

Non-SCE1: IBC BV throughput issue

JCTVC-R0089

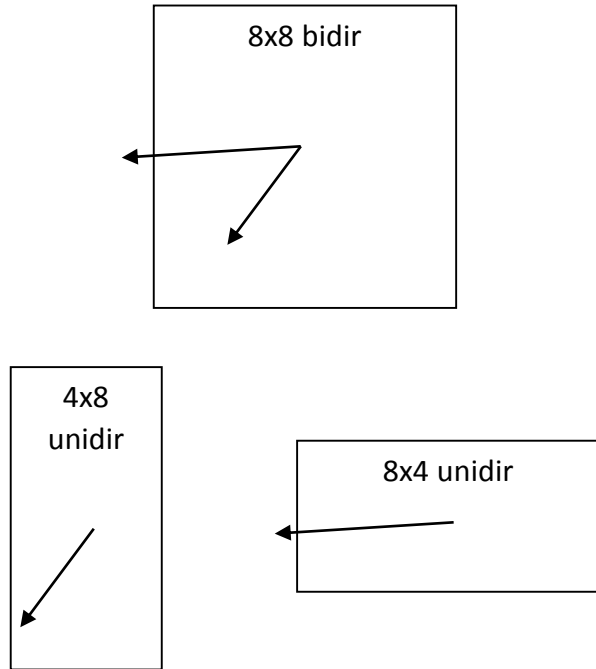
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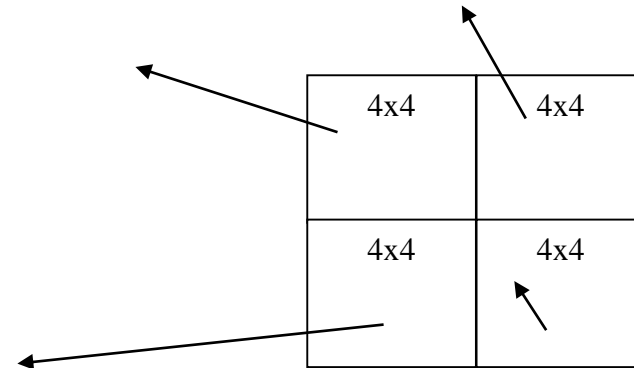
MVD parsing throughput issue

■ Worst case Inter



WC: 128 MVD

■ Worst case IBC



WC: 256 MVD

Proposed method: Principle

■ Mono-dimensional restriction for 4x4 PU BVs:

■ SCM1.0 CU 8x8

- $MVD_1(mvd_x^1, mvd_y^1)$
- $MVD_2(mvd_x^2, mvd_y^2)$
- $MVD_3(mvd_x^3, mvd_y^3)$
- $MVD_4(mvd_x^4, mvd_y^4)$

WC: 256 MVD

■ proposed CU 8x8

- $MVD_1(mvd_x^1, mvd_x^2)$
- $MVD_2(mvd_x^3, mvd_x^4)$

WC: 128 MVD

Proposed method: Solution 1

- Mono-dimensional restriction for 4x4 PU BVs:

- Only Horizontal component:

- $MVD_1(mvd_x^1, mvd_x^2)$

- $MVD_2(mvd_x^3, mvd_x^4)$

- BV prediction:

- If $mvd_y^{pred} \neq 0$ then $MVD_{pred}(-12, 0)$

Proposed method: Solution 2

■ Mono-dimensional restriction for 4x4 PU BVs:

■ Horizontal or vertical component selected at CU level:

$$\begin{array}{ll} \bullet MVD_1(mvd_x^1, mvd_x^2) & \text{OR} & \bullet MVD_1(mvd_y^1, mvd_y^2) \\ \bullet MVD_2(mvd_x^3, mvd_x^4) & & \bullet MVD_2(mvd_y^3, mvd_y^4) \end{array}$$

■ Direction inferred in the sign of the first component:

If $mvd_x^1 \geq 0$

$MV_1(mvd_x^1 - 4, 0)$ (horizontal)

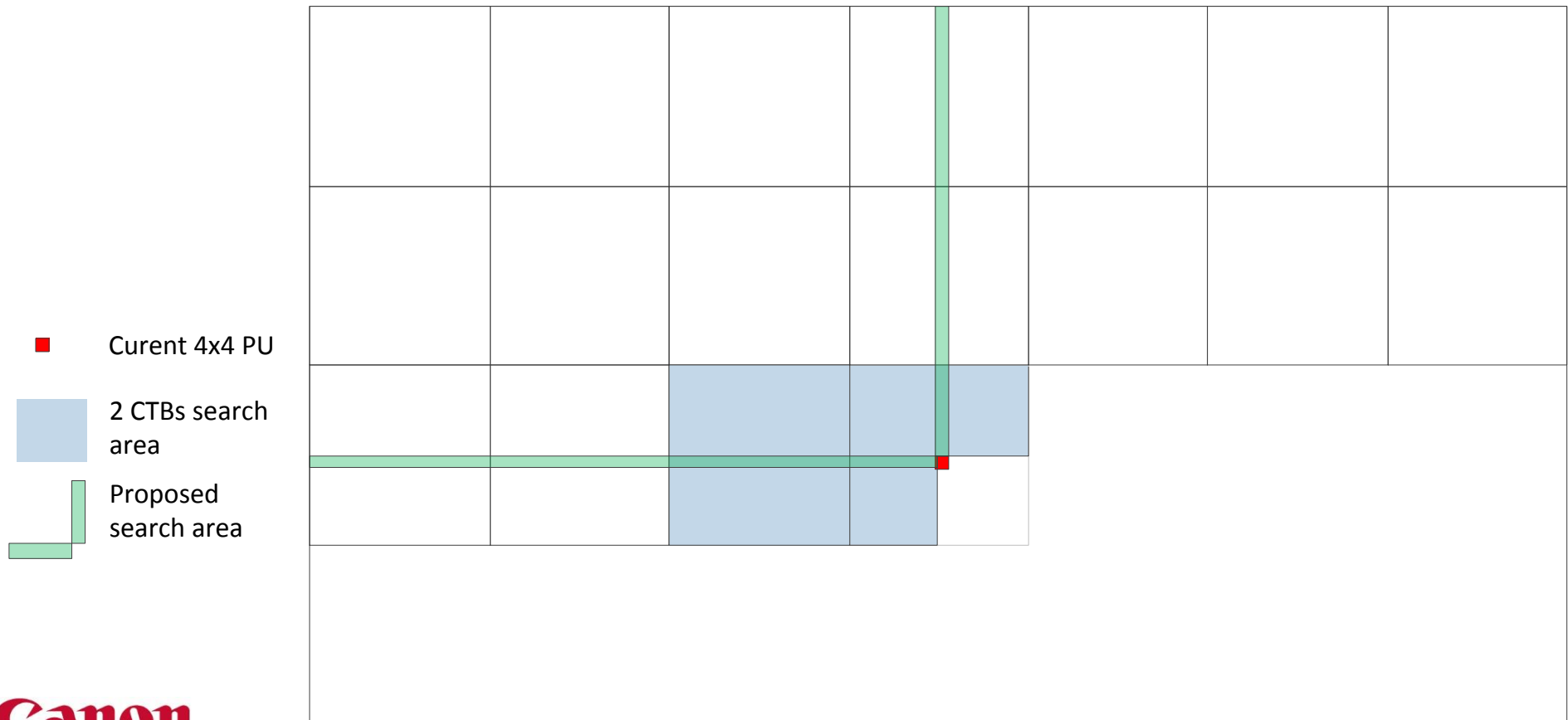
Else

$MV_1(0, mvd_x^1 - 3)$ (vertical)

Proposed method: encoder

■ Replace 2 CTB search area by :

- full causal line for Solution1
- Or full causal line and column for Solution 2



Experimental results: solution 1

■ Anchor: SCM1.0:

■ Full frame

■ Run time reduction

	All Intra		
	G/Y	B/U	R/V
RGB, text & graphics with motion, 1080p	-0,9%	-0,8%	-0,9%
RGB, text & graphics with motion,720p	-0,7%	-0,7%	-0,7%
RGB, mixed content, 1440p	-1,0%	-1,0%	-1,0%
RGB, mixed content, 1080p	-1,0%	-0,9%	-1,0%
RGB, Animation, 720p	0,1%	0,1%	0,1%
RGB, camera captured, 1080p	0,0%	0,0%	0,0%
YUV, text & graphics with motion, 1080p	-0,7%	-0,7%	-0,7%
YUV, text & graphics with motion,720p	-0,7%	-0,6%	-0,8%
YUV, mixed content, 1440p	-0,9%	-0,9%	-1,0%
YUV, mixed content, 1080p	-0,8%	-0,7%	-0,7%
YUV, Animation, 720p	0,1%	0,1%	0,1%
YUV, camera captured, 1080p	0,0%	0,0%	0,0%
Enc Time[%]	97%		
Dec Time[%]	90%		

	Random Access			Low delay B		
	G/Y	B/U	R/V	G/Y	B/U	R/V
RGB, text & graphics with motion, 1080p	-0,6%	-0,5%	-0,6%	-0,4%	-0,5%	-0,4%
RGB, text & graphics with motion,720p	-0,4%	-0,4%	-0,4%	-0,1%	-0,1%	-0,1%
RGB, mixed content, 1440p	-0,6%	-0,5%	-0,5%	-0,2%	-0,5%	-0,3%
RGB, mixed content, 1080p	-0,5%	-0,3%	-0,6%	-0,4%	-0,1%	-0,5%
RGB, Animation, 720p	0,0%	0,0%	0,0%	0,0%	0,1%	0,1%
RGB, camera captured, 1080p	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
YUV, text & graphics with motion, 1080p	-0,4%	-0,4%	-0,4%	-0,3%	-0,4%	-0,4%
YUV, text & graphics with motion,720p	-0,4%	-0,2%	-0,3%	-0,2%	-0,2%	-0,2%
YUV, mixed content, 1440p	-0,4%	-0,7%	-0,6%	-0,2%	-0,4%	-0,3%
YUV, mixed content, 1080p	-0,5%	-0,1%	-0,4%	0,1%	-0,5%	0,8%
YUV, Animation, 720p	0,0%	0,0%	0,2%	0,0%	-0,3%	-0,1%
YUV, camera captured, 1080p	0,0%	0,0%	-0,1%	0,0%	0,0%	0,0%
Enc Time[%]	102%			102%		
Dec Time[%]	92%			93%		

Experimental results: solution 2

■ Anchor: SCM1.0:

■ Full frame

■ Run time reduction

	All Intra		
	G/Y	B/U	R/V
RGB, text & graphics with motion, 1080p	-1,3%	-1,2%	-1,3%
RGB, text & graphics with motion,720p	-0,7%	-0,8%	-0,8%
RGB, mixed content, 1440p	-1,4%	-1,5%	-1,4%
RGB, mixed content, 1080p	-1,8%	-1,8%	-1,8%
RGB, Animation, 720p	0,0%	0,1%	0,1%
RGB, camera captured, 1080p	0,0%	0,0%	0,0%
YUV, text & graphics with motion, 1080p	-0,8%	-0,8%	-0,8%
YUV, text & graphics with motion,720p	-0,7%	-0,8%	-0,7%
YUV, mixed content, 1440p	-1,3%	-1,3%	-1,3%
YUV, mixed content, 1080p	-1,5%	-1,3%	-1,5%
YUV, Animation, 720p	0,1%	0,1%	0,1%
YUV, camera captured, 1080p	0,0%	0,0%	0,0%
Enc Time[%]	99%		
Dec Time[%]	91%		

	Random Access			Low delay B		
	G/Y	B/U	R/V	G/Y	B/U	R/V
RGB, text & graphics with motion, 1080p	-0,8%	-0,7%	-0,8%	-0,5%	-0,6%	-0,5%
RGB, text & graphics with motion,720p	-0,4%	-0,5%	-0,4%	-0,3%	-0,3%	-0,2%
RGB, mixed content, 1440p	-0,9%	-1,0%	-0,9%	-0,4%	-0,8%	-0,5%
RGB, mixed content, 1080p	-1,3%	-1,1%	-1,2%	-0,6%	-0,6%	-0,7%
RGB, Animation, 720p	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
RGB, camera captured, 1080p	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
YUV, text & graphics with motion, 1080p	-0,4%	-0,4%	-0,5%	-0,3%	-0,4%	-0,4%
YUV, text & graphics with motion,720p	-0,4%	-0,3%	-0,2%	-0,2%	-0,2%	-0,4%
YUV, mixed content, 1440p	-0,8%	-0,9%	-0,9%	-0,3%	-0,6%	-0,7%
YUV, mixed content, 1080p	-1,1%	-0,8%	-0,9%	-0,2%	-0,6%	0,6%
YUV, Animation, 720p	0,0%	0,0%	0,2%	0,1%	-0,2%	0,1%
YUV, camera captured, 1080p	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
Enc Time[%]	102%			102%		
Dec Time[%]	92%			90%		

Experimental results

MV Components		BDR Y	ENC Time
		AI	AI
Hor and Ver (SCM1.0)	Solution 1 Encoder only	-0.25%	96%
Hor	Solution 1	-0.60%	97%
Hor and Ver (SCM1.0)	Solution 2 Encoder Only	-0.51%	97%
Hor OR Ver	Solution 2	-0.80%	99%

■ Gains for proposed solutions

- Compared to SCM 1.0
- Compared to encoder only modification

Conclusion

- Reduction of the worst case parsing throughput of the BV residual
 - Keep only 1 component on 2 for IBC 4x4 PU
- Same Inter mode constraint
- Gains obtained compared to SCM1.0
- Recommend to adopt this modification for Screen Content Coding.