

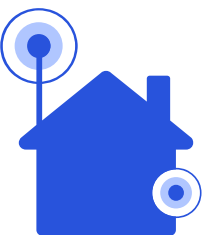
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Qualcomm

# Non-EE2: Template Matching for RR-IBC

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# Introduction

- Target: Enable template matching to refine BV of RRIBC AMVP/MRG modes
- Problems:
  - ECM7 performs TM search inconsistently, where only BV's of non-flipped IBC AMVP/MRG modes are refined while BV's of flipped ones are not
  - IBC AMVP candidates with flip cannot be reordered through TM cost because TM is not applied; however, IBC MRG candidates (either flipped or non-flipped) can be reordered through TM cost, causing another inconsistency in design
  - Such constraint imposes extra checks on candidate list construction
- The contribution removes design inconsistencies and extra checks and re-uses existing logics (TM search and template block flipping) to support TM RRIBC
- Summary:
  - AI : (F) -0.05%, (TGM) -0.03%, (Enc T.) 100% (Dec T.) 100%
  - RA: (F) -0.07%, (TGM) 0.02%, (Enc T.) 100% (Dec T.) 100%
  - LB : (F) -0.25%, (TGM) -0.04%, (Enc T.) 100% (Dec T.) 101%

# ECM7 constraints on RRIBC

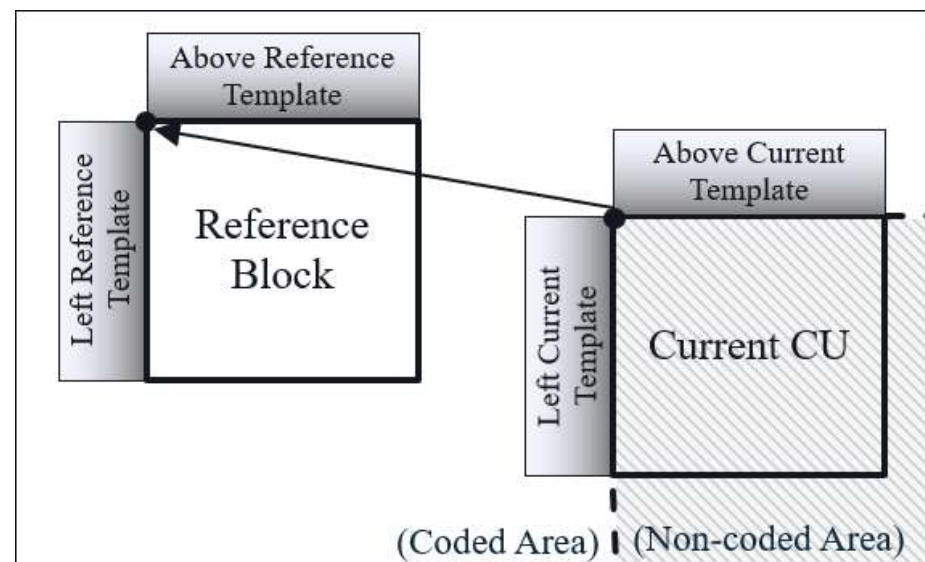
- ECM7 imposes extra checks on determining how AMVP/MRG candidate list is constructed: (1) whether TM-cost reordering performs and (2) whether BV candidates would be refined by TM search

|             | Support TM cost based reordering                                                                                            | Perform TM search for BV refinement                                 |
|-------------|-----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| IBC TM AMVP | Yes (if $RR=0$ ), No (if $RR \neq 0$ )                                                                                      | Yes (if $RR=0$ ), No (if $RR \neq 0$ )                              |
| IBC TM MRG  | Yes (for both $RR=0$ and $RR \neq 0$ ), but ECM7 forces setting $RR=0$ , so TM-based reordering for RRIBC never takes place | Yes (if $RR=0$ ), No (if $RR \neq 0$ , but this case never happens) |

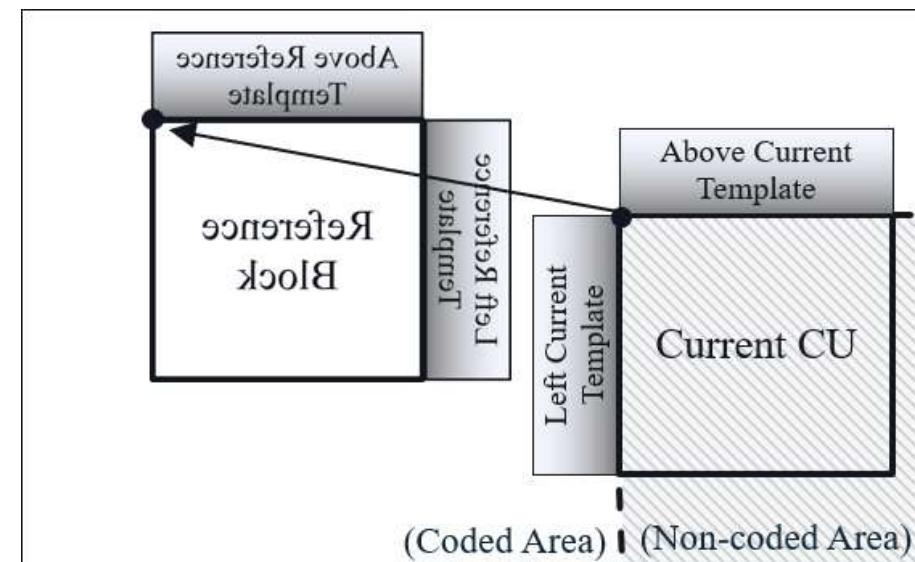
- These checks are required just because ECM7 does not support TM search for IBC AMVP/MRG candidates with flip mode enabled

# Template matching for RRIBC

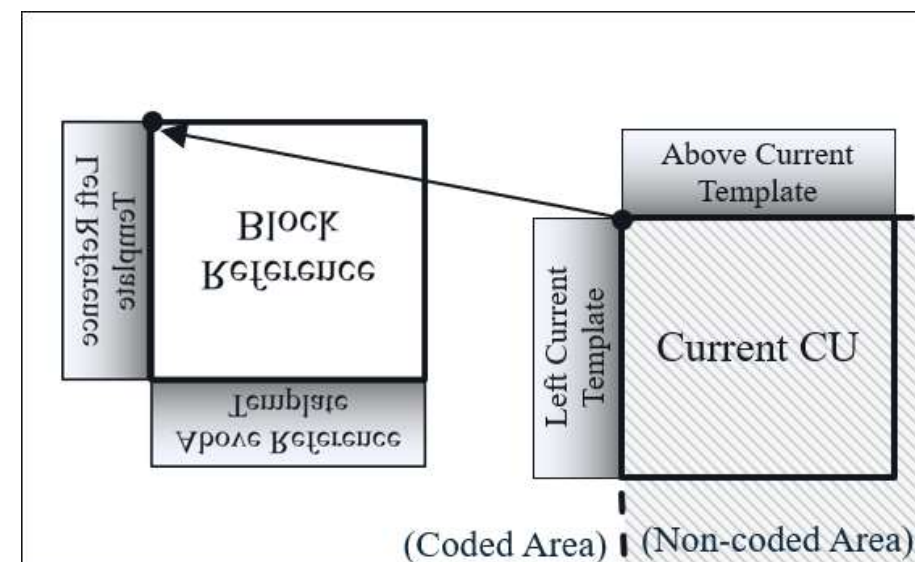
- Remove checks that impose constraint on IBC TM search and AMVP reordering
- Flip template blocks in TM search for RRIBC



TM search w/o flipping  
as in ECM7



TM search w/ hor flipping



TM search w/ ver flipping

# Experimental results

|           | <b>All Intra Main 10</b>     |        |        |      |      |
|-----------|------------------------------|--------|--------|------|------|
|           | Y                            | U      | V      | EncT | DecT |
| Class F   | -0.05%                       | 0.13%  | 0.11%  | 100% | 100% |
| Class TGM | -0.03%                       | 0.01%  | -0.02% | 100% | 100% |
|           | <b>Random Access Main 10</b> |        |        |      |      |
|           | Y                            | U      | V      | EncT | DecT |
| Class F   | -0.07%                       | -0.34% | -0.04% | 100% | 99%  |
| Class TGM | 0.02%                        | -0.10% | 0.06%  | 101% | 100% |
|           | <b>Low delay B Main 10</b>   |        |        |      |      |
|           | Y                            | U      | V      | EncT | DecT |
| Class F   | -0.25%                       | -0.38% | -1.21% | 100% | 100% |
| Class TGM | -0.04%                       | 0.11%  | 0.13%  | 100% | 101% |

# Concluding remarks

- Propose to support TM search for all RRIBC types by re-using existing logics
- Remove checks in ECM7 to let TM run consistently over all RRIBC types
- Recommend further study in the next round of EE2

We would like to thank Ofinno (JVET-AC0207) for crosscheck



# Thank you!

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