Non-CE9/Non-CE13:
New MVP positions for merge/skip modes and its combination with replacing redundant MVPs

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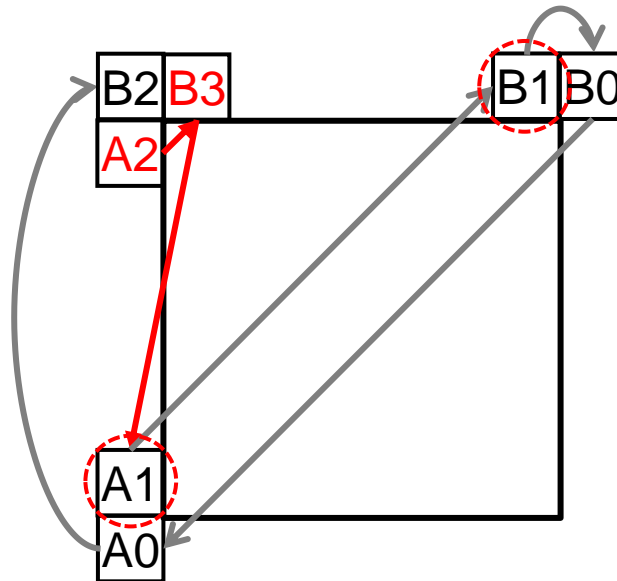
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JCTVC-G165

Proposed method

- **New merge candidate positions**
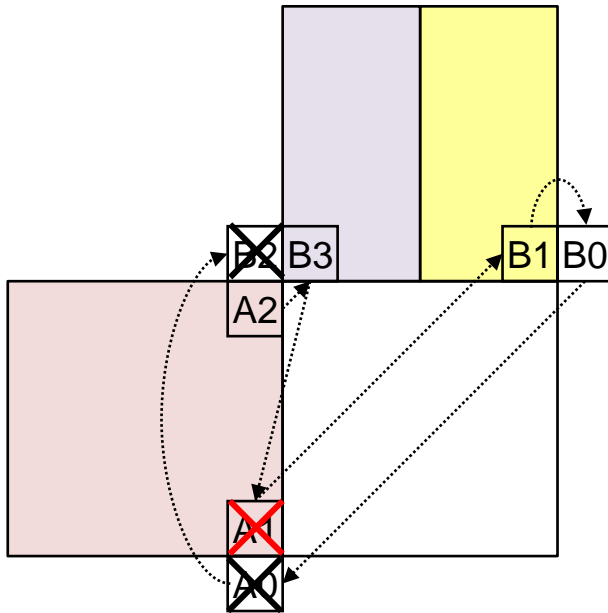 - ➢ Order : A2, B3, A1, B1, B0, A0, B2

- **Restrictions on adding spatial MVP candidates**
  - ➢ A1 cannot be added to the list if redundant to A2
  - ➢ B1 cannot be added to the list if redundant to B3
  - ➢ The maximum number of spatial MVP is still 4 (same as HM)
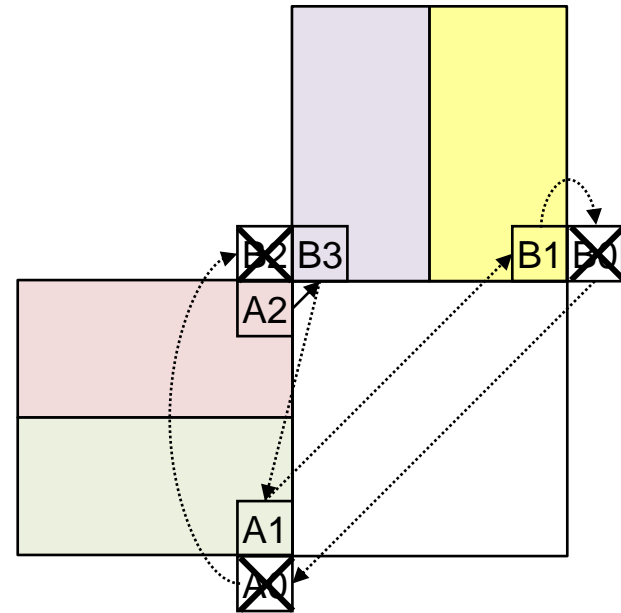
Proposed method (Examples)

▪ Example 1

➤ When
left PU has only 1 motion partition &&
above PU has 2 motion partitions

B2 B3   B1 B0
A2

A1

A0

➤ List : { A2, B3, B1, B0 }

▪ Example 2

➤ When
both left and above PUs have 2 motion partitions

B2 B3   B1 B0
A2

A1

A0

➤ List : { A2, B3, A1, B1 }

✕ Positions not checked due to Max. No.(4) for spatial candidates

✕ Unavailable candidates due to the redundancy check

Simulation Results

- **Performance**
  - ➢ Avg. 0.2% BD rate reduction (both w/o and w/t LP config.) without any encoding and decoding time increase

	RA-HE	RA-LC	LB-HE	LB-LC	LP-HE	LP-LC	Avg (w/o LP)	Avg. (w/t LP)
BD rate Y(%)	**-0.1**	**-0.1**	**-0.2**	**-0.2**	**-0.2**	**-0.2**	**-0.2**	**-0.2**
EncT (%)	100	100	100	100	100	100	100	100
DecT (%)	100	100	101	99	101	99	100	100

- Anchor is HM4.0 MrgEncFix
- Results are cross-verified by TI

Additional tests with the proposals for replacing redundant MVPs

▪ The combinations of the proposed method and the 4 proposals for replacing redundant MVPs are tested

- **M1** : CE13 3.1 F052 Test1 Simplified (JCTVC-G231) + Prop.

- **M2** : CE13 3.4 F402 Test3 (JCTVC-G776) + Prop.

- **M3** : CE13 3.5 F474 Test1 (JCTVC-G240) + Prop.

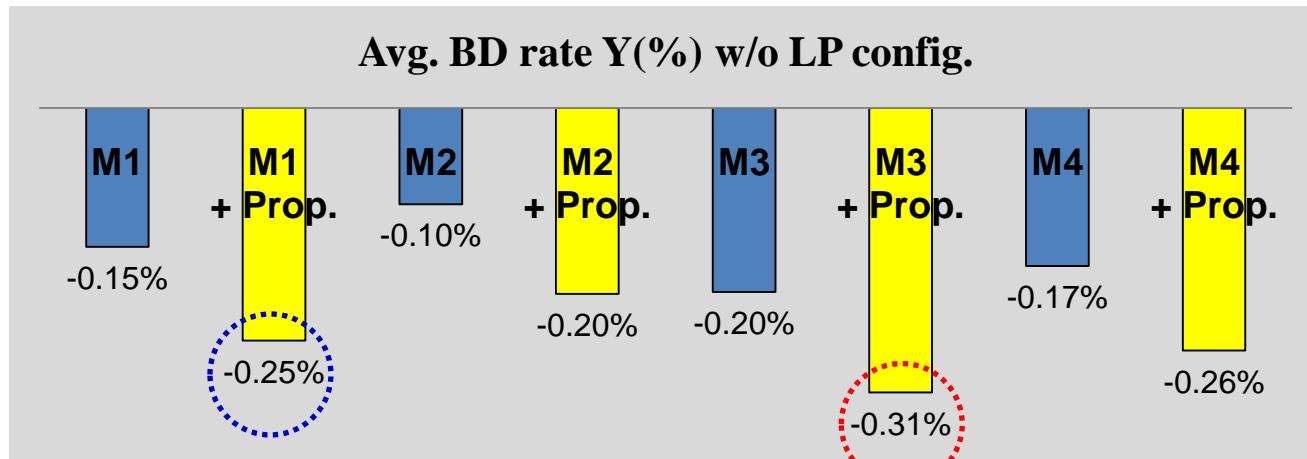- **M4** : JCTVC-G787 (Rounding pred. + MV dep. offset) + Prop.

▪ Purpose

➢ To show the gain is **additive** to those proposals

➢ To find **the best combination** in terms of coding efficiency and computational complexity
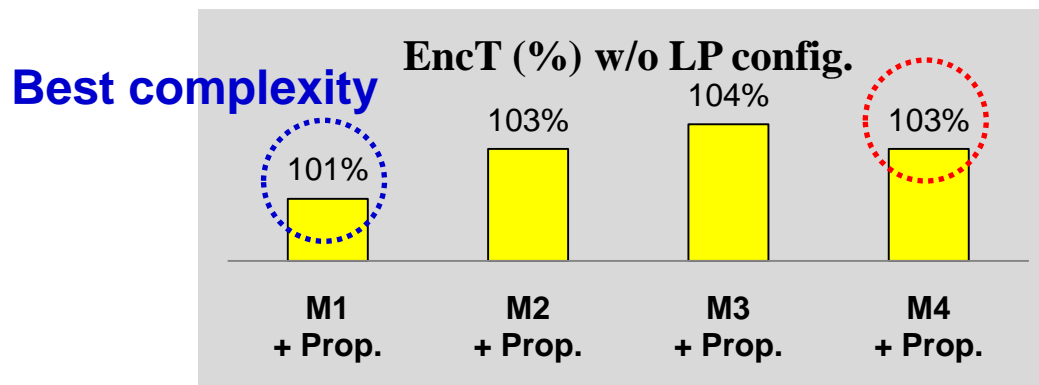
▪ Anchor is HM4.0 MrgEncFix

▪ Results are cross-verified by Qualcomm

Simulation Results
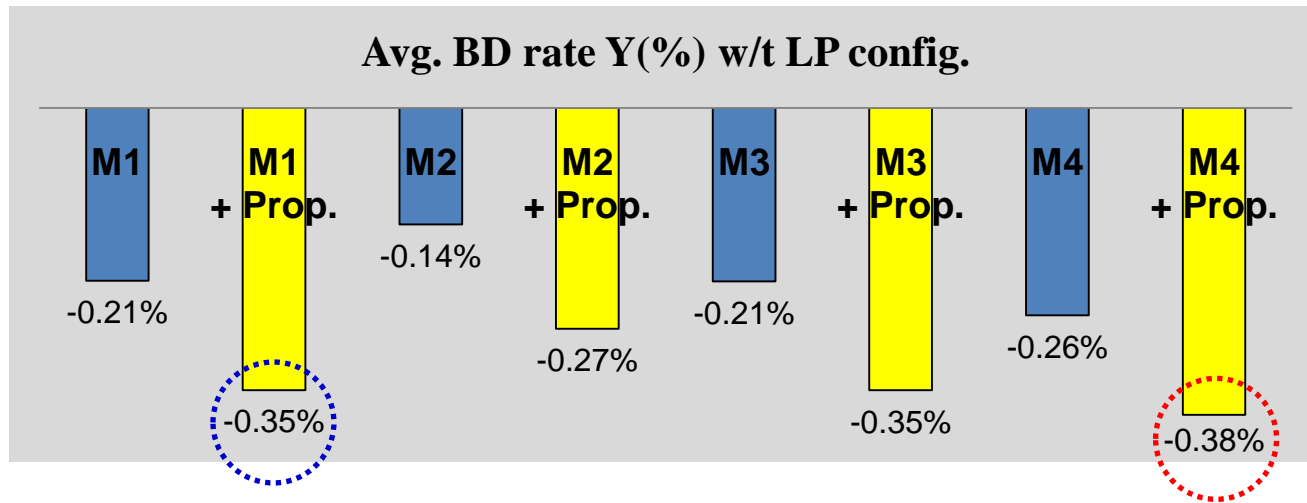
- Performance w/o LP configurations

Avg. BD rate Y(%) w/o LP config.

M1 -0.15%
M1 + Prop. -0.25%
M2 -0.10%
M2 + Prop. -0.20%
M3 -0.20%
M3 + Prop. -0.31%
M4 -0.17%
M4 + Prop. -0.26%

Best coding efficiency

EncT (%) w/o LP config.

Best complexity

M1 + Prop. 101%
M2 + Prop. 103%
M3 + Prop. 104%
M4 + Prop. 103%

Simulation Results

- Performance w/t LP configurations

Simulation Results (Summary)

- **"M1 + Prop."** is the best combination considering the trade-off between coding efficiency and complexity

  - w/o LP configurations,
    - BD rate Y : -0.25%
    - EncT : 101%
    - DecT : 100%

  - w/t LP configurations,
    - BD rate Y : -0.35%
    - EncT : 101%
    - DecT : 101%

Conclusions

▪ The proposed method provides average **0.2%** BD rate reduction with **100%** encoding/decoding time.

▪ When the proposed method is combined with the four proposals for replacing redundant MVPs, *the gains were always additive*.

▪ Among the combinations, "*M1 + Prop.*" showed the best performance considering the tradeoff between coding efficiency and complexity

➢ Average 0.35% BD rate reduction with only 1% encoding time increase.

Recommendations

- Recommend to adopt the proposed method in the next version of HM since average **0.2%** gain can be achieved **without any increase in encoding/decoding time**

- Recommend to adopt the combination **"M1 + Prop."** since average **0.35%** gain can be achieved with 1% encoding time decrease and 0% decoding time increase