Non-CE9: CU-based Parallel Inter Mode

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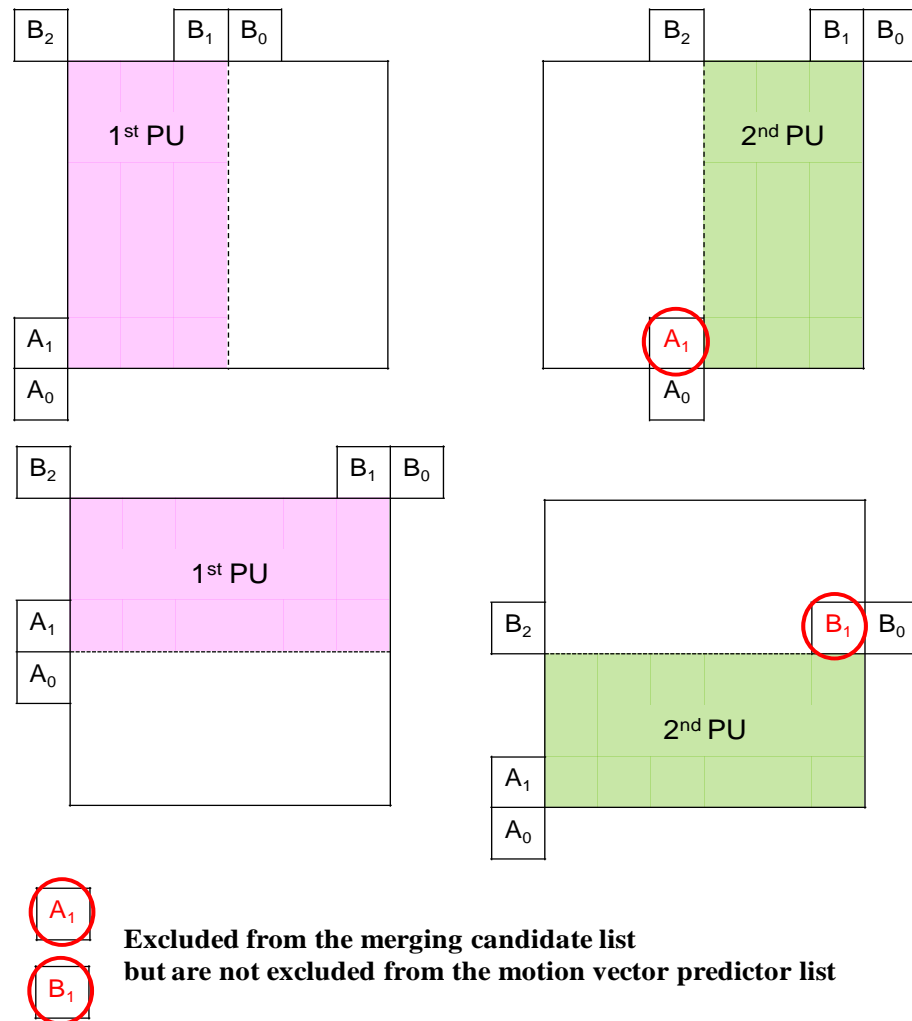
Overall Summary

- In HM-5.0

  - The spatial motion vector neighbours located in the 1st PU are excluded from the merging candidate list for the 2nd PU

  - However, those spatial motion vector neighbours are still used in inter mode

    - This prevents the 2nd PU from being processed in parallel with the 1st PU

- In the proposed modification

  - The spatial motion vector neighbours located in the 1st PU are excluded to remove data dependency

  - Allow parallel encoding and decoding for Inter mode

  - The motion vector neighbours used in merge and inter modes are unified

  - 0.0-0.2% bit rate increase

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Background Information

- A_1 and B_1 are removed from the merging candidate list but are not removed from the motion vector predictor list

- This causes motion data dependency in inter mode between two PUs and prevents parallel processing for the two PUs

Excluded from the merging candidate list but are not excluded from the motion vector predictor list

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Proposed Change

- For the 2nd PU in inter mode, we simply remove the spatial motion vector neighbour located in the 1st PU.

Simulation Results

- Anchor: JCTVC-G1200

- 0.0-0.2% bit rate increase

- The motion data dependency in inter mode is removed

	Random Access HE			Random Access LC		
	Y	U	V	Y	U	V
Class A (8bit)	0.1%	0.2%	0.1%	0.1%	0.3%	0.3%
Class B	0.2%	0.2%	0.2%	0.2%	0.3%	0.2%
Class C	0.3%	0.2%	0.3%	0.3%	0.4%	0.6%
Class D	0.3%	0.1%	0.2%	0.3%	0.4%	0.2%
Class E						
Overall	**0.2%**	**0.2%**	**0.2%**	**0.2%**	**0.4%**	**0.3%**
	0.2%	0.2%	0.2%	0.2%	0.4%	0.3%
Class F	0.6%	0.7%	0.7%	0.7%	0.7%	0.7%
Enc Time[%]	100%			100%		
Dec Time[%]	100%			100%		

	Low delay B HE			Low delay B LC		
	Y	U	V	Y	U	V
Class A						
Class B	0.0%	0.0%	0.1%	0.0%	0.0%	0.2%
Class C	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%
Class D	0.1%	0.0%	0.2%	0.0%	0.4%	-0.2%
Class E	0.0%	0.3%	-0.4%	-0.1%	-0.7%	0.2%
Overall	**0.1%**	**0.1%**	**0.0%**	**0.0%**	**0.0%**	**0.1%**
	0.1%	0.1%	0.0%	0.0%	0.0%	0.1%
Class F	0.8%	0.8%	0.6%	0.6%	0.1%	-0.1%
Enc Time[%]	100%			100%		
Dec Time[%]	100%			100%		

	Low delay P HE			Low delay P LC		
	Y	U	V	Y	U	V
Class A						
Class B	0.0%	0.1%	0.2%	0.0%	0.2%	-0.4%
Class C	0.1%	0.1%	-0.1%	0.1%	0.0%	-0.1%
Class D	0.1%	0.1%	0.1%	0.0%	-0.5%	0.4%
Class E	0.0%	-0.3%	-0.1%	0.0%	-0.8%	-0.6%
Overall	**0.1%**	**0.0%**	**0.1%**	**0.0%**	**-0.2%**	**-0.2%**
	0.1%	0.0%	0.0%	0.0%	-0.2%	-0.2%
Class F	0.7%	1.0%	0.9%	0.8%	0.8%	0.9%
Enc Time[%]	100%			101%		
Dec Time[%]	100%			100%		

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Conclusion

- Propose to remove the spatial motion vector neighbour located in the 1st PU for the 2nd PU in inter mode
    - Remove data dependency between the 1st PU and the 2nd PU
    - Achieve CU-based parallel inter mode
    - The motion vector neighbours used in merge and inter modes are unified
    - Recommend to adopt the proposed change into HM

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