

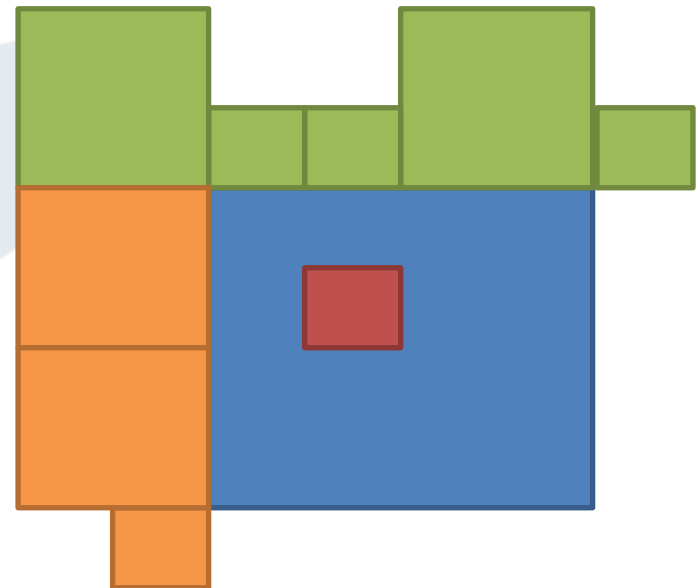


JCTVC-E101: Simplified AMVP candidate derivation for Inter and Merge modes

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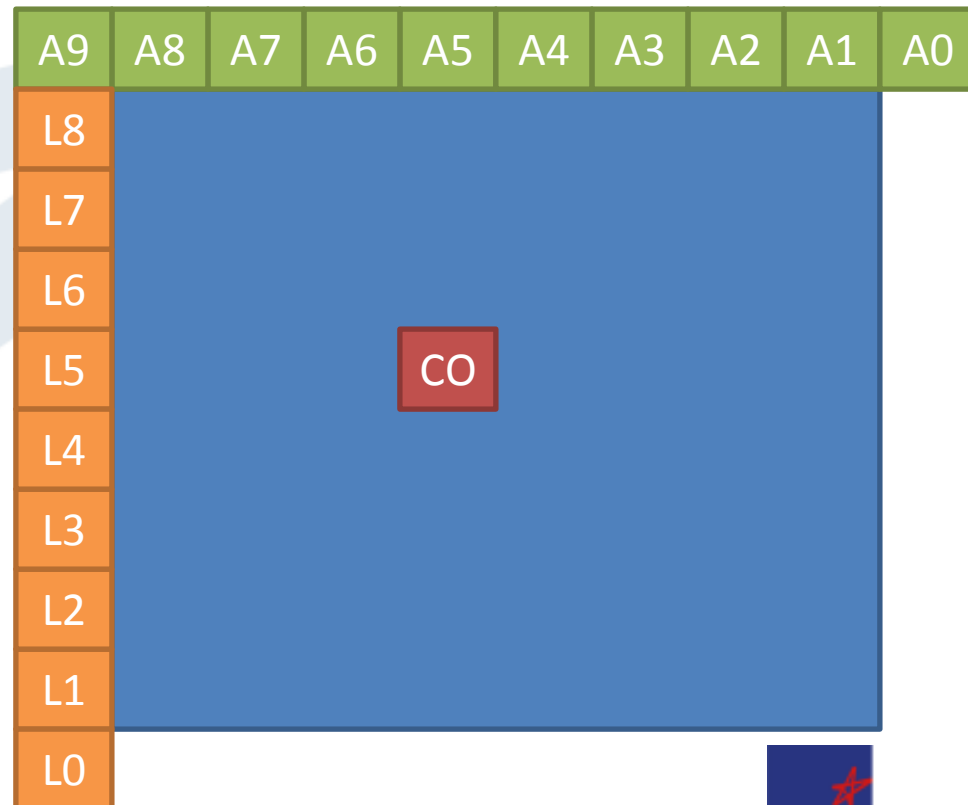
MV coding in HM2

- 3 Motion Vector Predictor (MVP) candidates
 - Left
 - Above
 - Co-located
- Choice of MVP is signaled



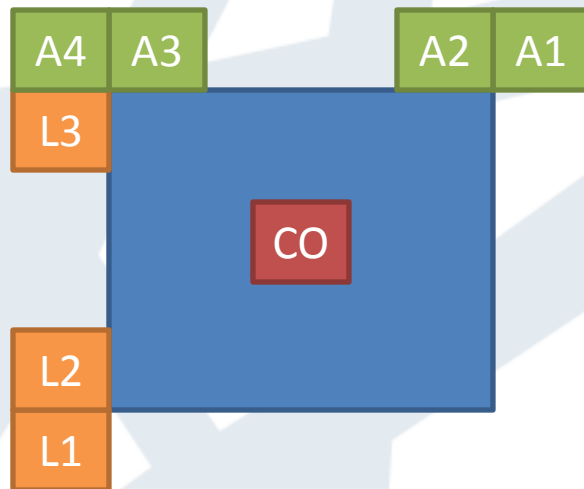
Derivation of MVP candidates in HM2

- Checks for Left and Above
 - Inter
 - Same reference frame
 - Unique
- Left/Above MV are copied
- Co-located MV is scaled

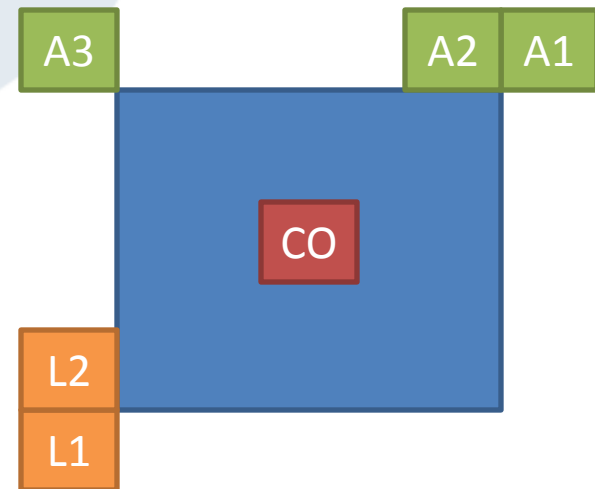


Two designs tested in CE9 (E116 from TI)

Test E

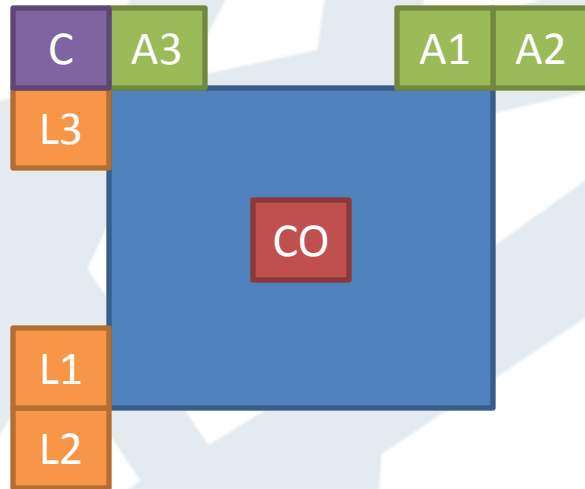


Test F

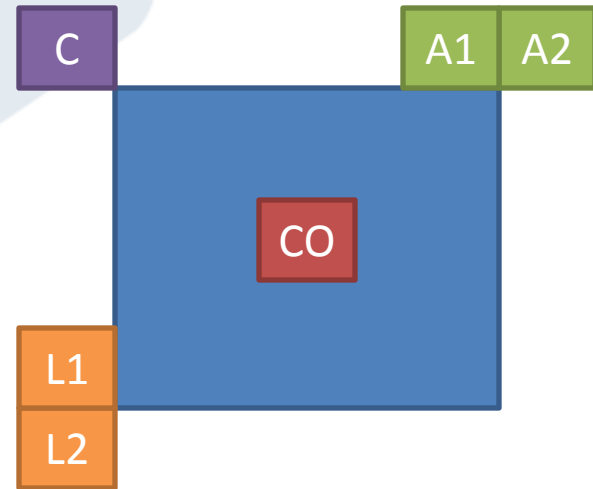


Proposed designs

E'



F'



Experiments

- Implemented in HM2
- Tested on all HEVC test video sequences for “random access” and “low delay” scenarios
- Cross-checked by Qualcomm (E402)

Results - HE

	CE9 Experiment E			CE9 Experiment F			Proposed E'			Proposed F'		
	Random access			Random access			Random access			Random access		
	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate
Class A	0.0	0.1	-0.1	0.1	0.0	0.0	0.0	-0.1	-0.1	0.0	0.1	0.0
Class B	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.0
Class C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	0.0	-0.1
Class D	0.0	0.0	-0.1	0.0	0.0	0.1	0.0	-0.1	0.0	0.0	-0.2	-0.1
Class E												
All	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Enc Time[%]	99%			100%			100%			99%		
Dec Time[%]	100%			101%			101%			100%		

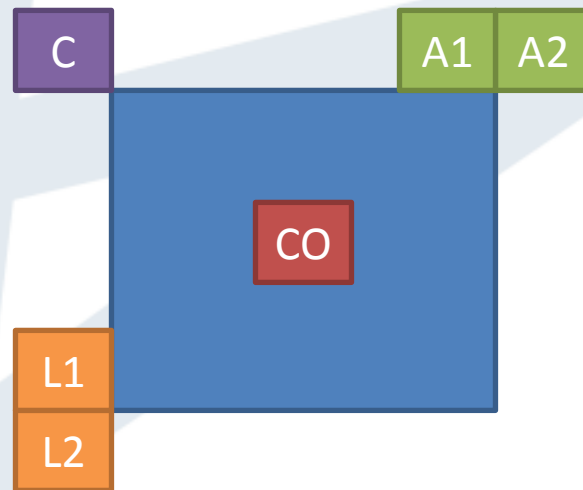
	Low delay			Low delay			Low delay			Low delay		
	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate
Class A												
Class B	0.0	0.0	-0.2	0.0	0.1	0.0	0.0	-0.1	0.0	0.0	0.0	-0.2
Class C	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.2	0.0	0.0	0.1
Class D	-0.1	-0.4	0.0	-0.1	-0.2	-0.2	-0.1	-0.1	-0.4	-0.1	-0.4	-0.2
Class E	-0.1	0.1	0.0	0.1	0.0	1.0	0.0	-0.4	0.0	-0.1	-0.4	0.3
All	0.0	-0.1	0.0	0.0	0.0	0.2	0.0	-0.1	-0.1	-0.1	-0.2	0.0
Enc Time[%]	99%			99%			99%			99%		
Dec Time[%]	100%			100%			100%			99%		

Results - LC

	CE9 Experiment E			CE9 Experiment F			Proposed E'			Proposed F'		
	Random access LoCo			Random access LoCo			Random access LoCo			Random access LoCo		
	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate
Class A	0.0	-0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1
Class B	0.0	0.0	0.1	0.0	0.1	0.1	0.0	-0.1	-0.1	0.0	0.0	0.0
Class C	0.0	0.0	0.0	0.0	0.1	0.1	-0.1	-0.1	0.0	0.0	0.0	0.0
Class D	0.0	0.0	0.0	0.0	0.1	-0.1	-0.1	-0.2	-0.1	-0.1	-0.2	-0.2
Class E												
All	0.0	0.0	0.0	0.0	0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0
Enc Time[%]	100%			100%			100%			100%		
Dec Time[%]	100%			101%			100%			100%		

	Low delay LoCo			Low delay LoCo			Low delay LoCo			Low delay LoCo		
	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate
Class A												
Class B	0.0	0.0	0.2	0.0	-0.2	0.1	0.0	-0.2	0.1	0.0	-0.2	0.0
Class C	0.0	0.0	0.0	0.0	-0.1	-0.3	0.0	-0.2	-0.4	0.0	0.0	-0.2
Class D	0.1	0.2	0.3	0.1	-0.2	0.2	0.0	0.0	-0.2	0.1	-0.1	0.0
Class E	-0.1	-0.5	0.2	0.0	-0.4	0.0	-0.3	0.0	-0.3	-0.2	-0.3	-0.2
All	0.0	0.0	0.2	0.0	-0.1	0.0	-0.1	-0.1	-0.2	0.0	-0.2	0.0
Enc Time[%]	100%			100%			100%			100%		
Dec Time[%]	100%			100%			100%			99%		

Extended to Merge mode



Results

	Random access			Random access LoCo		
	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate
Class A	0.1	0.2	0.1	0.2	0.1	0.1
Class B	0.1	0.0	0.1	0.2	0.2	0.1
Class C	0.1	0.0	0.1	0.1	0.1	0.1
Class D	0.1	0.0	0.1	0.1	-0.1	0.0
Class E						
All	0.1	0.1	0.1	0.2	0.1	0.1
Enc Time[%]	98%			99%		
Dec Time[%]	100%			100%		

	Low delay			Low delay LoCo		
	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate
Class A						
Class B	0.1	0.1	-0.2	0.3	0.2	0.6
Class C	0.1	0.1	0.1	0.2	0.2	0.0
Class D	0.0	-0.1	-0.4	0.4	0.3	0.3
Class E	0.1	-0.1	-0.1	0.3	0.3	0.3
All	0.1	0.0	-0.2	0.3	0.3	0.3
Enc Time[%]	98%			99%		
Dec Time[%]	100%			99%		

Conclusions

- Proposed designs for simplifying MVP derivation
 - Design F' seems to offer the best trade-off
- Possible extension to other inter modes, e.g., Merge mode
- Recommendation:
 - Adopt F' into HM2
 - Further study of unified candidate derivation for Inter and Merge modes