

SCE1: Summary report of SHVC Core Experiment on support for arbitrary scalability ratio

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SCE1 scope

- Support of arbitrary spatial scalability ratio
 - Not only ratios 1.5x and 2x
- Evaluates different luma/chroma 16-phase upsampling filters
- Reference: 16-phase filters agreed in JCTVC-No375

List of proposals

Proposal	Initial proposal	Proposal documents	Cross-checking documents
1.1	JCTVC-No219	JCTVC-O0076 (Samsung, Qualcomm)	JCTVC-O0124 (Canon)
1.2	JCTVC-No273	JCTVC-O0052 (Arris)	JCTVC-O0281 (Samsung)

Luma filters			
phase	Reference (N0375)	Proposal 1.1	Proposal 1.2
0/16	0, 0, 0, 64, 0, 0, 0, 0	0, 0, 0, 64, 0, 0, 0, 0	0, 0, 0, 64, 0, 0, 0, 0
1/16	0, 1, -3, 63, 4, -2, 1, 0	0, 1, -3, 63, 4, -2, 1, 0	0, 1, -3, 63, 4, -2, 1, 0
2/16	-1, 2, -5, 62, 8, -3, 1, 0	-1, 2, -5, 62, 8, -3, 1, 0	-1, 3, -7, 63, 8, -3, 1, 0
3/16	-1, 3, -8, 60, 13, -4, 1, 0	-1, 3, -8, 60, 13, -4, 1, 0	-1, 3, -8, 60, 13, -4, 1, 0
4/16	-1, 4, -10, 58, 17, -5, 1, 0	-1, 4, -10, 58, 17, -5, 1, 0	-1, 4, -10, 58, 17, -5, 1, 0
5/16	-1, 4, -11, 52, 26, -8, 3, -1	-1, 4, -11, 52, 26, -8, 3, -1	-1, 4, -11, 54, 23, -7, 3, -1
6/16	-1, 3, -9, 47, 31, -10, 4, -1	-1, 4, -11, 45, 34, -10, 4, -1	-1, 3, -9, 47, 31, -10, 4, -1
7/16	-1, 4, -11, 45, 34, -10, 4, -1	-1, 4, -11, 45, 34, -10, 4, -1	-1, 4, -11, 45, 34, -10, 4, -1
8/16	-1, 4, -11, 40, 40, -11, 4, -1	-1, 4, -11, 40, 40, -11, 4, -1	-1, 4, -11, 40, 40, -11, 4, -1

Chroma filters			
phase	Reference (N0375)	Proposal 1.1	Proposal 1.2
0/16	0, 64, 0, 0	0, 64, 0, 0	0, 64, 0, 0
1/16	-2, 62, 4, 0	-2, 62, 4, 0	0, 58, 8, -2
2/16	-2, 58, 10, -2	-2, 58, 10, -2	-2, 58, 10, -2
3/16	-4, 56, 14, -2	-4, 56, 14, -2	-2, 53, 17, -4
4/16	-4, 54, 16, -2	-4, 54, 16, -2	-4, 54, 16, -2
5/16	-6, 52, 20, -2	-6, 52, 20, -2	-4, 48, 24, -4
6/16	-6, 46, 28, -4	-6, 46, 28, -4	-4, 44, 28, -4
7/16	-4, 42, 30, -4	-4, 42, 30, -4	-6, 44, 30, -4
8/16	-4, 36, 36, -4	-4, 36, 36, -4	-4, 36, 36, -4

Test conditions

- 3 ratios considered:
 - 1.5x / 2x - already used in CTCs
 - ~1.75x - adjusted to ensure picture size multiple of 8
- enables to test all of the 16 phases.
- 2 downsamplers
 - SHVC downsampler - based on M23485 and M24499
- for 1.5x and 2x, identical to CTCs
 - JSVM downsampler - with luma-chroma alignment phase = 0
- for 1.5x and 2x, new base layers
- 4 tests

Downsampler	SHVC dwnsamp	JSVM downsampler
Ratios		
1.5x and 2x	Case 1 (CTCs)	Case 2 (CTCs with new BL)
~1.75x	Case 3	Case 4

Downsamplers validity check

- SHM3.0.1 vs HM11.0

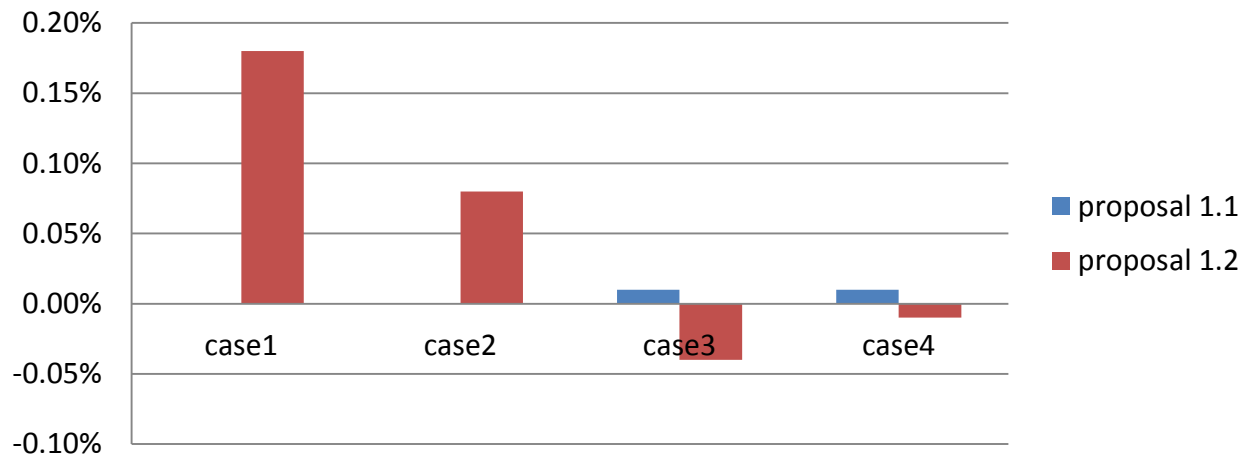
	×2 SHVC	×2 JSVM	~1,75 SHVC	~1,75 JSVM	×1,5 SHVC	×1,5 JSVM
AI	12.8%	14.1%	14.0%	15.5%	10.5%	13.3%
RA	19.0%	19.4%	19.5%	20.3%	16.2%	17.3%
LD-B	28.3%	28.0%	28.5%	28.7%	24.8%	24.9%
LD-P	26.5%	26.1%	26.6%	26.6%	22.8%	22.8%

- coherent results between the two downsamplers
- "arbitrary ratio" downsamplers work adequately

Test results vs N0375 filters (1 digit)

		Proposal 1.1 - 00076					Proposal 1.2 - 00052				
		Y	U	V	mem	mult	Y	U	V	mem	mult
Case1 CTCs 1.5x/2x	avg	0.0%	0.0%	0.0%	100%	100%	0.2%	0.1%	0.0%	100%	100%
Case2 JSVM 1.5x/2x	avg	0.0%	0.0%	0.0%	100%	100%	0.1%	0.0%	0.0%	100%	100%
Case3 SHVC ~1.75x	avg	0.0%	0.0%	0.0%	100%	100%	0.0%	-0.2%	-0.2%	100%	100%
Case4 SHVC ~1.75x	avg	0.0%	0.0%	0.0%	100%	100%	0.0%	-0.2%	-0.1%	100%	100%

average BDR_y variations

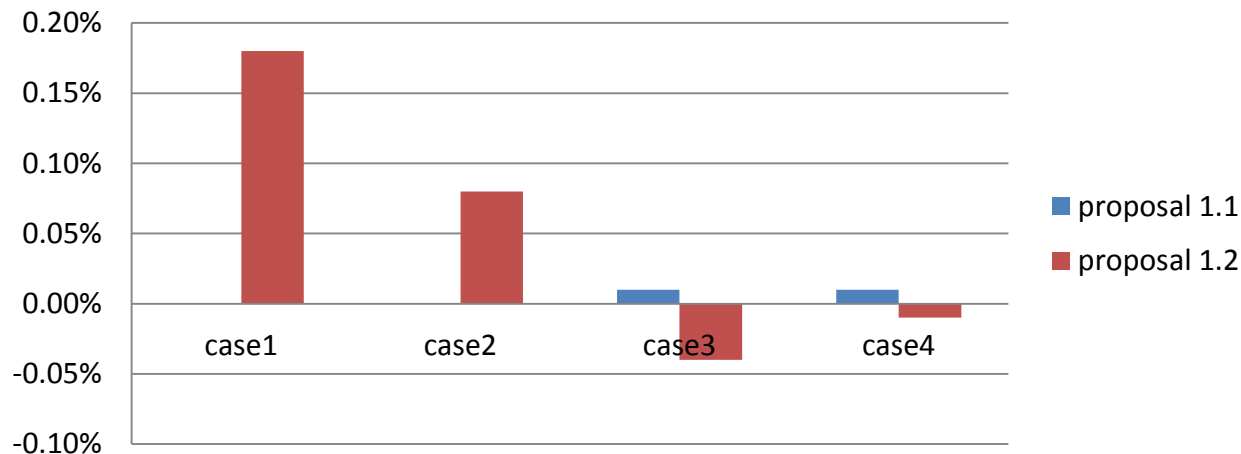


Both performance and memory usage are demonstrated

Test results vs N0375 filters (2 digits)

		Proposal 1.1 - 00076					Proposal 1.2 - 00052				
		Y	U	V	mem	mult	Y	U	V	mem	mult
Case1 CTCs 1.5x/2x	avg	0.00%	0.00%	0.00%	100%	100%	0.18%	0.06%	0.03%	100%	100%
Case2 JSVM 1.5x/2x	avg	0.00%	0.00%	0.00%	100%	100%	0.08%	-0.03%	-0.05%	100%	100%
Case3 SHVC ~1.75x	avg	0.01%	-0.02%	0.01%	100%	100%	-0.04%	-0.19%	-0.19%	100%	100%
Case4 SHVC ~1.75x	avg	0.01%	-0.03%	-0.01%	100%	100%	-0.01%	-0.15%	-0.15%	100%	100%

average BDR_γ variations



Both performance and memory usage are demonstrated