications:

- Processor: Intel Xeon X5675
- Clock Speed: 3.06 GHz
- Memory: approx. 4 GB per Core
- OS: 64-bit Windows Server 2008
- Compiler: Microsoft Visual Studio 2008 (64 bit)

Exemplary results are shown in Table 1. Overview of the results are shown in Tables 3-5. All simulation results are attached to this document in excel sheet. The obtained results are in perfect match with those provided in JCT3V-B0046 [1].

Table 1 MV-HEVC (without temporal scalability) VS HTM4.0 anchor

	Texture										
Rate: kbit/s		1st view		2nd view		3rd view		Total		Performance	
PSNR, dB	RP	Rate	PSNR	Rate	PSNR	Rate	PSNR	Rate	PSNR	BD-rate (piecewise cubic)	BD-rate (cubic)
	Rp4	809,45	42,1268	284,99	41,8400	301,48	41,6839	1395,92	41,88357		
	Rp3	344,571	41,1527	123,774	40,8269	126,89	40,7363	595,235	40,9053		
	Rp2	177,936	39,7583	66,706	39,3800	68,476	39,3433	313,118	39,49387		
S01	Rp1	100,014	38,0462	39,6	37,5956	39,753	37,6015	179,367	37,74777	-0,08%	-0,08%
	Rp4	2427,17	39,8566	776,6208	38,9553	763,948	38,8834	3967,743	39,23177		
	Rp3	956,042	37,9129	238,9752	37,0942	237,1672	36,912	1432,185	37,30637		
	Rp2	461,099	35,8976	98,9016	35,2248	99,4968	34,9515	659,4976	35,35797		
S02	Rp1	240,895	33,7823	47,7264	33,258	46,3864	32,9503	335,008	33,3302	-0,04%	-0,04%
	Rp4	4594,02	38,7523	1034,444	37,8857	983,5504	38,0475	6612,015	38,2285		
	Rp3	1995,2	35,8925	410,4168	35,2716	389,0928	35,4597	2794,712	35,54127		
	Rp2	916,974	33,3749	195,8	32,8858	187,6424	33,0755	1300,417	33,11207		
S03	Rp1	429,164	31,1005	99,8736	30,6744	97,4176	30,8413	626,4552	30,87207	-0,03%	-0,03%
	Rp4	3667,77	40,1921	662,92	39,5952	683,56	39,5634	5014,254	39,78357		
	Rp3	1611,16	37,7834	258,2488	37,3402	266,2584	37,3037	2135,666	37,47577		
	Rp2	755,351	35,5982	118,0688	35,2578	123,0912	35,2214	996,5112	35,35913		
S04	Rp1	366,218	33,4626	60,0816	33,1674	61,3264	33,122	487,6264	33,25067	-0,27%	-0,27%
	Rp4	844,578	43,6144	358,9856	42,6723	386,8976	42,2895	1590,461	42,85873		
	Rp3	451,658	41,463	176,0328	40,3135	187,9424	40,0422	815,6328	40,60623		
	Rp2	257,243	38,9885	97,8216	37,8631	102,9048	37,6631	457,9696	38,17157		
S05	Rp1	155,508	36,3791	57,412	35,3046	60,1648	35,1371	273,0848	35,60693	-0,05%	-0,05%
	Rp4	876,454	43,101	370,9504	42,1771	400,304	41,8556	1647,709	42,3779		
	Rp3	481,894	41,0724	185,02	39,7819	200,1912	39,5514	867,1056	40,13523		
	Rp2	278,198	38,5097	101,0432	37,1591	109,608	36,9466	488,8496	37,53847		
S06	Rp1	168,792	35,6798	56,8624	34,3982	62,6336	34,2295	288,288	34,76917	-0,04%	-0,04%
	Rp4	950,767	41,3531	356,7728	40,2462	403,3264	39,8508	1710,866	40,48337		
	Rp3	500,339	39,001	164,6904	37,9092	186,9504	37,4764	851,98	38,12887		
	Rp2	276,024	36,4642	86,8512	35,5069	98,42	35,032	461,2952	35,6677		
S08	Rp1	160,437	33,9062	49,7952	33,0789	56,1448	32,5191	266,3768	33,16807	-0,05%	-0,05%

Table 2 MV-HEVC (with temporal scalability) VS HTM4.0 anchor

	Texture										
Rate: kbit/s		1st view		2nd view		3rd view		Total		Performance	
PSNR, dB	RP	Rate	PSNR	Rate	PSNR	Rate	PSNR	Rate	PSNR	BD-rate (piecewise cubic)	BD-rate (cubic)
	Rp4	812,261	42,1258	285,173	41,8437	300,327	41,6882	1397,761	41,8859		
	Rp3	344,254	41,1496	123,813	40,8272	126,239	40,7341	594,306	40,90363		
	Rp2	177,634	39,7563	66,783	39,3779	68,204	39,3512	312,621	39,49513		
S01	Rp1	99,714	38,044	39,402	37,5905	39,7	37,5982	178,816	37,74423	-0,23%	-0,23%
	Rp4	2440,17	39,8637	780,0272	38,9564	767,532	38,884	3987,725	39,2347		
	Rp3	956,972	37,9116	239,8784	37,0948	237,8808	36,9112	1434,731	37,30587		
	Rp2	461,272	35,8982	99,1736	35,2273	99,556	34,9508	660,0016	35,35877		
S02	Rp1	241,009	33,7844	47,9336	33,2603	46,468	32,9493	335,4104	33,33133	0,11%	0,11%
	Rp4	4618,63	38,7524	1035,6816	37,8848	983,1624	38,0443	6637,476	38,22717		
	Rp3	1999,68	35,8927	410,464	35,2702	388,7512	35,4592	2798,891	35,5407		
	Rp2	917,003	33,374	196,4264	32,8867	187,1944	33,068	1300,624	33,10957		
S03	Rp1	429,281	31,1002	99,9816	30,6742	97,3304	30,8426	626,5928	30,87233	0,13%	0,13%
	Rp4	3674,15	40,1908	662,4664	39,5943	682,9896	39,5628	5019,604	39,78263		
	Rp3	1611,35	37,7808	258,8152	37,3376	266,8496	37,3026	2137,018	37,47367		
	Rp2	755,262	35,5948	118,556	35,2543	123,2632	35,2169	997,0808	35,35533		
S04	Rp1	365,542	33,4589	60,2856	33,1655	61,488	33,1183	487,3152	33,24757	-0,13%	-0,13%
	Rp4	845,063	43,6143	358,5328	42,6691	386,2952	42,2894	1589,891	42,8576		
	Rp3	451,836	41,4642	175,7048	40,3056	187,9624	40,0421	815,5032	40,60397		
	Rp2	257,263	38,9868	97,8872	37,8637	103,0056	37,6584	458,156	38,16963		
S05	Rp1	155,692	36,3788	57,3168	35,2952	60,1176	35,1441	273,1264	35,60603	0,00%	0,00%
	Rp4	877,756	43,0997	370,4992	42,1756	400,4832	41,8574	1648,738	42,37757		
	Rp3	482,096	41,0713	185,0928	39,7851	200,264	39,5524	867,4528	40,13627		
	Rp2	278,051	38,504	100,9808	37,1642	109,6968	36,9493	488,7288	37,53917		
S06	Rp1	168,439	35,6835	56,8112	34,4017	62,8064	34,2246	288,0568	34,76993	-0,06%	-0,06%
	Rp4	951,501	41,3531	357,1936	40,2456	403,508	39,8485	1712,202	40,4824		
	Rp3	500,295	39,0003	164,3904	37,9082	187,0056	37,4743	851,6912	38,1276		
	Rp2	276,027	36,4616	87,0864	35,5077	98,468	35,031	461,5816	35,66677		
S08	Rp1	160,302	33,9074	49,9256	33,0782	56,108	32,5147	266,3352	33,16677	-0,01%	0,00%

Table 3 MV-HEVC (without temporal scalability) VS HTM4.0 anchor

	Texture Coding	
	BD-rate (piecewise cubic)	BD-rate (cubic)
S01	-0,08%	-0,08%
S02	-0,04%	-0,04%
S03	-0,03%	-0,03%
S04	-0,27%	-0,27%
S05	-0,05%	-0,05%
S06	-0,04%	-0,04%
S08	-0,05%	-0,05%
Average	-0,08%	-0,08%

Table 4 MV-HEVC (with temporal scalability) VS HTM4.0 anchor

	Texture Coding	
	BD-rate (piecewise cubic)	BD-rate (cubic)
S01	-0,23%	-0,23%
S02	0,11%	0,11%
S03	0,13%	0,13%
S04	-0,13%	-0,13%
S05	0,00%	0,00%
S06	-0,06%	-0,06%
S08	-0,01%	0,00%
Average	-0,03%	-0,03%

Table 5 MV-HEVC (RPLI off) vs MV-HEVC(RPLI on)

	Texture Coding	
	BD-rate (piecewise cubic)	BD-rate (cubic)
S01	-0,08%	-0,08%
S02	-0,03%	-0,03%
S03	-0,02%	-0,02%
S04	-0,02%	-0,02%
S05	-0,06%	-0,06%
S06	-0,06%	-0,06%
S08	-0,06%	-0,06%

Average	-0,05%	-0,05%

3 Conclusion

Cross-check results for AHG5 MV-HEVC Software for HTM have been reported in this contribution. The simulation results are in perfect match with whose provided in JCT3V-B0046 [1].

References

[1] L. Zhang, Y. Chen, J. Kang, "AHG5: MV-HEVC software for HTM" Joint Collaborative Team on 3D Video Coding Extension Development of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11 Doc. JTCV3-B0046, 2nd Meeting: Shanghai, CN, 13–19 Oct. 2012

[2] G. Tech, K. Wegner, Y. Chen, M. Hannuksela, "MV-HEVC text specification draft 1" Joint Collaborative Team on 3D Video Coding Extension Development of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11 Doc. JTC2-A1004, 1st Meeting: Stockholm, SE, 16–20 July 2012