# Non-CE9: Improvement in temporal candidate of merge mode and AMVP
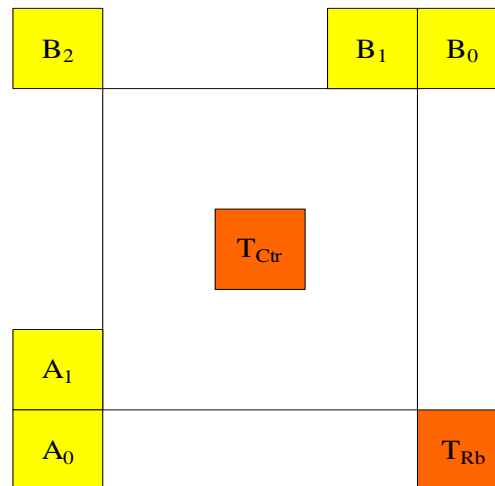
## JCTVC-G343

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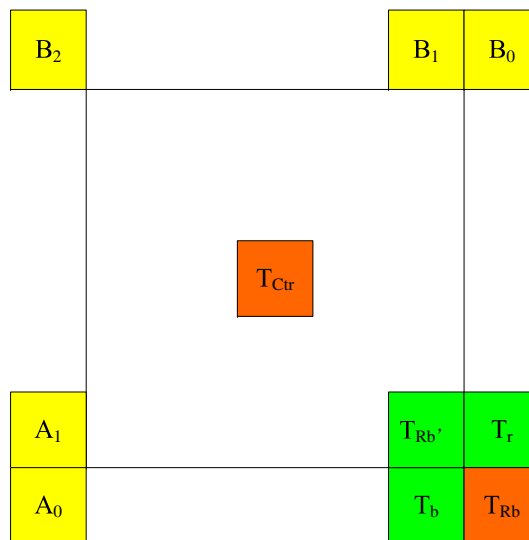# Candidates of Merge and AMVP in HM4.0

◆Candidate locations in HM4.0

➢ Merge mode and AMVP use the same candidate locations

➢ It may be not enough to exploit the motion information on the below and right sides

# Improvement in temporal candidate
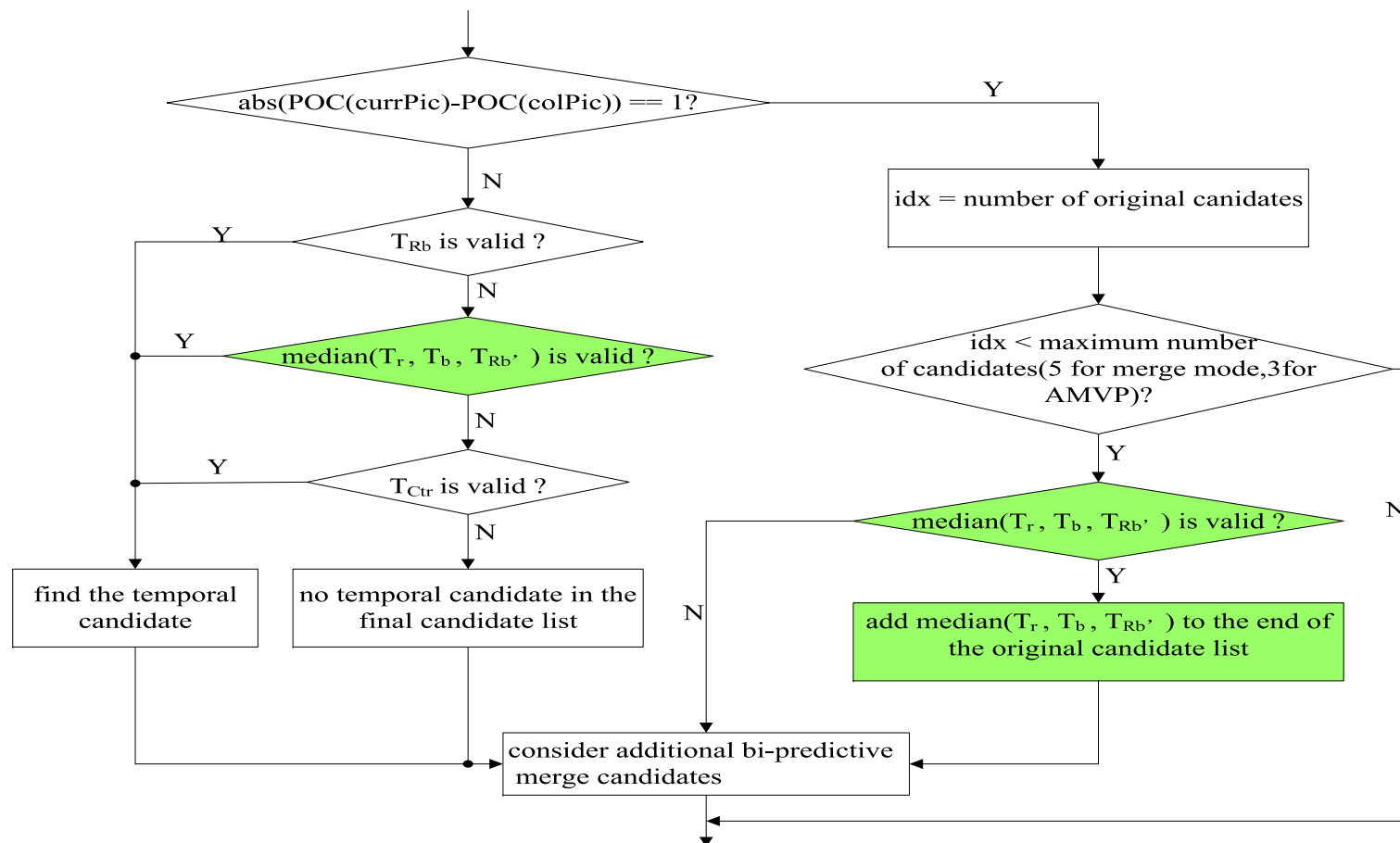
◆Proposed candidate locations

➢ Consider three additional temporal candidate locations ($T_b$, $T_r$ and $T_{Rb'}$ ) in some cases

➢ A new candidate: median($T_b$, $T_r$ , $T_{Rb'}$ )
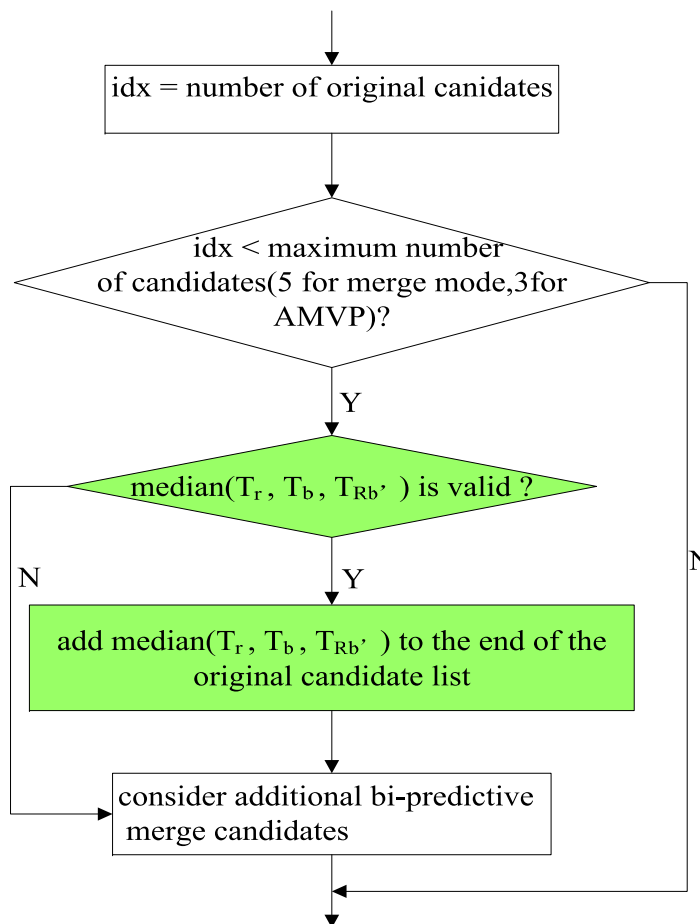
# Solution

◆Solution A

# Solution

◆Solution B

# Experimental Results(1)

◆Test results with the solution A

  ➢ BD bitrate saving

    ➢ 0.1% for random access,0.2% for lowdelay

  ➢ Complexity

    ➢ Almost the same time cost as HM4.0

| | Random Access HE | | | Random Access LC | | |
|---|---|---|---|---|---|---|
| | Y | U | V | Y | U | V |
| Class A | -0.1% | -0.1% | -0.3% | -0.1% | -0.1% | -0.1% |
| Class B | -0.1% | 0.0% | 0.0% | -0.1% | -0.1% | 0.0% |
| Class C | -0.1% | 0.0% | 0.0% | -0.1% | -0.1% | -0.2% |
| Class D | -0.1% | -0.1% | -0.1% | -0.1% | -0.2% | -0.1% |
| Class E | | | | | | |
| **Overall** | -0.1% | 0.0% | -0.1% | -0.1% | -0.1% | -0.1% |
| | -0.1% | 0.0% | -0.1% | -0.1% | -0.1% | -0.1% |
| Enc Time[%] | | 100% | | | 100% | |
| Dec Time[%] | | 100% | | | 101% | |

# Experimental Results(1)

◆Test results with the solution A (continue)

| | Low delay B HE | | | Low delay B LC | | |
|---|---|---|---|---|---|---|
| | Y | U | V | Y | U | V |
| Class A | | | | | | |
| Class B | -0.2% | -0.3% | -0.1% | -0.2% | -0.1% | 0.1% |
| Class C | -0.2% | -0.2% | -0.2% | -0.2% | -0.1% | -0.3% |
| Class D | -0.2% | -0.2% | 0.0% | -0.2% | -0.1% | -0.3% |
| Class E | -0.2% | 0.1% | 0.7% | -0.2% | 0.0% | -0.1% |
| **Overall** | -0.2% | -0.2% | 0.1% | -0.2% | -0.1% | -0.1% |
| | -0.2% | -0.2% | 0.0% | -0.2% | -0.1% | -0.1% |
| Enc Time[%] | | 101% | | | 101% | |
| Dec Time[%] | | 100% | | | 101% | |

| | Low delay P HE | | | Low delay P LC | | |
|---|---|---|---|---|---|---|
| | Y | U | V | Y | U | V |
| Class A | | | | | | |
| Class B | -0.2% | 0.1% | 0.2% | -0.3% | 0.0% | -0.2% |
| Class C | -0.2% | -0.2% | 0.0% | -0.2% | -0.3% | -0.2% |
| Class D | -0.1% | -0.2% | -0.3% | -0.2% | 0.1% | -0.5% |
| Class E | -0.2% | -0.2% | -0.4% | -0.3% | -0.5% | -0.7% |
| **Overall** | -0.2% | -0.1% | -0.1% | -0.3% | -0.1% | -0.4% |
| | -0.2% | -0.2% | -0.2% | -0.3% | -0.2% | -0.4% |
| Enc Time[%] | | 100% | | | 101% | |
| Dec Time[%] | | 101% | | | 102% | |

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# Experimental Results(2)

◆Test results with the solution B

➢ BD bitrate saving

    ➢0.1% for random access,0.2% for lowdelay

    ➢In random access configurations , solution B has better prediction performance than solution A for almost one

    third of the test sequences, and has almost the same prediction performance for the other test sequences.

    ➢ In low delay configurations, solution A  and solution B

    have the same prediction performance.

➢ Complexity

    ➢Almost the same time cost as HM4.0

# Experimental Results(2)

◆Test results with the solution B (continue)

| | Random Access HE | | | Random Access LC | | |
|---|---|---|---|---|---|---|
| | Y | U | V | Y | U | V |
| Class A | -0.1% | -0.2% | -0.3% | -0.1% | 0.0% | 0.0% |
| Class B | -0.1% | 0.0% | 0.0% | -0.1% | -0.1% | 0.0% |
| Class C | -0.1% | -0.1% | 0.0% | -0.1% | -0.1% | -0.1% |
| Class D | -0.1% | -0.1% | -0.1% | -0.2% | -0.2% | -0.1% |
| Class E | | | | | | |
| **Overall** | -0.1% | -0.1% | -0.1% | -0.1% | -0.1% | -0.1% |
| | -0.1% | -0.1% | -0.1% | -0.1% | -0.1% | -0.1% |
| Enc Time[%] | 100% | | | 100% | | |
| Dec Time[%] | 101% | | | 101% | | |

| | Low delay B HE | | | Low delay B LC | | |
|---|---|---|---|---|---|---|
| | Y | U | V | Y | U | V |
| Class A | | | | | | |
| Class B | -0.2% | -0.3% | -0.1% | -0.2% | -0.1% | 0.1% |
| Class C | -0.2% | -0.2% | -0.2% | -0.2% | -0.1% | -0.3% |
| Class D | -0.2% | -0.2% | 0.0% | -0.2% | -0.1% | -0.3% |
| Class E | -0.2% | 0.1% | 0.7% | -0.2% | 0.0% | -0.1% |
| **Overall** | -0.2% | -0.2% | 0.1% | -0.2% | -0.1% | -0.1% |
| | -0.2% | -0.2% | 0.0% | -0.2% | -0.1% | -0.1% |
| Enc Time[%] | 100% | | | 101% | | |
| Dec Time[%] | 100% | | | 102% | | |

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

# Conclusions

◆ Two solutions are proposed to improve temporal candidate of merge mode and AMVP

◆ Overall, the performance of solution B is slightly better than that of solution A

◆ It is recommended to adopt solution B into the next version of HM.