

JCTVC-H0111: Modification of bi-prediction

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Summary of CE9 subset 1

1. Proposal (JCTVC-G305) to be tested
 - Use List 1 PMV instead of parsing List 1 MV for bi-prediction
 - MVD for List 1 is not signaled and it sets to (0, 0) at decoder
 - A flag to indentify whether the MVD List 1 is parsed or not is signaled at slice layer
 - Flag is set to 1 when List 1 is identical to List 0 (GPB pictures) in the proposed encoder
2. Purpose of CE
 - From Geneva Meeting note
 - Does this have any visual impact?
 - More investigation whether this can be done in a non-normative way with similar results.
 - Tests in CE
 - Compare proposed method with encoder only solutions
 - Verify if the proposed method does not have any unpleasant side effect on decoded images
 - Verify the influence of HM ticket #175 which is related to bi-predictive ME
3. Experimental results
 - Gain obtained by proposed method was confirmed. No unpleasant visual effect was found.
 - 1 % gain in LDB and 0.2% gain in RA with no encoding/decoding time increase
 - Encoder only solutions cannot achieve the similar gain
 - Only encoder change of proposal; 0.2% gain in LDB and no gain for RA
 - Additional ME; 0.7% gain in LDB, but 31% encoding time was increased
 - Ticket #175 achieved promising gain for class F on the top of HM5.0 and proposal
 - HM5.0; 0.9% gain in LDB and 0.6% gain in RA for class F. No gain for other classes
 - Proposal; 1.9% and 0.7% gain for class F. 1.1% gain in LDB and 0.3% gain RA for other classes
4. Recommendations
 - Adopt the proposed method with ticket #175 bug fix (BP8 in CE9 subset 1) to CD and HM6.0

Experimental result of BP08

- Proposed method (BP01) with the bug fix of ticket #175

	Low delay B HE			Low delay B LC		
	Y	U	V	Y	U	V
Class B	-0.8%	-1.1%	-0.8%	-1.4%	-1.6%	-1.2%
Class C	-1.0%	-1.0%	-1.1%	-1.1%	-0.8%	-0.8%
Class D	-1.0%	-1.3%	-0.8%	-1.2%	-0.7%	-1.1%
Class E	-0.8%	-1.2%	-1.0%	-1.0%	-2.3%	-0.7%
Overall	-0.9%	-1.2%	-0.9%	-1.2%	-1.3%	-1.0%
	-0.9%	-1.2%	-0.9%	-1.2%	-1.3%	-1.0%
Class F	-1.9%	-1.5%	-1.8%	-1.9%	-2.6%	-2.2%
Enc Time[%]	99%			99%		
Dec Time[%]	100%			100%		

	Random Access HE			Random Access LC			Random Access HE-10		
	Y	U	V	Y	U	V	Y	U	V
Class A (8bit)	-0.2%	-0.3%	-0.3%	-0.3%	-0.4%	-0.5%	-0.4%	-0.3%	-0.5%
Class B	-0.3%	-0.4%	-0.4%	-0.4%	-0.4%	-0.6%	-0.3%	-0.3%	-0.3%
Class C	-0.2%	-0.2%	-0.2%	-0.2%	-0.3%	-0.2%			
Class D	-0.3%	-0.5%	-0.4%	-0.3%	-0.3%	-0.4%			
Overall	-0.3%	-0.3%	-0.3%	-0.3%	-0.4%	-0.4%	-0.3%	-0.3%	-0.4%
	-0.3%	-0.3%	-0.3%	-0.3%	-0.4%	-0.4%	-0.3%	-0.3%	-0.4%
Class F	-0.7%	-0.6%	-0.6%	-0.7%	-0.7%	-0.7%			
Enc Time[%]	99%			99%			99%		
Dec Time[%]	100%			100%			100%		

Experimental result of BP07

- HM5.0 with the bug fix of ticket #175

	Low delay B HE			Low delay B LC		
	Y	U	V	Y	U	V
Class B	0.0%	0.1%	0.2%	-0.1%	-0.2%	0.1%
Class C	-0.1%	-0.2%	0.1%	0.0%	0.2%	0.1%
Class D	-0.1%	0.1%	0.0%	-0.1%	0.5%	-0.1%
Class E	0.0%	-0.3%	0.6%	0.0%	-0.5%	-0.1%
Overall	0.0%	-0.1%	0.2%	-0.1%	0.0%	0.0%
	-0.1%	-0.1%	0.2%	-0.1%	0.0%	0.0%
Class F	-0.9%	-0.6%	-1.0%	-0.9%	-1.2%	-1.6%
Enc Time[%]	100%			100%		
Dec Time[%]	100%			99%		

	Random Access HE			Random Access LC			Random Access HE-10		
	Y	U	V	Y	U	V	Y	U	V
Class A (8bit)	-0.1%	0.0%	-0.2%	0.0%	0.0%	-0.1%	0.0%	0.0%	-0.2%
Class B	0.0%	-0.1%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class C	-0.1%	-0.1%	-0.1%	0.0%	-0.1%	-0.1%			
Class D	-0.1%	-0.2%	-0.1%	-0.1%	0.0%	-0.2%			
Overall	-0.1%	-0.1%	-0.1%	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%
	-0.1%	-0.1%	-0.1%	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%
Class F	-0.6%	-0.5%	-0.5%	-0.6%	-0.6%	-0.6%			
Enc Time[%]	100%			100%			99%		
Dec Time[%]	100%			100%			98%		

Comparison between JCTVC-H0111 and JCTVC-H0431

- They look very similar. Both H0111 and H0431 needs modifications of the normative part
 - First bin for MVD identifies whether MVD is (0, 0) or not. It is similar to the MVD syntax change of H0111 (G305)
- Changes of H0111 to WD are fewer than that of H0431
 - H0431 increases the decoder complexity regardless of the encoder choice, but H0111 does not
- Encoder choice of H0111 is easier and more flexible than that of H0431
 - Explicit way (H0111) can select the encoder algorithm easier than implicit way (H0431).
 - No evidence that H0431 has additional benefit. If there is, it also could work well on the top of H0111.

	JCTVC-H0111 (JCTVC-G305)	JCTVC-H0431
Modification	Syntax change for MVD <ul style="list-style-type: none"> • Add one on/off flag at slice header • MVD for List 1 is set to (0,0) when this on/off flag is true 	Additional contexts for 1 st bin of MVD <ul style="list-style-type: none"> • Add two additional contexts • Switch the context according to slice type, interpred flag and reference list * First bin of MVD identifies whether the magnitude of MVD is 0 or not
Coding gain	<ul style="list-style-type: none"> • 1.1% in LDB and 0.3% in RA when the on/off flag is true for GPB pictures • No gain when this flag is always false 	<ul style="list-style-type: none"> • 0.9% in LDB and 0.2% in RA when MVD for L1 is set to (0, 0) for GPB pictures at encoder • No gain when the ME process is not changed
Complexity	<ul style="list-style-type: none"> • Decoding process is not changed 	<ul style="list-style-type: none"> • Two context for 1st bin of MVD are added • Updating process of additional contexts is added
Flexibility	<ul style="list-style-type: none"> • Switch at the slice level is flexible. • Encoder is free to choose the algorithm for decision of setting the switch. 	<ul style="list-style-type: none"> • Decoder base context switching is implicit. • The algorithm for decision is fixed or the RD cost function to switch implicitly becomes complex
Software	Verified in CE9	Verified by JCTVC-H0640 (late)
Text	Ready in contribution	Not shown in the contribution