



MEDIATEK

JVET-Q0192

Chroma wide angle intra prediction mode mapping for 4:2:2 format

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Overall Summary

- In HEVC-RExt, 4:2:2 chroma intra mode mapping is the final step for deriving chroma intra angular prediction mode
- In VVC Draft 7, 4:2:2 chroma intra mode mapping is not the final step for deriving chroma intra angular prediction mode
 - 4:2:2 chroma intra mode mapping is applied before WAIP mode mapping process
 - Not every WAIP mode is mapped to the correct angular mode (Per last adoption from JVET-P-0111)
- Proposed to move 4:2:2 chroma intra mode mapping after the WAIP mode mapping process

Over VTM7.0	AI					RA				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
Proposed method	0.00%	0.01%	-0.01%	99%	96%	0.00%	0.01%	0.05%	99%	100%

4:2:2 Chroma WAIP Modes Conversion Follows the Aspect of JVET-P0111

- Not every WAIP mode is mapped to the correct angular mode after the WAIP mode mapping process

WAIP modes	Without subsampling		With 4:2:2 format		Mapping		In VVC Draft 7
	intraPredAngle (height)	Angle	intraPredAngle*2	Angle	Closest Angle	Mapped Mode	
-14	512	86.4237	1024	88.2101	86.4237	-14	-15
-13	341	84.6390	682	87.3136	86.4237	-14	-15
-12	256	82.8750	512	86.4237	86.4237	-14	
-11	171	79.4006	342	84.6546	84.6390	-13	
-10	128	75.9638	256	82.8750	82.8750	-12	
-9	102	72.5820	204	81.0851	79.4006	-11	-12
-8	86	69.5901	172	79.4608	79.4006	-11	
-7	73	66.3295	146	77.6375	75.9638	-10	-11
-6	64	63.4349	128	75.9638	75.9638	-10	
-5	57	60.6900	114	74.3205	75.9638	-10	
-4	51	57.8937	102	72.5820	72.5820	-9	
-3	45	54.5829	90	70.4269	69.5901	-8	
-2	39	50.6307	78	67.6938	66.3295	-7	-8
-1	35	47.5638	70	65.4328	66.3295	-7	
	intraPredAngle (width)	Angle	intraPredAngle/2	Angle	Closest Angle	Mapped Mode	
67	35	47.5638	17.5	28.6731	29.3578	61	
68	39	50.6307	19.5	31.3571	32.0054	62	
69	45	54.5829	22.5	35.1120	35.7067	63	
70	51	57.8937	25.5	38.5505	39.0939	64	
71	57	60.6900	28.5	41.6891	42.1844	65	
72	64	63.4349	32	45.0000	45.0000	66	
73	73	66.3295	36.5	48.7586	47.5638	67	
74	86	69.5901	43	53.3439	54.5829	69	68
75	102	72.5820	51	57.8937	57.8937	70	
76	128	75.9638	64	63.4349	63.4349	72	71
77	171	79.4006	85.5	69.4807	69.5901	74	73
78	256	82.8750	128	75.9638	75.9638	76	75
79	341	84.6390	170.5	79.3702	79.4006	77	
80	512	86.4237	256	82.8750	82.8750	78	

Proposed Changes

- Follows the mapping rules proposed in JVET-P0111
- 4:2:2 chroma intra mode mapping is moved after the WAIP mode mapping process
- The updated 4:2:2 chroma intra mode mapping table

predModeIntra	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1
mode Y	-14	-14	-14	-13	-12	-11	-11	-10	-10	-10	-9	-8	-7	-7	0	1
predModeIntra	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
mode Y	-6	-5	-4	-3	-2	-1	2	3	5	6	8	10	12	13	14	16
predModeIntra	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
mode Y	18	20	22	23	24	26	28	30	31	33	34	35	36	37	38	39
predModeIntra	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
mode Y	40	41	41	42	43	43	44	44	45	45	46	47	48	48	49	49
predModeIntra	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65
mode Y	50	51	51	52	52	53	54	55	55	56	56	57	57	58	59	59
predModeIntra	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	
mode Y	60	61	62	63	64	65	66	67	69	70	72	74	76	77	78	

Highlighted are the extended parts for support 4:2:2 chroma intra mode mapping from mode -14 to mode 80

Detailed Results

- The simulations were conducted with 4:2:2 test sequences

Table 1. BD-rates over VTM7.0 under all intra configuration

	Y	U	V	EncTime	DecTime
EBUGraphics	0.01%	0.00%	0.02%	100%	89%
EBUHorse	0.00%	-0.00%	0.05%	99%	93%
EBUKidSoccer	0.00%	0.01%	-0.11%	99%	100%
EBUWaterRocksClose	0.00%	0.01%	0.05%	99%	99%
Kimono	0.00%	-0.01%	0.03%	100%	99%
Seeking	0.01%	-0.02%	-0.08%	99%	99%
Traffic	0.01%	0.06%	-0.02%	99%	98%
All	0.00%	0.01%	-0.01%	99%	96%

Table 2. BD-rates over VTM7.0 under random access configuration

	Y	U	V	EncTime	DecTime
EBUGraphics	-0.03%	0.04%	-0.03%	99%	100%
EBUHorse	0.02%	0.13%	-0.02%	99%	99%
EBUKidSoccer	-0.01%	-0.02%	0.06%	99%	101%
EBUWaterRocksClose	0.01%	-0.07%	-0.03%	99%	99%
Kimono	0.06%	0.13%	0.24%	100%	100%
Seeking	0.00%	0.01%	0.02%	100%	100%
Traffic	-0.02%	-0.14%	0.09%	100%	103%
All	0.00%	0.01%	0.05%	99%	100%

Summary

- Proposed to apply 4:2:2 chroma intra mode mapping after the WAIP mode mapping process
 - Support 4:2:2 chroma intra mode mapping from mode -14 to mode 80
- Align the 4:2:2 chroma intra mode mapping flow between HEVC-RExt and VVC