

The MEDIATEK logo is displayed in white, uppercase letters within an orange parallelogram shape.

# CE4-4.1: Simplification of triangle merging candidate list derivation

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The bottom of the slide features a solid orange background with a dense, white line-art pattern of various objects including a pot, a bowl of food, a laptop, a desk lamp, a lightbulb, a pencil, a ruler, a coffee cup, a pizza, a bottle, and a whisk.

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

- 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 reuse the candidate list of regular merge mode
  - Select two candidates with existing syntax
  - CE4-4.1.a:
    - 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
  - CE4-4.1.c:
    - CE4-4.1.c: CE4-4.1.a + if the MVs of those two candidates are the same, 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.a	0.06%	0.00%	0.06%	0.15%	0.19%	-0.01%
CE4-4.1.c	0.05%	0.04%	0.07%	0.11%	0.08%	-0.08%

# 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**

# Proposed Method – 1, Test CE4-4.1.a

- Proposed to 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
  
- Only additional 2 refIdx comparisons

# Proposed Method – 1, Test CE4-4.1.c

- Proposed to 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 refIdx comparisons, 1 MV comparison, and 1 addition are required

# Simulation Results

## ■ Anchor: VTM4.0

### CE4-4.1.a

	Random Access Main 10				
	Over VTM-4.0				
	Y	U	V	EncT	DecT
Class A1	0.06%	0.18%	0.17%	100%	100%
Class A2	-0.02%	-0.18%	-0.04%	101%	100%
Class B	0.05%	-0.04%	0.06%	101%	100%
Class C	0.12%	0.04%	0.07%	101%	102%
<b>Overall</b>	0.06%	0.00%	0.06%	101%	100%
Class D	0.05%	0.09%	-0.05%	101%	99%
Class F	0.15%	0.09%	0.02%	100%	94%

	Low delay B Main10				
	Over VTM-4.0				
	Y	U	V	EncT	DecT
Class B	0.08%	-0.03%	-0.10%	98%	99%
Class C	0.19%	0.35%	0.31%	100%	100%
Class E	0.21%	0.33%	-0.30%	102%	101%
<b>Overall</b>	0.15%	0.19%	-0.01%	100%	100%
Class D	0.14%	-0.14%	-0.60%	101%	102%
Class F	-0.07%	0.25%	-0.04%	99%	100%

### CE4-4.1.c

	Random Access Main 10				
	Over VTM-4.0				
	Y	U	V	EncT	DecT
Class A1	0.07%	0.18%	0.16%	100%	96%
Class A2	-0.02%	-0.12%	0.01%	102%	101%
Class B	0.04%	0.00%	0.05%	99%	100%
Class C	0.11%	0.08%	0.07%	102%	100%
<b>Overall</b>	0.05%	0.04%	0.07%	101%	99%
Class D	0.06%	0.21%	0.01%	101%	97%
Class F	0.14%	0.11%	0.11%	101%	93%

	Low delay B Main10				
	Over VTM-4.0				
	Y	U	V	EncT	DecT
Class B	0.09%	-0.04%	-0.22%	101%	100%
Class C	0.14%	0.36%	0.27%	98%	98%
Class E	0.12%	-0.10%	-0.29%	101%	100%
<b>Overall</b>	0.11%	0.08%	-0.08%	100%	100%
Class D	0.07%	0.47%	-0.16%	100%	101%
Class F	-0.11%	-0.08%	-0.13%	103%	102%

# 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 reuse the candidate list of regular merge mode with simple operation
  - Select two candidates with existing syntax
  - CE4-4.1.a:
    - 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
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*everyday genius*