



Non-CE9: CU-based Parallel Merge Mode

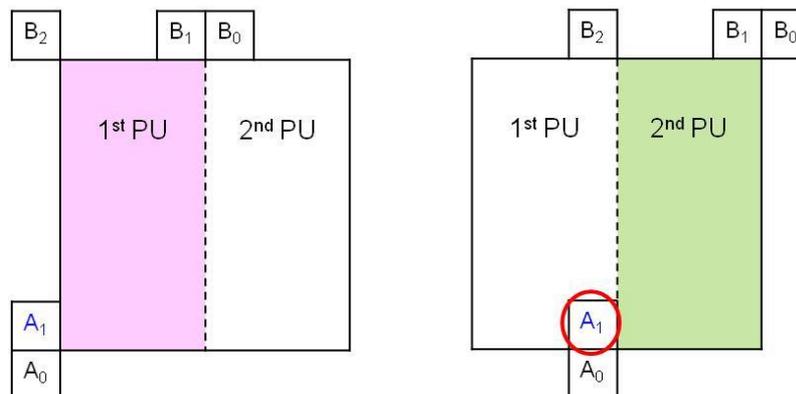
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Presented by Yu-Wen Huang
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Overall Summary

- In HM-5.0
 - The left position is used to derive the reference indices for temporal merging candidates
 - It causes a motion data dependency issue in PU merge



- In the proposed modification
 - Set the reference index of the 2nd PU as zero
 - Remove the motion data dependency in PU merge
 - Allow parallel encoding and decoding for PU merge
 - No coding efficiency loss

Background Information

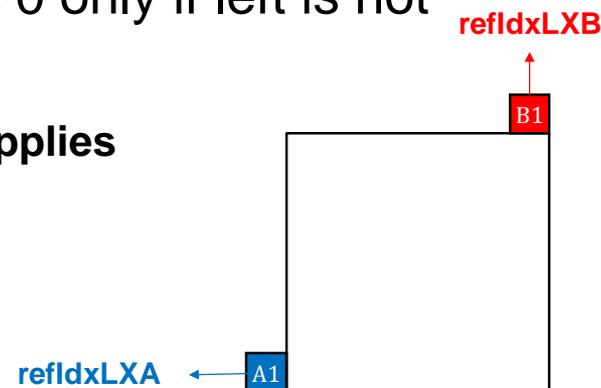
- In HM-5.0, the reference index of the temporal merging candidates uses left reference index as default. Set as 0 only if left is not available:

- If refIdxLXA is not equal to -1, the following applies

- $\text{refIdxLX} = \text{refIdxLXA}$

- Otherwise, the following applies

- $\text{refIdxLX} = 0$



- This issue causes motion data dependency in Nx2N PU merge.
 - The reference index of A1 position cannot be accessed before the motion data of the first PU is available

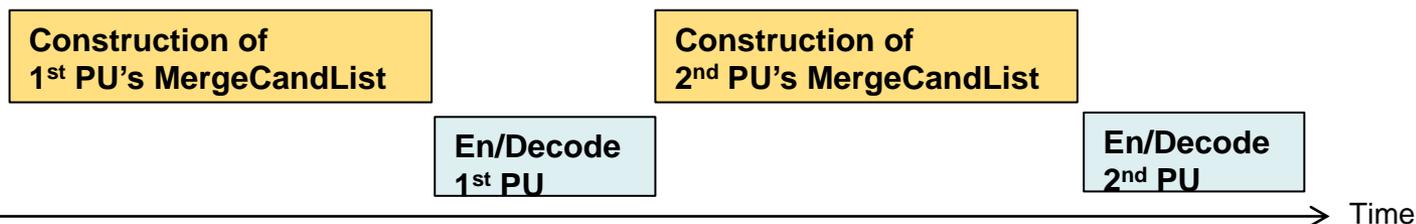
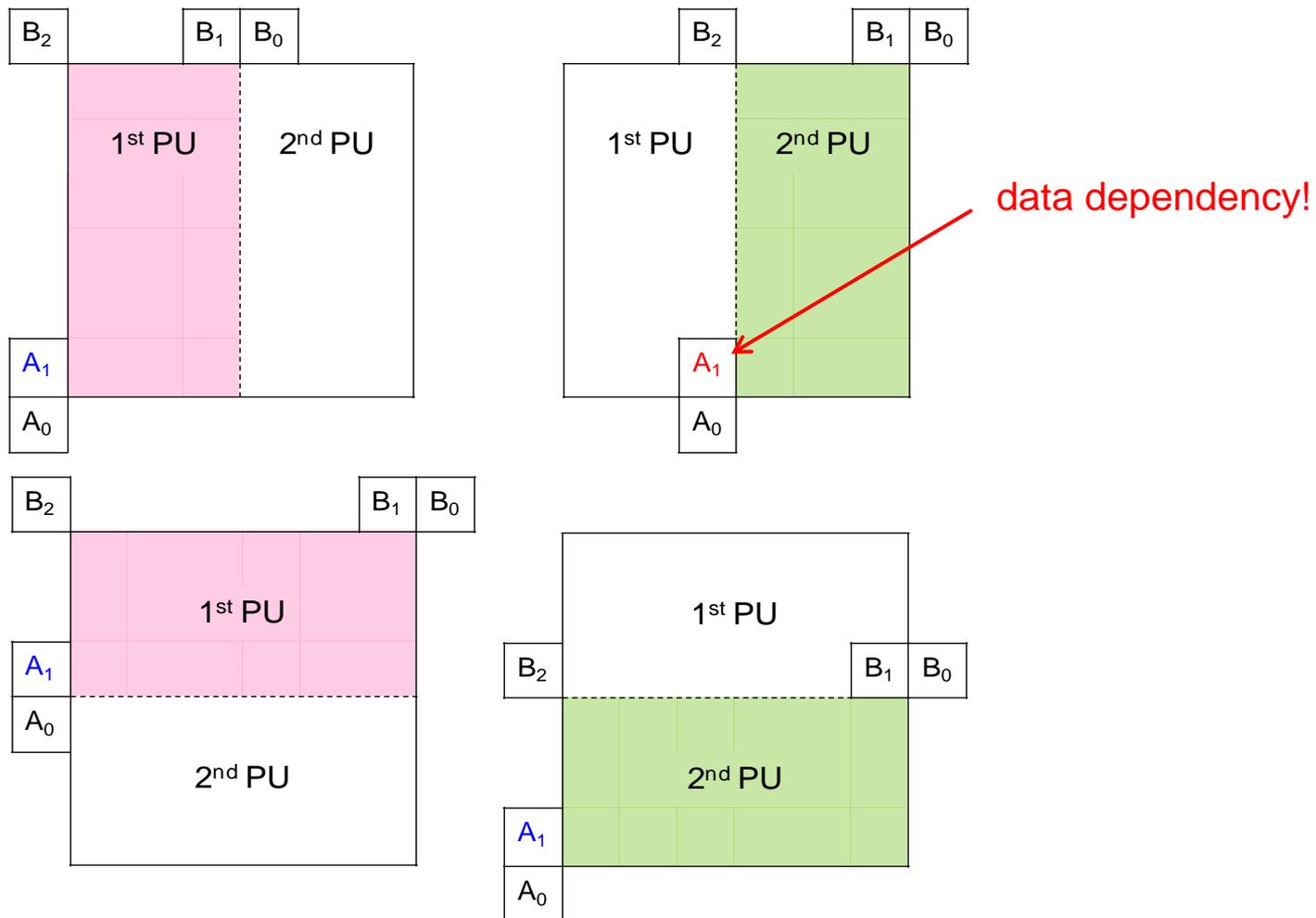


Illustration of reference indices in PU merge



Proposed Change

- For $2N \times N$, $N \times 2N$, $2N \times nU$, $2N \times nD$, $nL \times 2N$, and $nR \times 2N$, set the reference index of the 2nd PU as zero.

Simulation Results

- Anchor: JCTVC-G1200
- No coding efficiency loss
- The motion data dependency in PU merge is removed

	Random Access HE			Random Access LC		
	Y	U	V	Y	U	V
Class A (8bit)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class B	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class C	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class D	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%
Class E						
Overall	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class F	-0.1%	-0.1%	-0.1%	0.0%	0.0%	0.0%
Enc Time[%]		100%			100%	
Dec Time[%]		99%			100%	
	Low Delay B HE			Low Delay B LC		
	Y	U	V	Y	U	V
Class A						
Class B	0.0%	0.1%	0.6%	0.0%	0.0%	0.4%
Class C	0.0%	-0.1%	-0.1%	0.0%	0.1%	0.1%
Class D	0.1%	-0.2%	0.2%	0.0%	0.7%	0.3%
Class E	0.0%	0.3%	0.0%	0.0%	-0.5%	0.3%
Overall	0.0%	0.0%	0.2%	0.0%	0.1%	0.3%
	0.0%	0.0%	0.2%	0.0%	0.2%	0.2%
Class F	-0.2%	-0.3%	-0.2%	0.0%	0.1%	-0.4%
Enc Time[%]		101%			100%	
Dec Time[%]		100%			99%	
	Low Delay P HE			Low Delay P LC		
	Y	U	V	Y	U	V
Class A						
Class B	0.0%	0.3%	0.1%	-0.1%	0.1%	-0.4%
Class C	0.1%	-0.2%	-0.3%	-0.1%	0.0%	0.2%
Class D	0.1%	0.3%	-0.1%	0.0%	-0.2%	0.1%
Class E	-0.1%	0.1%	0.3%	0.0%	-0.1%	-0.5%
Overall	0.0%	0.1%	0.0%	0.0%	0.0%	-0.2%
	0.0%	0.1%	0.0%	0.0%	-0.1%	-0.3%
Class F	-0.1%	0.3%	-0.1%	-0.1%	-0.3%	-0.2%
Enc Time[%]		98%			101%	
Dec Time[%]		101%			100%	

Conclusion

- Propose to set the reference index for temporal merging candidates of the 2nd PU as zero.
 - Remove motion data dependency
 - Achieve CU-based parallel merge
 - No coding efficiency loss