

**MEDIATEK**

# CE4-related: Simplification of triangle merging candidate list derivation on top of CE4-4.1c

Tzu-Der Chuang, Ching-Yeh Chen, Yu-Wen Huang,  
Shaw-Min Lei

Presented by Tzu-Der (Peter) Chuang  
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# Overall Summary

- Proposed to modify the CE4-4.1.c for better coding efficiency
  - Select two candidates from the regular merge candidate list
  - 1<sup>st</sup> cand.: Take the L0 MV if exists, otherwise, take L1 MV
  - 2<sup>nd</sup> cand.: Take the L1 MV if exists, otherwise, take L0 MV
  - If the MVs of those two candidates are the same,
    - If 2<sup>nd</sup> cand. is bi-pred candidate, take L1 MV
    - Otherwise, if 1<sup>st</sup> cand. is bi-pred candidate, take L0 MV
    - Otherwise, add an (1/4 pel, 0) MV offset on 2<sup>nd</sup> cand.

	RA			LB		
	Y	U	V	Y	U	V
CE4-4.1.c	0.05%	0.04%	0.07%	0.11%	0.08%	-0.08%
Proposed	0.04%	0.06%	0.02%	0.07%	0.28%	-0.07%

# Problem Definition

- The candidate list generation for triangular merge mode is too complex
- 5 spatial MVs and 2 temporal collocated MVs are used to generate the source candidates
  - Full pruning process is applied to spatial MVs. At most 10 MV pruning and 4 MV scaling are required
- From the source candidates, the uni-prediction MVs are put into the candidate list first and followed by the L0 MVs of the bi-prediction candidates, the L1 MVs of the bi-prediction candidates, and averaged MVs of the L0 and L1 MVs of bi-prediction candidates.
  - MV scaling is required for MV averaging
  - Full pruning process is performed for every MV.
  - At most 74 MV pruning, 7 MV scaling, and 7 MV averaging are required
- **At most 84 MV pruning, 11 MV scaling, and 7 MV averaging are required**
- **An additional circuit is also required**

## Method in CE4-4.1.c

- Reuse the candidate list of regular merge mode
  - Select two candidates with existing syntax
  - For the first candidate: Take the L0 MV if exist, otherwise, take L1 MV
  - For the second candidate: Take the L1 MV if exist, otherwise, take L0 MV
  - If the MVs of those two candidates are the same, add an  $(1/4 \text{ pel}, 0)$  MV offset on second candidates
- Only additional 2 interDir comparisons, 1 MV comparison, and 1 addition are required

# Proposed Method

- Reuse the candidate list of regular merge mode
  - Select two candidates with existing syntax
  - For the first candidate: Take the L0 MV if exist, otherwise, take L1 MV
  - For the second candidate: Take the L1 MV if exist, otherwise, take L0 MV
  - If the MVs of those two candidates are the same,
    - If 2<sup>nd</sup> cand. Is bi-pred candidate, take L1 MV
    - Otherwise, if 1<sup>st</sup> cand. Is bi-pred candidate, take L0 MV
    - add an (1/4 pel, 0) MV offset on second candidates
- Only additional 4 interDir comparisons, 1 MV comparison, and 1 addition are required

# Simulation Results

- Anchor: VTM4.0
- 0.04%/0.07% Y-BD-rate in RA/LB
  - CE4-4.1.c: 0.05%/0.11% Y-BD-rate in RA/LB

Random Access Main 10					
Over VTM-4.0					
	Y	U	V	EncT	DecT
Class A1	0.07%	0.19%	0.10%	101%	101%
Class A2	-0.03%	-0.04%	0.07%	100%	99%
Class B	0.02%	0.00%	0.02%	99%	99%
Class C	0.08%	0.10%	-0.07%	100%	100%
<b>Overall</b>	0.04%	0.06%	0.02%	100%	100%
Class D	0.06%	0.01%	0.18%	101%	98%
Class F	0.10%	0.09%	0.03%	100%	94%

Low delay B Main10					
Over VTM-4.0					
	Y	U	V	EncT	DecT
Class B	0.06%	0.07%	-0.32%	100%	104%
Class C	0.09%	0.14%	-0.05%	101%	103%
Class E	0.04%	0.82%	0.31%	101%	96%
<b>Overall</b>	0.07%	0.28%	-0.07%	101%	101%
Class D	0.13%	-0.20%	0.12%	101%	101%
Class F	-0.09%	0.10%	0.19%	101%	100%

# Conclusions

- The candidate list generation for triangular merge mode is too complex
  - Need an additional circuit and up to 84 MV pruning, 7 MV averaging, and 11 MV scaling
- Proposed to modify the CE4-4.1.c
  - Select two candidates from regular merge candidate list
  - 1<sup>st</sup> cand.: Take the L0 MV if exists, otherwise, take L1 MV
  - 2<sup>nd</sup> cand.: Take the L1 MV if exists, otherwise, take L0 MV
  - If the MVs of those two candidates are the same,
    - If 2<sup>nd</sup> cand. is bi-pred candidate, take L1 MV
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	RA			LB		
	Y	U	V	Y	U	V
Proposed	0.04%	0.06%	0.02%	0.07%	0.28%	-0.07%



*everyday genius*