

JVET-K0346

**CE4-related: One simplified design of
advanced temporal motion vector
prediction (ATMVP)**

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Introduction

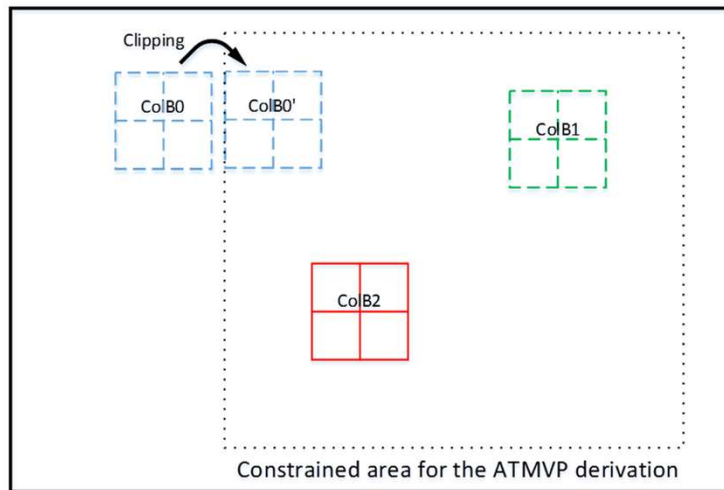
- The ATMVP in the BMS-1.0
 - Derives multiple motion for sub-blocks of one CU based on the motion information of temporal neighboring pictures.
 - The collocated block is derived using the neighboring MV of the current CU.
- Complexity issues of the current ATMVP
 - 1) The collocated pictures of different ATMVP CUs may not be the same if multiple reference pictures are used, **needing to access the motion fields of multiple reference picture.**
 - 2) The motion information of each ATMVP CU is always derived based on 4x4 units, **resulting multiple invocation of motion compensation and motion derivation.**
 - 3) The collocated blocks of neighboring ATMVP CUs can be far away from each other, **making it necessary to access motion information from non-adjacent regions of the reference picture.**

Proposed ATMVP simplifications

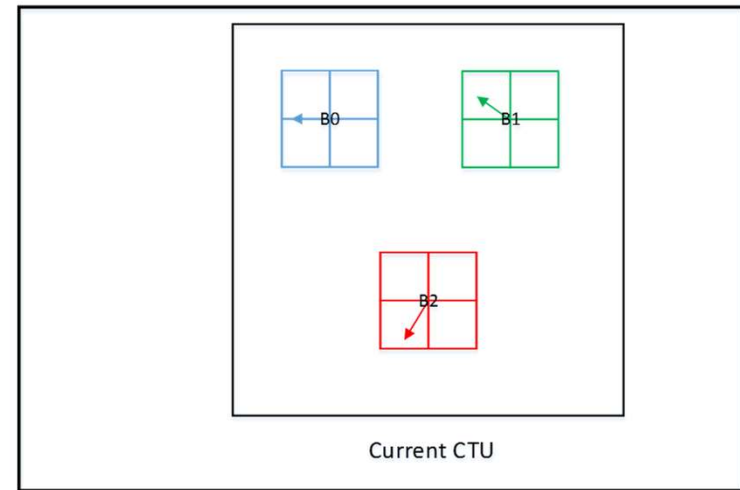
- Simplified derivation of the collocated block
 - Based on the collocated block derivation method in CE4.2.6 Test 1.
 - One clean-up: Early termination to skip checking the L1/L0 MVs of the remaining merge candidates if a merge candidate uses the slice-level collocated picture.
- Adaptive ATMVP sub-block size
 - Use the method in CE4.2.5 Test 2.
 - Support of the slice-level adaptation of sub-block size for the ATMVP motion derivation

Proposed ATMVP simplifications

- Constrained region for the collocated block derivation
 - Derive the collocated block of the current CU within one constrained area.
 - If one collocated block is outside the region, then it is clipped back to be within the constrained area.
 - Use the same constrained region of the TMVP (i.e., one CTU plus one column of 4x4 blocks) for the ATMVP (***the same as HEVC***)



Collocated picture



Current picture

Simulation results

- Implemented on top of the BMS-1.0
- Follows the test conditions and evaluation criteria used for CE4
- Two tested cases
 - Test one: the proposed ATMVP + uncompressed motion field
 - Test two: the proposed ATMVP + compressed motion field at 8x8 granularity

Simulation results (RA)

Top: uncompressed motion

Bottom: 8x8 compressed motion

Random Access Main 10										
	Over VTM-1.0					Over BMS-1.0-ATMVP				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
Class A1	-0.77%	-0.68%	-0.57%	102%	104%	-0.58%	-0.55%	-0.47%	100%	100%
Class A2	-0.99%	-0.75%	-0.79%	102%	106%	-0.58%	-0.47%	-0.40%	100%	100%
Class B	-0.94%	-0.65%	-0.62%	102%	106%	-0.52%	-0.42%	-0.58%	99%	100%
Class C	-1.28%	-0.93%	-1.01%	101%	102%	-1.01%	-0.93%	-0.77%	99%	101%
Class E										
Overall	-1.01%	-0.75%	-0.75%	102%	105%	-0.67%	-0.59%	-0.57%	99%	100%
Class D	-1.45%	-0.67%	-0.96%	101%	104%	-1.04%	-0.67%	-0.77%	99%	100%

Random Access Main 10										
	Over VTM-1.0					Over BMS-1.0-ATMVP				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
Class A1	-0.76%	-0.67%	-0.59%	102%	103%	-0.58%	-0.58%	-0.52%	100%	100%
Class A2	-0.97%	-0.67%	-0.72%	102%	103%	-0.54%	-0.41%	-0.38%	99%	100%
Class B	-0.90%	-0.65%	-0.63%	102%	105%	-0.48%	-0.37%	-0.51%	99%	101%
Class C	-1.12%	-0.82%	-0.93%	102%	107%	-0.85%	-0.67%	-0.69%	99%	100%
Class E										
Overall	-0.95%	-0.70%	-0.72%	102%	105%	-0.61%	-0.50%	-0.53%	99%	100%
Class D	-1.21%	-0.52%	-0.67%	102%	106%	-0.78%	-0.47%	-0.65%	100%	99%

Simulation results (LD)

Top: uncompressed motion

Bottom: 8x8 compressed motion

	Low delay B Main10									
	Over VTM-1.0					Over BMS-1.0-ATMVP				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
Class A1										
Class A2										
Class B	-0.66%	-0.73%	-0.47%	103%	108%	-0.53%	-0.59%	-0.64%	100%	102%
Class C	-1.34%	-1.02%	-0.99%	102%	108%	-0.99%	-1.10%	-1.01%	98%	102%
Class E	-2.33%	-2.87%	-2.63%	99%	110%	-2.19%	-2.38%	-2.21%	97%	103%
Overall	-1.30%	-1.36%	-1.18%	102%	108%	-1.10%	-1.21%	-1.16%	99%	102%
Class D	-1.86%	-1.71%	-1.14%	101%	106%	-1.16%	-1.31%	-0.76%	98%	101%

	Low delay B Main10									
	Over VTM-1.0					Over BMS-1.0-ATMVP				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
Class A1										
Class A2										
Class B	-0.52%	-0.48%	-0.32%	104%	107%	-0.42%	-0.39%	-0.43%	99%	100%
Class C	-1.07%	-0.84%	-0.52%	103%	108%	-0.67%	-0.95%	-0.61%	99%	102%
Class E	-1.92%	-2.19%	-1.80%	101%	108%	-1.64%	-2.33%	-1.58%	97%	103%
Overall	-1.05%	-1.03%	-0.76%	103%	108%	-0.81%	-1.06%	-0.78%	99%	102%
Class D	-1.40%	-0.52%	-1.05%	103%	107%	-0.69%	-0.71%	-0.98%	99%	102%