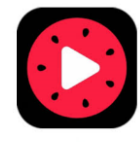


JVET-Q0521: Alignment Of BDPCM For ACT

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Motivation

- ACT assumes that the residual for all three colour components should be aligned
 - *Not the case for BDPCM*
- BDPCM in the draft, when ACT is on
 - *Luma BDPCM can be applied*
 - *Chroma BDPCM is always disabled¹*

¹ In the software, chroma BDPCM flag is still sent even it is always zero.

Proposed fix

- Enable chroma BDPCM and follow the luma BDPCM selection

intra_bdpcm_chroma_flag equal to 1 specifies that BDPCM is applied to the current chroma coding blocks at the location (x_0 , y_0), i.e. the transform is skipped, the intra chroma prediction mode is specified by **intra_bdpcm_chroma_dir_flag**. **intra_bdpcm_chroma_flag** equal to 0 specifies that BDPCM is not applied to the current chroma coding blocks at the location (x_0 , y_0).

When **intra_bdpcm_chroma_flag** is not present, it is inferred to be equal to θ `sps_bdpcm_chroma_enabled_flag && cu_act_enabled_flag && intra_bdpcm_luma_flag`.

The variable **BdpcmFlag**[x][y][$cIdx$] is set equal to **intra_bdpcm_chroma_flag** for $x = x_0..x_0 + cbWidth - 1$, $y = y_0..y_0 + cbHeight - 1$ and $cIdx = 1..2$.

intra_bdpcm_chroma_dir_flag equal to 0 specifies that the BDPCM prediction direction is horizontal. **intra_bdpcm_chroma_dir_flag** equal to 1 specifies that the BDPCM prediction direction is vertical.

When **intra_bdpcm_chroma_dir_flag** is not present, it is inferred to be equal to $(cu_act_enabled_flag ? intra_bdpcm_luma_dir_flag : 0)$.

The variable **BdpcmDir**[x][y][$cIdx$] is set equal to **intra_bdpcm_chroma_dir_flag** for $x = x_0..x_0 + cbWidth - 1$, $y = y_0..y_0 + cbHeight - 1$ and $cIdx = 1..2$.

Experimental results – lossless

Anchor:

JVET-Q0510

Tested:

Proposed (JVETQ0510+JVET-Q0521)

	All Intra			Random Access			Low delay B		
	ratio		bit-rate savings	ratio		bit-rate savings	ratio		bit-rate savings
	JVET-Q0510	Proposed		JVET-Q0510	Proposed		JVET-Q0510	Proposed	
RGB, TGM 1080p	26.5	26.7	-0.85%	423.0	426.4	-0.48%	593.9	598.1	-0.43%
RGB, TGM 720p	11.4	11.9	-3.34%	111.3	115.2	-2.07%	183.6	191.8	-2.07%
RGB, Animation	2.4	2.5	-2.61%	4.0	4.1	-0.41%	4.0	4.0	-0.25%
RGB, Mixed content	6.4	6.6	-3.12%	38.0	38.6	-1.84%	41.7	42.5	-1.69%
RGB, Camera-Captured content	1.6	1.6	-0.60%	1.3	1.3	-0.19%	1.3	1.3	-0.17%
YUV, TGM 1080p	27.6	27.6	0.00%	440.9	440.9	0.00%	615.7	615.7	0.00%
YUV, TGM 720p	14.4	14.4	0.00%	141.8	141.8	0.00%	237.3	237.3	0.00%
YUV, Animation	6.5	6.5	0.00%	14.4	14.4	0.00%	14.0	14.0	0.00%
YUV, Mixed content	8.4	8.4	0.00%	52.0	52.0	0.00%	57.2	57.2	0.00%
YUV, Camera-Captured content	1.9	1.9	0.00%	2.0	2.0	0.00%	2.0	2.0	0.00%
All (RGB)	12.6	12.9	-2.14%	161.3	163.4	-1.18%	231.6	235.3	-1.12%
All (YUV)	13.5	13.5	0.00%	158.4	158.4	0.00%	226.8	226.8	0.00%
Enc Time[%]	98%			98%			99%		
Dec Time[%]	95%			98%			99%		

Experimental results – CTC

Anchor: JVET-Q0510

Tested: JVETQ0510+JVET-Q0521

	All Intra Main10					Random access Main10					Low delay B Main10				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
RGB, TGM 1080p	-0.30%	-0.24%	-0.22%	91%	96%	-0.17%	-0.11%	-0.11%	99%	100%	-0.10%	-0.03%	-0.06%	97%	98%
RGB, TGM 720p	-0.17%	-0.16%	-0.11%	99%	98%	-0.19%	-0.11%	-0.09%	99%	100%	-0.13%	-0.14%	0.00%	102%	101%
RGB, Animation	-0.03%	-0.04%	-0.02%	100%	98%	-0.02%	-0.01%	-0.04%	102%	97%	-0.03%	0.09%	0.05%	103%	100%
RGB, Mixed content	-0.29%	-0.20%	-0.22%	98%	99%	-0.21%	-0.16%	-0.17%	101%	102%	-0.15%	-0.07%	-0.17%	100%	99%
RGB, Camera-Captured content	-0.11%	-0.01%	-0.04%	104%	102%	-0.03%	0.03%	-0.01%	100%	100%	-0.03%	-0.03%	0.04%	101%	98%
YUV, TGM 1080p	-0.01%	-0.01%	-0.01%	100%	100%	0.00%	-0.01%	0.01%	101%	101%	0.01%	0.02%	0.00%	106%	103%
YUV, TGM 720p	0.00%	0.00%	0.00%	101%	104%	0.02%	0.03%	-0.01%	100%	99%	0.06%	0.01%	-0.29%	103%	100%
YUV, Animation	0.01%	0.01%	0.01%	100%	100%	0.03%	0.05%	0.02%	101%	101%	0.00%	0.00%	0.02%	100%	99%
YUV, Mixed content	0.00%	0.00%	-0.01%	100%	100%	0.05%	0.02%	0.06%	102%	100%	-0.20%	-0.23%	-0.18%	99%	98%
YUV, Camera-Captured content	0.00%	0.00%	0.00%	93%	96%	0.00%	0.00%	0.00%	100%	100%	0.02%	0.02%	0.00%	100%	101%
Overall (RGB)	-0.21%	-0.16%	-0.15%	97%	98%	-0.15%	-0.09%	-0.10%	100%	100%	-0.10%	-0.06%	-0.05%	100%	99%
Overall (YUV)	0.00%	0.00%	0.00%	99%	101%	0.02%	0.02%	0.02%	101%	100%	-0.02%	-0.03%	-0.10%	102%	100%