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ISO/IEC JTC1/SC29/WG11
CODING OF MOVING PICTURES AND AUDIO**

**ISO/IEC JTC 1/SC 29/WG 11
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Title: Verification of proposal: “Performance evidence of software proposal for Wavelet Video Coding Exploration group”

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Source: aceMedia consortium (Motorola Ltd, Philips Electronics Nederland, Queen Mary University of London, Telefonica I+D, etc)

Subgroup: VidWav MPEG-21 Video Subgroup

Purpose: Evaluation of new wavelet based scalable video coding tools

1. Introduction

The document m13416 presents the encoding performance of the wavelet scalable video codec developed by aceMedia consortium. The codec architecture, concerning the encoding schemes (t+2D, 2D+t+2D, etc.) that can be realized, are basically the same allowed in the current MSRA VidWav scalable video coding model. The main differences can be found in the fundamental tools, such as Motion Estimation, Entropy Encoder, etc., used to implement a given encoding architecture. The evaluation of the proposed technology and its performance will be useful for improving the current VidWav reference scalable video codec.

2. Verification description

The following tasks have been performed:

1. Verification of extracted bitstream length according to the specified conditions
2. Verification of the correctness of bitstream decoding
3. PSNR calculation

3. Validation of SNR scalability

For each video sequence of Scenario1, three bitstream have been provided one for each spatial resolution (4CIF, CIF, QCIF). The bitstreams of each working point have been extracted following the test conditions described in document [1]. The corresponding bitstream length and PSNR values can be found in the attached Excel file m13301_SNR.xls. For PSNR calculation the reference videos have been obtained applying the MPEG downsampling filter to the corresponding 4CIF video sequence.

4. Combined and Extended scalability

Do to lack of time the verification of Extended and Combined Scalability have not been completed yet. Verification result for these testing modalities will be uploaded as soon as available.

5. Conclusion

From the verification bitstreams submitted by aceMedia, it can be concluded that videos can be correctly decoded (at least for SNR scalability test). After a preliminary subjective quality evaluations it can be concluded that the proposed encoder exhibits performances comparable with those of the actual VidWav encoder. Moreover extraction and decoding operation are quite fast.

[1] "Description of Testing in Wavelet Video Coding", ISO/IEC JTC1/SC29/WG11 MPEG2006/N7823, Bangkok, Thailand, Jan. 2006.

4CIF-60Hz	Target Bitrate [kbps]	File Size [B]	Real Bitrate [kbps]	PSNRY	PSNRU	PSNRV
	2048,00	2559989,00	2047,99	35,76	44,97	47,07
	1792,00	2239992,00	1791,99	35,49	44,72	46,83
	1536,00	1919997,00	1536,00	35,14	44,39	46,50
	1280,00	1599990,00	1279,99	34,73	43,89	45,96
	1024,00	1279994,00	1024,00	34,16	43,19	45,34
	848,00	1059991,00	847,99	33,57	42,72	44,82
	672,00	839997,00	672,00	32,76	41,88	44,14

CIF-30HZ	Target Bitrate [kbps]	File Size [B]	Real Bitrate [kbps]	PSNRY	PSNRU	PSNRV
	768,00	959999,00	768,00	40,36	47,77	49,13
	672,00	839999,00	672,00	39,84	47,54	48,87
	576,00	719999,00	576,00	39,22	47,05	48,43
	480,00	599999,00	480,00	38,49	46,55	47,89
	384,00	479999,00	384,00	37,42	45,91	47,26
	320,00	399997,00	320,00	36,58	44,83	46,28
	256,00	319999,00	256,00	35,47	43,95	45,46

QCIF-15Hz	Target Bitrate [kbps]	File Size [B]	Real Bitrate [kbps]	PSNRY	PSNRU	PSNRV
	192,00	239998,00	192,00	41,40	48,85	49,59
	168,00	209998,00	168,00	40,73	48,26	49,01
	144,00	180000,00	144,00	39,86	47,83	48,61
	120,00	150000,00	120,00	38,89	46,82	47,76
	96,00	120000,00	96,00	37,76	45,63	46,59
	80,00	99998,00	80,00	36,79	44,99	46,12
	64,00	79998,00	64,00	35,58	43,54	44,64

4CIF-60Hz	Target Bitrate [kbps]	File Size [B]	Real Bitrate [kbps]	PSNRY	PSNRU	PSNRV
	3072,00	3839999,00	3072,00	36,53	44,00	45,88
	2688,00	3359998,00	2688,00	36,14	43,76	45,67
	2304,00	2879998,00	2304,00	35,64	43,40	45,27
	1920,00	2399998,00	1920,00	34,97	42,94	44,78
	1536,00	1919998,00	1536,00	34,15	42,41	44,19
	1280,00	1599997,00	1280,00	33,55	42,05	43,85
	1024,00	1279996,00	1024,00	32,72	41,44	43,17

CIF-30Hz	Target Bitrate [kbps]	File Size [B]	Real Bitrate [kbps]	PSNRY	PSNRU	PSNRV
	1152,00	1439994,00	1152,00	38,38	43,90	45,53
	1024,00	1280000,00	1024,00	37,74	43,52	45,13
	864,00	1079996,00	864,00	36,79	42,94	44,53
	720,00	899993,00	719,99	35,86	42,39	43,94
	576,00	719994,00	576,00	34,82	41,76	43,29
	480,00	599994,00	480,00	33,95	41,20	42,80
	384,00	479993,00	383,99	32,94	40,50	42,12

QCIF-15Hz	Target Bitrate [kbps]	File Size [B]	Real Bitrate [kbps]	PSNRY	PSNRU	PSNRV
	288,00	359998,00	288,00	39,90	43,98	45,67
	252,00	314998,00	252,00	38,87	43,24	44,88
	216,00	269998,00	216,00	37,74	42,63	44,29
	180,00	224998,00	180,00	36,55	41,92	43,62
	144,00	179998,00	144,00	35,15	40,85	42,58
	120,00	149998,00	120,00	34,03	40,15	42,13
	96,00	119999,00	96,00	32,89	39,54	41,55

4CIF-60Hz	Target Bitrate [kbps]	File Size [B]	Real Bitrate [kbps]	PSNRY	PSNRU	PSNRV
	3072,00	3839994,00	3072,00	36,70	41,19	42,08
	2688,00	3359993,00	2687,99	36,42	41,03	41,77
	2304,00	2879995,00	2304,00	36,09	40,82	41,38
	1920,00	2399995,00	1920,00	35,64	40,49	40,83
	1536,00	1919995,00	1536,00	35,04	40,07	40,16
	1280,00	1599998,00	1280,00	34,55	39,70	39,59
	1024,00	1279992,00	1023,99	33,90	39,12	38,75

CIF-30Hz	Target Bitrate [kbps]	File Size [B]	Real Bitrate [kbps]	PSNRY	PSNRU	PSNRV
	1152,00	1439998,00	1152,00	38,35	42,22	41,71
	1024,00	1279996,00	1024,00	37,86	41,87	41,25
	864,00	1079999,00	864,00	37,13	41,31	40,54
	720,00	899999,00	720,00	36,32	40,72	39,77
	576,00	719999,00	576,00	35,42	40,09	38,88
	480,00	599999,00	480,00	34,75	39,52	38,17
	384,00	479999,00	384,00	33,84	38,81	37,21

QCIF-15Hz	Target Bitrate [kbps]	File Size [B]	Real Bitrate [kbps]	PSNRY	PSNRU	PSNRV
	288,00	359999,00	288,00	38,05	41,22	39,97
	252,00	315000,00	252,00	37,25	40,66	39,33
	216,00	270000,00	216,00	36,48	40,06	38,65
	180,00	224999,00	180,00	35,56	39,34	37,82
	144,00	179999,00	144,00	34,41	38,55	36,86
	120,00	149999,00	120,00	33,65	37,81	36,10
	96,00	119999,00	96,00	32,74	37,13	35,23

4CIF-60Hz	Target Bitrate [kbps]	File Size [B]	Real Bitrate [kbps]	PSNRY	PSNRU	PSNRV
	3072,00	3839992,00	3071,99	33,46	44,57	47,00
	2688,00	3359991,00	2687,99	33,09	44,39	46,83
	2304,00	2879993,00	2303,99	32,67	44,00	46,41
	1920,00	2399992,00	1919,99	32,08	43,79	46,19
	1536,00	1919992,00	1535,99	31,42	43,47	45,84
	1280,00	1599994,00	1280,00	30,93	43,10	45,41
	1024,00	1279997,00	1024,00	30,29	42,55	44,81

CIF-30Hz	Target Bitrate [kbps]	File Size [B]	Real Bitrate [kbps]	PSNRY	PSNRU	PSNRV
	1152,00	1440000,00	1152,00	34,50	45,40	47,42
	1024,00	1279997,00	1024,00	33,94	45,14	47,20
	864,00	1080000,00	864,00	33,08	44,87	46,82
	720,00	900000,00	720,00	32,36	44,50	46,41
	576,00	720000,00	576,00	31,50	44,03	45,90
	480,00	599999,00	480,00	30,82	43,47	45,31
	384,00	479999,00	384,00	29,96	43,01	44,70

QCIF-15Hz	Target Bitrate [kbps]	File Size [B]	Real Bitrate [kbps]	PSNRY	PSNRU	PSNRV
	288,00	359999,00	288,00	36,95	46,47	48,26
	252,00	314999,00	252,00	36,14	45,79	47,45
	216,00	269997,00	216,00	35,23	45,14	46,81
	180,00	224999,00	180,00	34,30	44,17	45,97
	144,00	179999,00	144,00	33,18	43,43	45,29
	120,00	149999,00	120,00	32,31	42,76	44,69
	96,00	119999,00	96,00	31,40	41,84	44,03

4CIF-60Hz	Target Bitrate [kbps]	File Size [B]	Real Bitrate [kbps]	PSNRY	PSNRU	PSNRV
	2048,00	2559989,00	2047,99	35,76	44,97	47,07
	1792,00	2239992,00	1791,99	35,49	44,72	46,83
	1536,00	1919997,00	1536,00	35,14	44,39	46,50
	1280,00	1599990,00	1279,99	34,73	43,89	45,96
	1024,00	1279994,00	1024,00	34,16	43,19	45,34
	848,00	1059991,00	847,99	33,57	42,72	44,82
	672,00	839997,00	672,00	32,76	41,88	44,14

CIF-30HZ	Target Bitrate [kbps]	File Size [B]	Real Bitrate [kbps]	PSNRY	PSNRU	PSNRV
	768,00	959999,00	768,00	40,36	47,77	49,13
	672,00	839999,00	672,00	39,84	47,54	48,87
	576,00	719999,00	576,00	39,22	47,05	48,43
	480,00	599999,00	480,00	38,49	46,55	47,89
	384,00	479999,00	384,00	37,42	45,91	47,26
	320,00	399997,00	320,00	36,58	44,83	46,28
	256,00	319999,00	256,00	35,47	43,95	45,46

QCIF-15Hz	Target Bitrate [kbps]	File Size [B]	Real Bitrate [kbps]	PSNRY	PSNRU	PSNRV
	192,00	239998,00	192,00	41,40	48,85	49,59
	168,00	209998,00	168,00	40,73	48,26	49,01
	144,00	180000,00	144,00	39,86	47,83	48,61
	120,00	150000,00	120,00	38,89	46,82	47,76
	96,00	120000,00	96,00	37,76	45,63	46,59
	80,00	99998,00	80,00	36,79	44,99	46,12
	64,00	79998,00	64,00	35,58	43,54	44,64

4CIF-60Hz	Target Bitrate [kbps]	File Size [B]	Real Bitrate [kbps]	PSNRY	PSNRU	PSNRV
	3072,00	3839999,00	3072,00	36,53	44,00	45,88
	2688,00	3359998,00	2688,00	36,14	43,76	45,67
	2304,00	2879998,00	2304,00	35,64	43,40	45,27
	1920,00	2399998,00	1920,00	34,97	42,94	44,78
	1536,00	1919998,00	1536,00	34,15	42,41	44,19
	1280,00	1599997,00	1280,00	33,55	42,05	43,85
	1024,00	1279996,00	1024,00	32,72	41,44	43,17

CIF-30Hz	Target Bitrate [kbps]	File Size [B]	Real Bitrate [kbps]	PSNRY	PSNRU	PSNRV
	1152,00	1439994,00	1152,00	38,38	43,90	45,53
	1024,00	1280000,00	1024,00	37,74	43,52	45,13
	864,00	1079996,00	864,00	36,79	42,94	44,53
	720,00	899993,00	719,99	35,86	42,39	43,94
	576,00	719994,00	576,00	34,82	41,76	43,29
	480,00	599994,00	480,00	33,95	41,20	42,80
	384,00	479993,00	383,99	32,94	40,50	42,12

QCIF-15Hz	Target Bitrate [kbps]	File Size [B]	Real Bitrate [kbps]	PSNRY	PSNRU	PSNRV
	288,00	359998,00	288,00	39,90	43,98	45,67
	252,00	314998,00	252,00	38,87	43,24	44,88
	216,00	269998,00	216,00	37,74	42,63	44,29
	180,00	224998,00	180,00	36,55	41,92	43,62
	144,00	179998,00	144,00	35,15	40,85	42,58
	120,00	149998,00	120,00	34,03	40,15	42,13
	96,00	119999,00	96,00	32,89	39,54	41,55

4CIF-60Hz	Target Bitrate [kbps]	File Size [B]	Real Bitrate [kbps]	PSNRY	PSNRU	PSNRV
	3072,00	3839994,00	3072,00	36,70	41,19	42,08
	2688,00	3359993,00	2687,99	36,42	41,03	41,77
	2304,00	2879995,00	2304,00	36,09	40,82	41,38
	1920,00	2399995,00	1920,00	35,64	40,49	40,83
	1536,00	1919995,00	1536,00	35,04	40,07	40,16
	1280,00	1599998,00	1280,00	34,55	39,70	39,59
	1024,00	1279992,00	1023,99	33,90	39,12	38,75

CIF-30Hz	Target Bitrate [kbps]	File Size [B]	Real Bitrate [kbps]	PSNRY	PSNRU	PSNRV
	1152,00	1439998,00	1152,00	38,35	42,22	41,71
	1024,00	1279996,00	1024,00	37,86	41,87	41,25
	864,00	1079999,00	864,00	37,13	41,31	40,54
	720,00	899999,00	720,00	36,32	40,72	39,77
	576,00	719999,00	576,00	35,42	40,09	38,88
	480,00	599999,00	480,00	34,75	39,52	38,17
	384,00	479999,00	384,00	33,84	38,81	37,21

QCIF-15Hz	Target Bitrate [kbps]	File Size [B]	Real Bitrate [kbps]	PSNRY	PSNRU	PSNRV
	288,00	359999,00	288,00	38,05	41,22	39,97
	252,00	315000,00	252,00	37,25	40,66	39,33
	216,00	270000,00	216,00	36,48	40,06	38,65
	180,00	224999,00	180,00	35,56	39,34	37,82
	144,00	179999,00	144,00	34,41	38,55	36,86
	120,00	149999,00	120,00	33,65	37,81	36,10
	96,00	119999,00	96,00	32,74	37,13	35,23

4CIF-60Hz	Target Bitrate [kbps]	File Size [B]	Real Bitrate [kbps]	PSNRY	PSNRU	PSNRV
	3072,00	3839992,00	3071,99	33,46	44,57	47,00
	2688,00	3359991,00	2687,99	33,09	44,39	46,83
	2304,00	2879993,00	2303,99	32,67	44,00	46,41
	1920,00	2399992,00	1919,99	32,08	43,79	46,19
	1536,00	1919992,00	1535,99	31,42	43,47	45,84
	1280,00	1599994,00	1280,00	30,93	43,10	45,41
	1024,00	1279997,00	1024,00	30,29	42,55	44,81

CIF-30Hz	Target Bitrate [kbps]	File Size [B]	Real Bitrate [kbps]	PSNRY	PSNRU	PSNRV
	1152,00	1440000,00	1152,00	34,50	45,40	47,42
	1024,00	1279997,00	1024,00	33,94	45,14	47,20
	864,00	1080000,00	864,00	33,08	44,87	46,82
	720,00	900000,00	720,00	32,36	44,50	46,41
	576,00	720000,00	576,00	31,50	44,03	45,90
	480,00	599999,00	480,00	30,82	43,47	45,31
	384,00	479999,00	384,00	29,96	43,01	44,70

QCIF-15Hz	Target Bitrate [kbps]	File Size [B]	Real Bitrate [kbps]	PSNRY	PSNRU	PSNRV
	288,00	359999,00	288,00	36,95	46,47	48,26
	252,00	314999,00	252,00	36,14	45,79	47,45
	216,00	269997,00	216,00	35,23	45,14	46,81
	180,00	224999,00	180,00	34,30	44,17	45,97
	144,00	179999,00	144,00	33,18	43,43	45,29
	120,00	149999,00	120,00	32,31	42,76	44,69
	96,00	119999,00	96,00	31,40	41,84	44,03