

JCTVC-F049



CE2: Report of OBMC with Motion Merging

National Chiao Tung University (NCTU)

Wen-Hsiao Peng, Chun-Chi Chen, Yan-Yu Chen
Chung-Lin Lee, Hsueh-Ming Hang



Summary

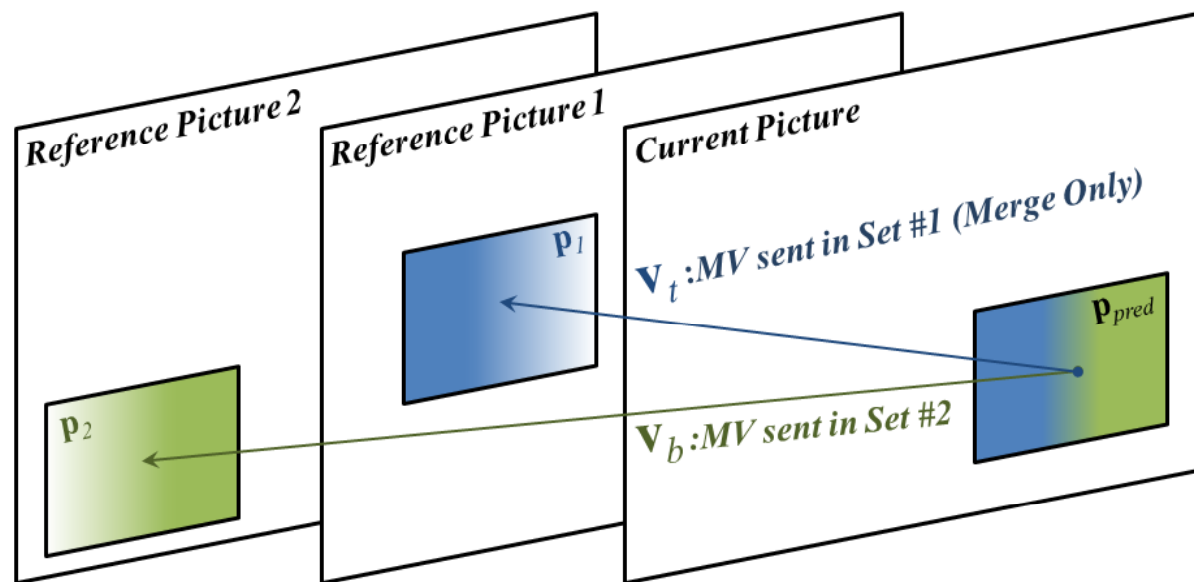
- Subtest 2.7: OBMC with Motion Merging
 - Derive predictors from two sets of motion parameters
 - Set #1: Motion Merging
 - Set #2: Motion Merging or MV Coding (uni- or bi-prediction)
 - Combine them into a $2N \times 2N$ prediction block using OBMC
- Results (Cross-checked by Intel, JCTVC-F515)

	Y BD-rate	Min	Max	Enc. Time	Dec. Time
RAHE	-1.5%	-0.9%	-1.9%	122%	104%
RALC	-1.3%	-0.9%	-1.8%	122%	107%
LBHE	-1.8%	-0.9%	-2.6%	128%	100%
LBLC	-2.2%	-1.0%	-4.2%	127%	103%

OBMC with Motion Merging

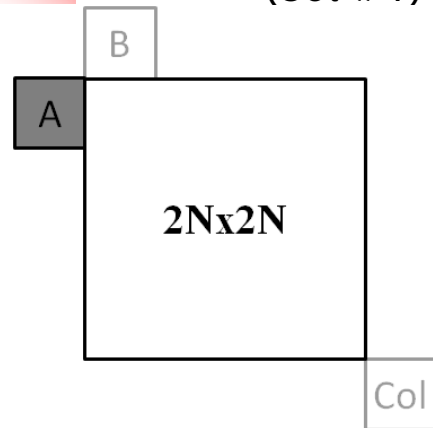
Weights for OBMC

$$\underbrace{\mathbf{p}_{pred}(i, j; \mathbf{v}_t, \mathbf{v}_b)}_{\text{2Nx2N Prediction Block}} = \underbrace{w(i, j)}_{\text{Merging}} \underbrace{\mathbf{p}_1(i, j; \mathbf{v}_t)}_{\text{Merging or MV Coding}} + (1 - w(i, j)) \underbrace{\mathbf{p}_2(i, j; \mathbf{v}_b)}_{\text{Merging or MV Coding}}$$

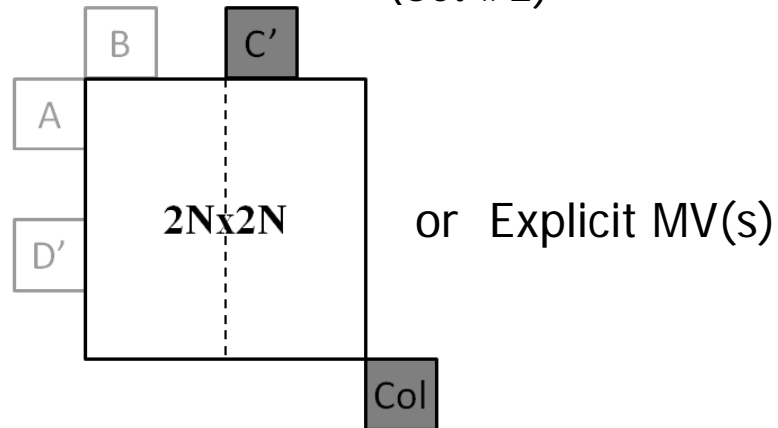


Merging Candidate Selection (1)

p_1 (Set #1)

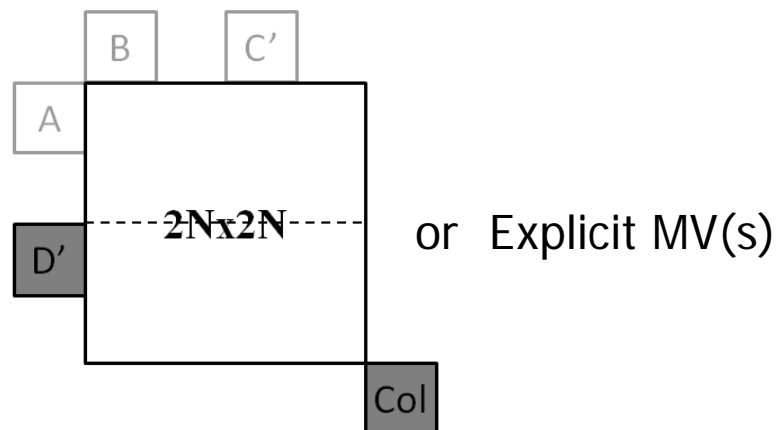
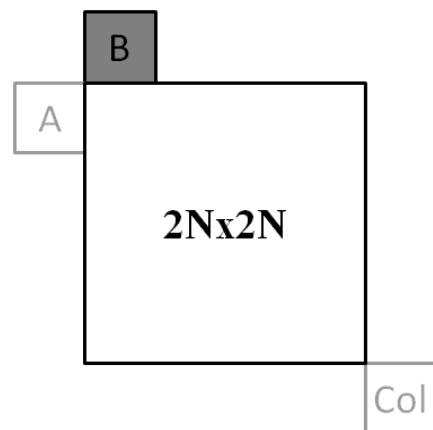


p_2 (Set #2)



$w(i, j)$ for p_1

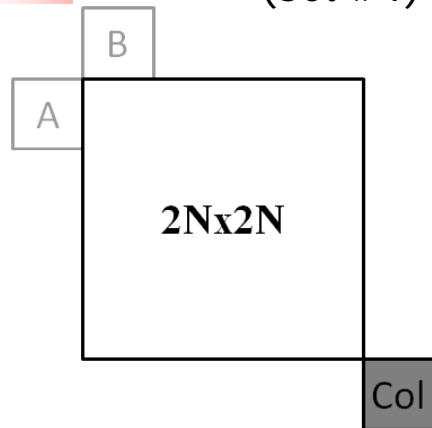
6	4	4	1	0	0	0	0
6	4	4	1	0	0	0	0
6	4	4	1	0	0	0	0
6	4	4	1	0	0	0	0
6	4	4	1	0	0	0	0
6	4	4	1	0	0	0	0
6	4	4	1	0	0	0	0
6	4	4	1	0	0	0	0



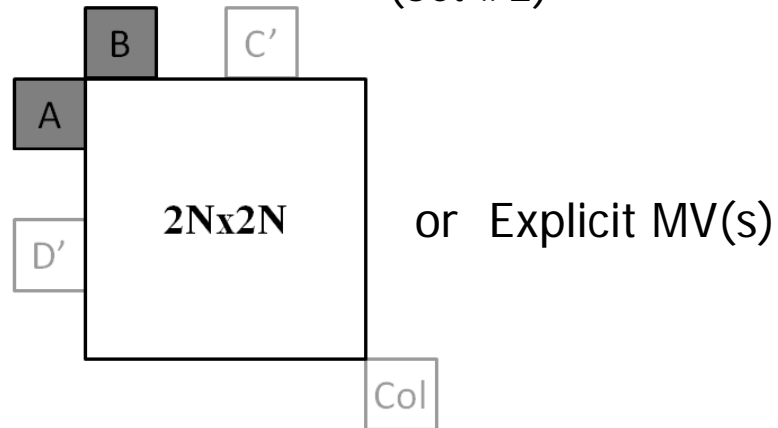
6	6	6	6	6	6	6	6
4	4	4	4	4	4	4	4
4	4	4	4	4	4	4	4
1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

Merging Candidate Selection (2)

p_1 (Set #1)

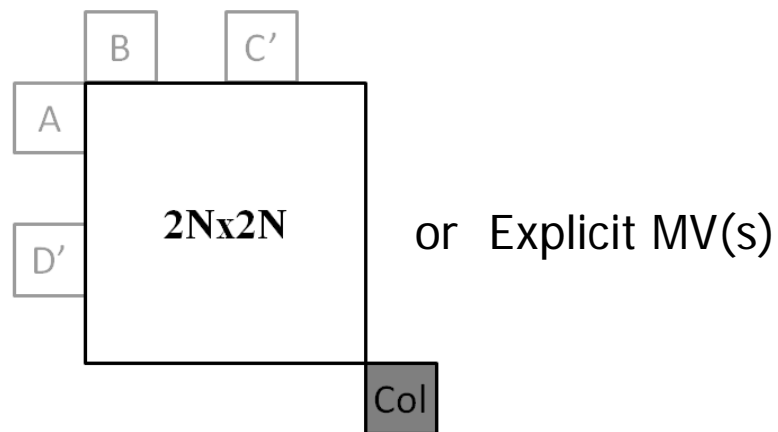
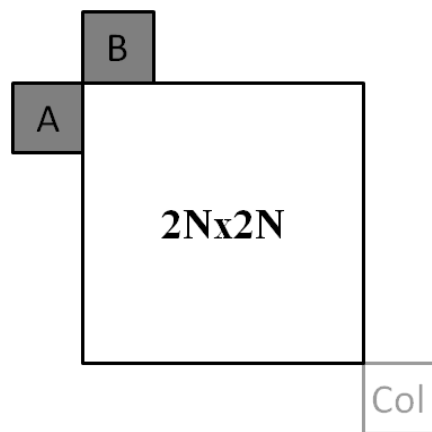


p_2 (Set #2)



$w(i, j)$ for p_1

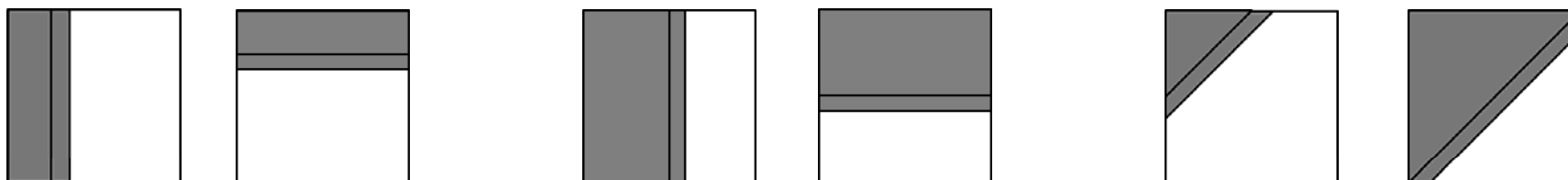
4	4	4	4	4	4	4	4
4	4	4	4	4	4	4	4
4	4	4	4	4	4	4	4
4	4	4	4	4	4	4	4
4	4	4	4	4	4	4	4
4	4	4	4	4	4	4	4
4	4	4	4	4	4	4	4
4	4	4	4	4	4	4	4



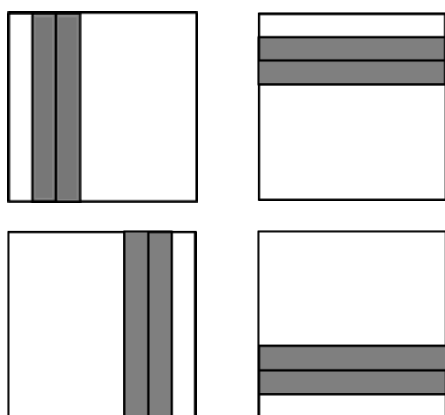
7	7	7	7	7	4	4	1
7	7	7	7	4	4	1	0
7	7	7	4	4	1	0	0
7	7	4	4	1	0	0	0
7	4	4	1	0	0	0	0
4	4	1	0	0	0	0	0
4	1	0	0	0	0	0	0
1	0	0	0	0	0	0	0

OBMC with Motion Merging

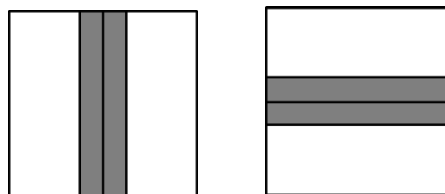
6



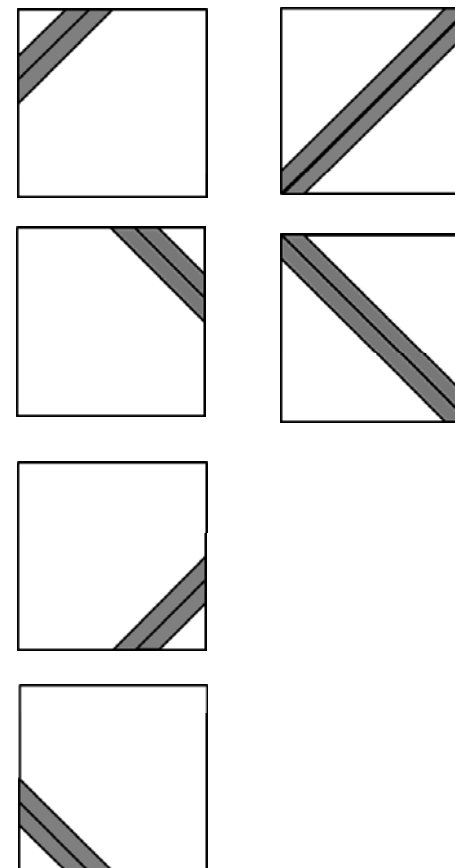
AMP + OBMC



2NxN/Nx2N + OBMC



NRMP + OBMC





Results

	Random Access HE			Random Access LC		
	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate
Class A	-1.3	-2.5	-2.5	-1.2	-1.2	-1.4
Class B	-1.2	-2.1	-2.0	-1.1	-1.7	-1.8
Class C	-1.7	-2.5	-2.7	-1.5	-2.3	-2.4
Class D	-1.7	-2.3	-2.5	-1.4	-2.1	-2.1
Class E						
All	-1.5	-2.4	-2.4	-1.3	-1.8	-1.9
Enc Time[%]	122%			122%		
Dec Time[%]	104%			107%		
	Low Delay B HE			Low Delay B LC		
	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate
Class A						
Class B	-1.3	-2.4	-2.3	-1.8	-2.4	-2.6
Class C	-1.9	-2.6	-2.7	-2.1	-2.5	-2.8
Class D	-2.0	-2.7	-2.7	-2.2	-3.0	-3.0
Class E	-2.0	-2.3	-2.7	-3.0	-3.5	-4.2
All	-1.8	-2.5	-2.6	-2.2	-2.8	-3.0
Enc Time[%]	128%			127%		
Dec Time[%]	100%			103%		



Memory Bandwidth

- # of extra pixels fetched relative to HM3.0

	Random Access HE			Random Access LC		
	MAX	MIN	AVG	MAX	MIN	AVG
Class A	130%	100%	107%	126%	100%	107%
Class B	115%	100%	103%	114%	100%	104%
Class C	108%	101%	104%	108%	101%	104%
Class D	106%	101%	103%	107%	100%	103%
Class E						
All	130%	100%	104%	126%	100%	104%
	Low Delay B HE			Low Delay B LC		
	MAX	MIN	AVG	MAX	MIN	AVG
Class A						
Class B	109%	96%	102%	107%	97%	102%
Class C	114%	98%	104%	113%	99%	104%
Class D	111%	99%	104%	110%	98%	104%
Class E	105%	99%	101%	103%	99%	100%
All	114%	96%	103%	113%	97%	102%



Concluding Remarks

- We thank Intel for cross-checking the results
- We recommend adoption of this technique into the next release of HM and Working Draft