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Non-CE4: DMVR on SMVD and AMVP mode

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Problem statement

- In VVC draft 5, DMVR is applied to a CU predicted using regular merge or CIIP mode
- The benefit of DMVR cannot be applied to AMVP or SMVD mode

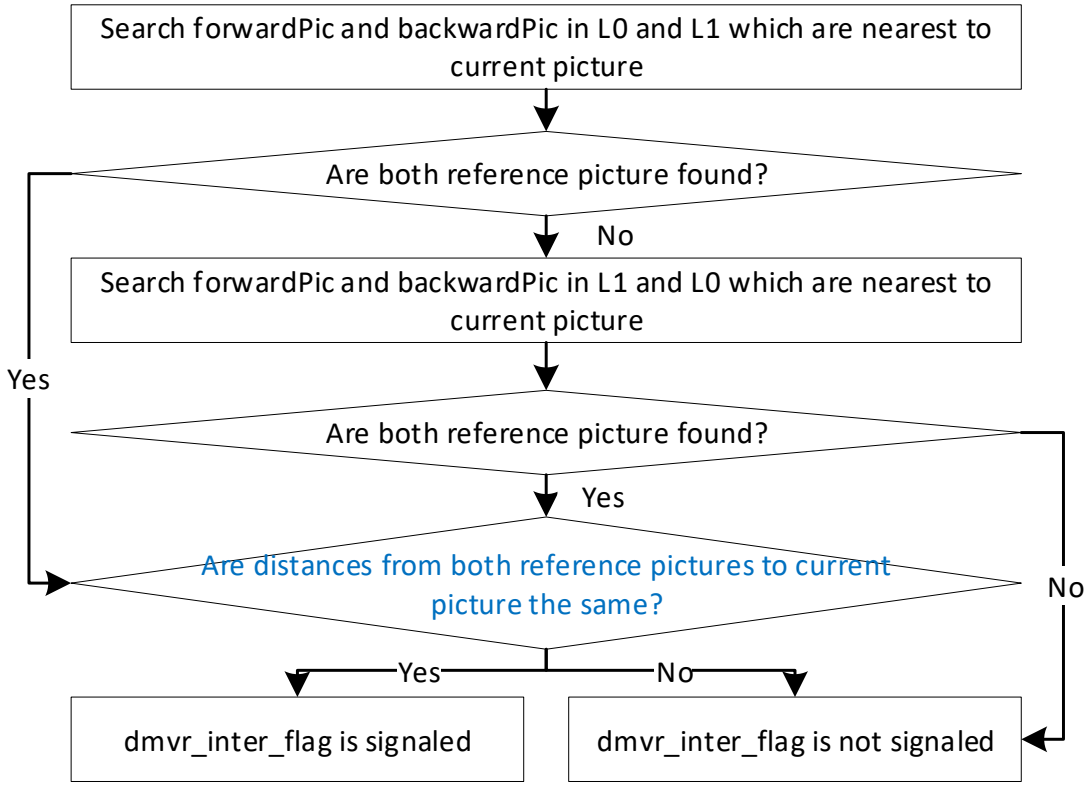
➡ It is proposed to apply DMVR to AMVP and SMVD modes

Proposed method

- A flag (dmvr_inter_flag) is signaled to indicate whether DMVR is applied to AMVP or SMVD
- When the dmvr_inter_flag is true, the BCW index and two reference picture indices are not signaled but derived:
  - The BCW index is set to be equal weight
  - The two reference pictures are derived at slice-level using the similar process to that in SMVD mode

Reference picture derivation process

- Denote forwardPic and backwardPic as two reference pictures



Inherited DMVR decision in merge mode

- The DMVR on/off decision is inherited for regular merge and CIIP modes
- A CU-level DMVR on/off flag is derived for each CU:
  - If a CU is coded using regular merge or CIIP mode, the flag is inherited from its neighboring merge block
  - If the CU is coded using bi-predicted AMVP or SMVD mode, the flag is set to be the same as dmvr_inter_flag
  - Otherwise, the flag is set to be true

Conditions to apply DMVR

- The DMVR conditions are modified as follows:
  - the CU is predicted using regular merge, CIIP, bi-predicted AMVP or SMVD modes
  - BCW is not applied to the CU
  - CU width ≧ 8
  - CU height ≧ 8
  - CU size ≧ 128
  - the CU is bi-predicted with equal distance from current picture to two reference pictures
  - the CU-level DMVR on/off flag is on

Simulation results

- 0.12% coding gain is observed with 12% encoding time increase
- Higher coding gain is observed for class A sequences

	Over VTM-5.0				
	Random Access				
	Y	U	V	EncT	DecT
Class A1	-0.12%	-0.23%	-0.10%	114%	100%
Class A2	-0.24%	-0.13%	-0.12%	113%	100%
Class B	-0.07%	-0.07%	-0.09%	112%	100%
Class C	-0.08%	-0.04%	-0.17%	111%	99%
Overall	-0.12%	-0.11%	-0.12%	112%	100%
Class D	-0.09%	-0.06%	-0.14%	109%	98%
Class F	-0.05%	-0.01%	-0.03%	107%	99%

Conclusion

- It is proposed to apply DMVR to AMVP and SMVD modes
- 0.12% coding gain with 12% encoding time and 0% decoding time increase
- Suggest to further study in CE

- Thanks to Qualcomm for cross-checking