

# **[JVET-P0669] AHG6: Wrap-around motion vector prediction at the picture boundary**

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# Introduction

- ❖ If the spatial and temporal candidates out of the picture boundary, such as B2, B0, A1, A0 and C0 in Fig 1, are excluded from the motion vector predictor candidate list



Figure 1. Example of unavailable candidates

- ❖ In SbTMVP mode, if the point at where the motion vector of left neighbor block in collocated picture is out of left or right boundary, then the point is clipped in the picture boundary

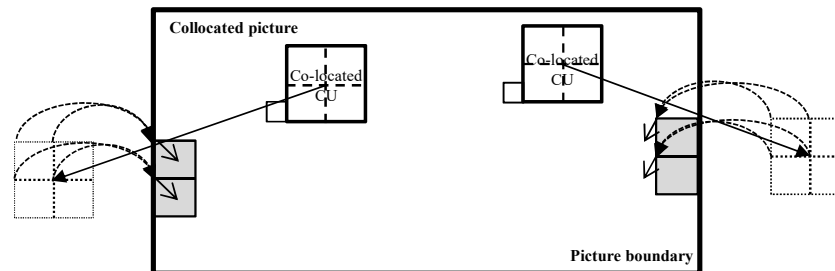
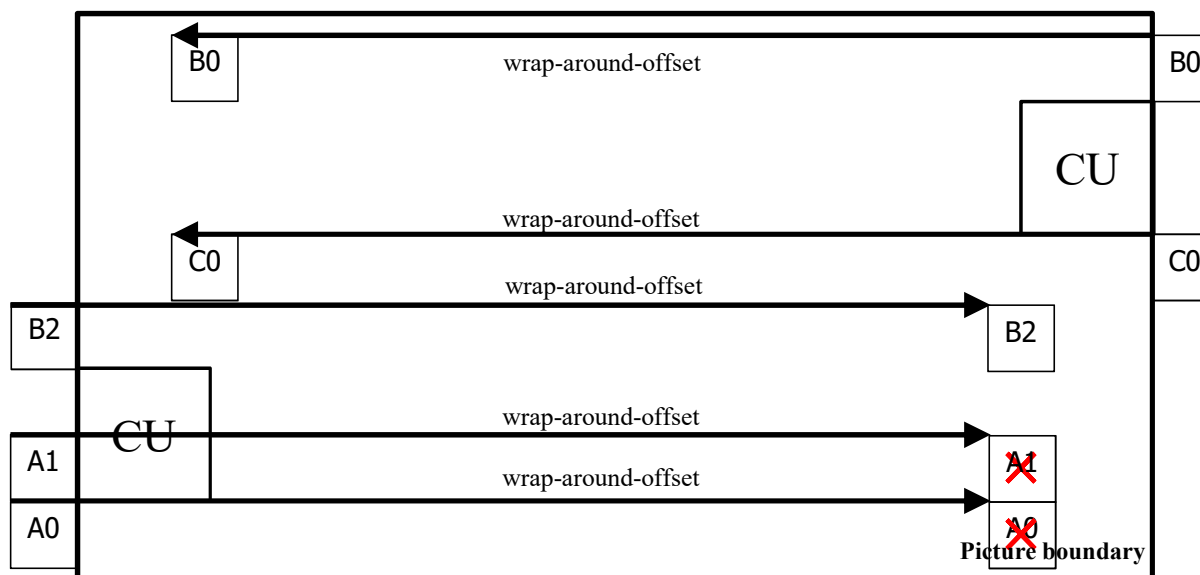


Figure 2. Example of unavailable candidates

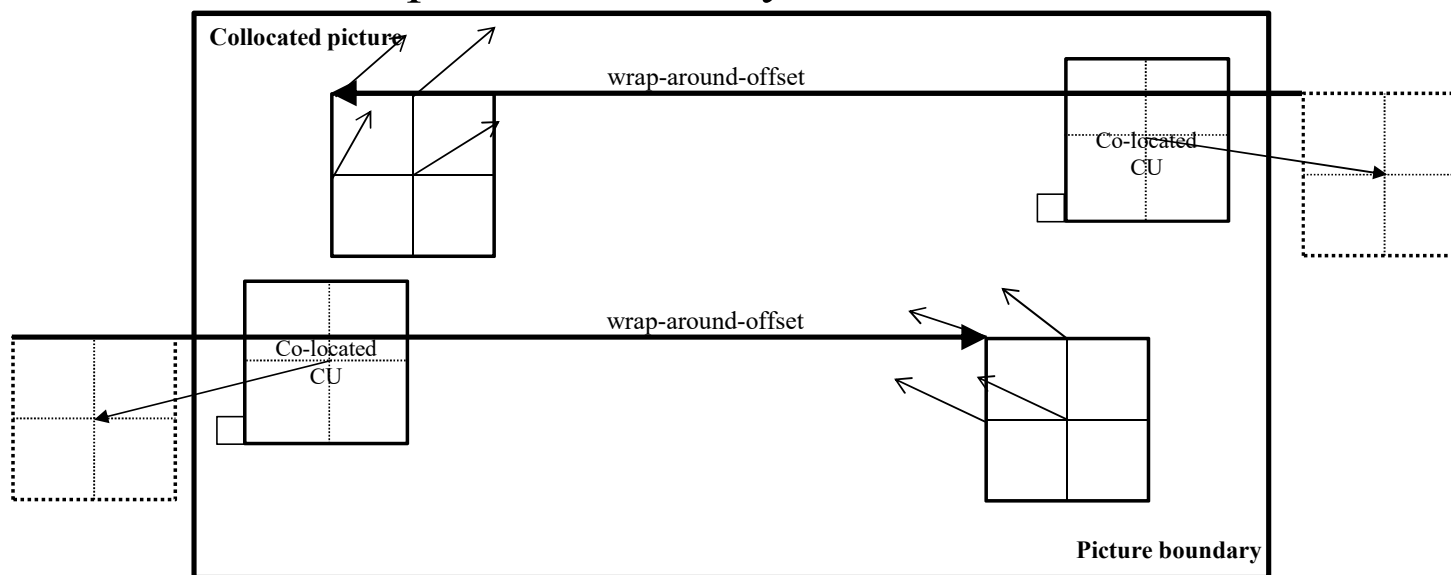
# Proposed Method

- ❖ If the spatial and temporal candidates out of the picture boundary, then adding or subtracting wrap-around-offset from the position of the out-of-boundary candidate in the horizontal direction
  - $\text{wrap-around-offset} = (\text{sps\_ref\_wraparound\_offset\_minus1} + 1) * \text{MinCbSizeY}$
- ❖ In the figure below, A0 and A1 are not used for the proposed method
  - Because motion vectors, 'wrap-arounded A0' and 'wrap-arounded A1', are unavailable



# Proposed Method

- ❖ If the point at where the motion vector of left neighbor block in collocated picture is out of boundary, then adding or subtracting wrap-around-offset from the out of boundary point in the horizontal direction, not clipped the picture boundary
- ❖ The proposed methods, are simply applicable, same as Wrap-around MC, just adding or subtracting offset when the position of motion vector candidate or the point of motion vector is out of the picture boundary



# Simulation Results

## ❖ RD performance of VTM6.0 with 360Lib-9.1 in RA configuration

- Simulation results show that proposed methods yields -0.02%, -0.04% and -0.12% BD-rate gain in end-to-end WS-PSNR with no additional complexity

		Random Access				
Reference: VTM-6.0		Over VTM-6.0				
Tested: Proposed		Y	U	V	EncT	DecT
S1	SkateboardInLot	-0.06%	-0.20%	-0.41%	100%	100%
	ChairliftRide	0.00%	0.04%	0.03%	100%	99%
	KiteFlite	-0.02%	0.00%	0.07%	100%	100%
	Harbor	-0.01%	-0.05%	-0.13%	100%	100%
	Trolley	-0.03%	0.00%	-0.02%	100%	100%
	GasLamp	-0.01%	-0.01%	0.00%	101%	99%
S2	Balboa	0.00%	-0.02%	-0.41%	100%	100%
	Broadway	-0.01%	-0.04%	-0.01%	101%	100%
	Landing2	0.00%	-0.03%	-0.15%	100%	100%
	BranCastle2	-0.02%	-0.09%	-0.12%	100%	100%
Overall		-0.02%	-0.04%	-0.12%	100%	100%

Thank you for crosschecking samsung

# Conclusion

- ❖ This contribution proposes a wrap-around motion vector prediction at the picture boundary to improve the coding efficiency of 360 video
- ❖ In VVC, Wrap-around MC is already adopted, the proposed methods in this contribution are very simply applicable, same as Wrap-around MC and there is no additional syntax signalling and no additional complexity
- ❖ Due to the characteristics of 360 video, affine mode has many choices, so these proposed methods are expected that it will perform better if it is applied to the affine mode