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# ◁JCTVC-F712> Additional Results on JCTVC-F356 (MC Complexity Reduction for Bi-prediction)

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# Summary

## ❑ JCTVC-F356

- ❖ Focused on MC complexity reduction

## ❑ This contribution (JCTVC-F712)

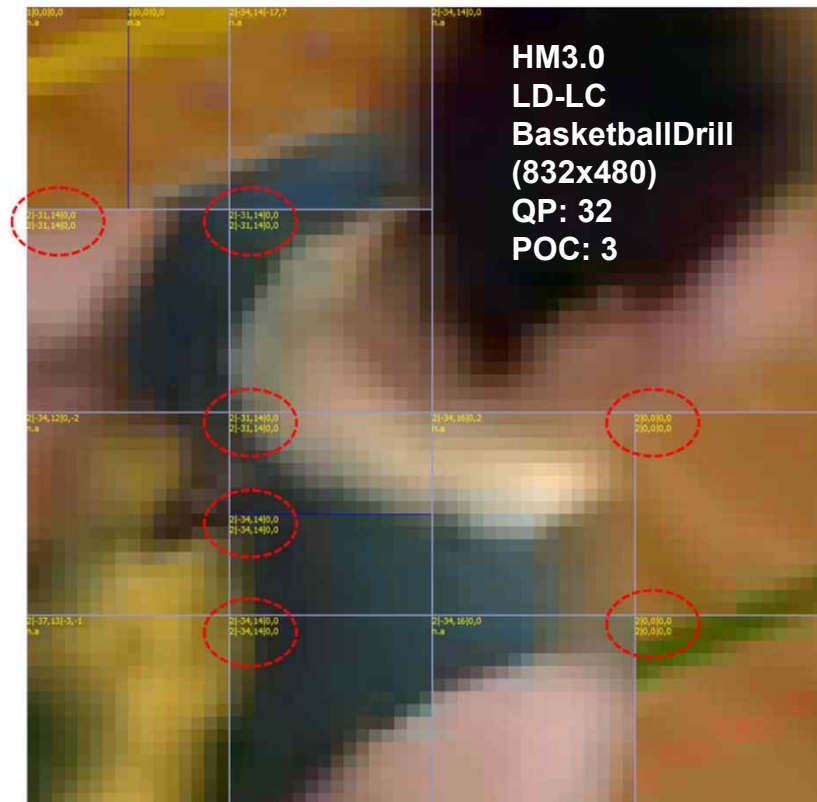
- ❖ Focused on improving coding efficiency  
by maximizing the chance of bi-prediction averaging
  - Identical motion → search the neighboring PUs for another mv
- ❖ Cross-checked by BBC (JCTVC-F769)

# Introduction

## □ Observation

❖ % Area of PUs satisfying “mvL0==mvL1 && pocL0==pocL1”

	QP	LD HE (%)	LD LC (%)	RA HE (%)	RA LC (%)
Class A	37			7.8%	8.0%
	32			5.4%	6.0%
	27			3.4%	4.0%
	22			1.9%	2.3%
Class B	37	38.3%	38.6%	10.5%	10.7%
	32	28.8%	28.4%	8.1%	8.4%
	27	21.0%	19.8%	5.3%	5.4%
	22	11.6%	9.2%	1.9%	2.1%
Class C	37	31.3%	33.6%	7.3%	8.2%
	32	21.0%	23.2%	4.6%	5.7%
	27	14.2%	16.2%	2.8%	3.6%
	22	9.3%	10.1%	1.9%	2.1%
Class D	37	32.9%	35.0%	9.9%	11.1%
	32	22.6%	23.7%	6.2%	7.1%
	27	15.4%	16.3%	3.9%	3.9%
	22	10.0%	10.2%	2.0%	2.0%
Class E	37	71.0%	70.2%		
	32	55.1%	57.7%		
	27	41.0%	44.8%		
	22	29.6%	34.4%		
Average		28.3%	29.5%	5.2%	5.7%



- LD: % Area is computed for all B-Slices
- RA: % Area is computed for the B-Slices of temporal-level 0

❖ Redundant MC and weighted averaging operations for those cases

## □ Method A

HM 3.0 Derivation process of reference indices  
for temporal merging candidate

HM 3.0 TMVP derivation process

**Bi-prediction?**

(refIdxL0 >= 0 && refIdxL1 >= 0)

No

Yes

**Identical motion information?**

(RefPicOrderCnt(currPic, refIdxL0, L0) == RefPicOrderCnt(currPic, refIdxL1, L1)  
&& mvL0Col == mvL1Col)

No

Yes

**For N={A, B, E}, find a motion vector such that**

- availableFlagN == 1, predModeN != MODE\_INTRA
  - predFlagLON == 1, mvLON != (0,0)

If availableFlagN == 1, then bFindMV = true

**bFindMV ?**

No

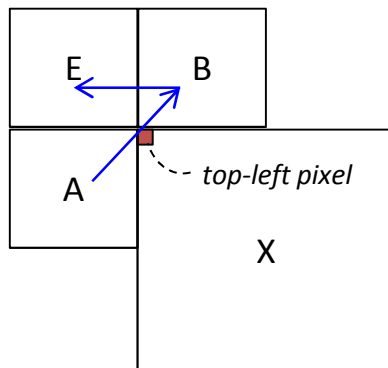
Yes

**mvL1Col = mvLON**

**Infer Pred\_LC**

END

4



- X: Current PU
- A: Left PU
- B: Above PU
- E: Corner PU

# Method B

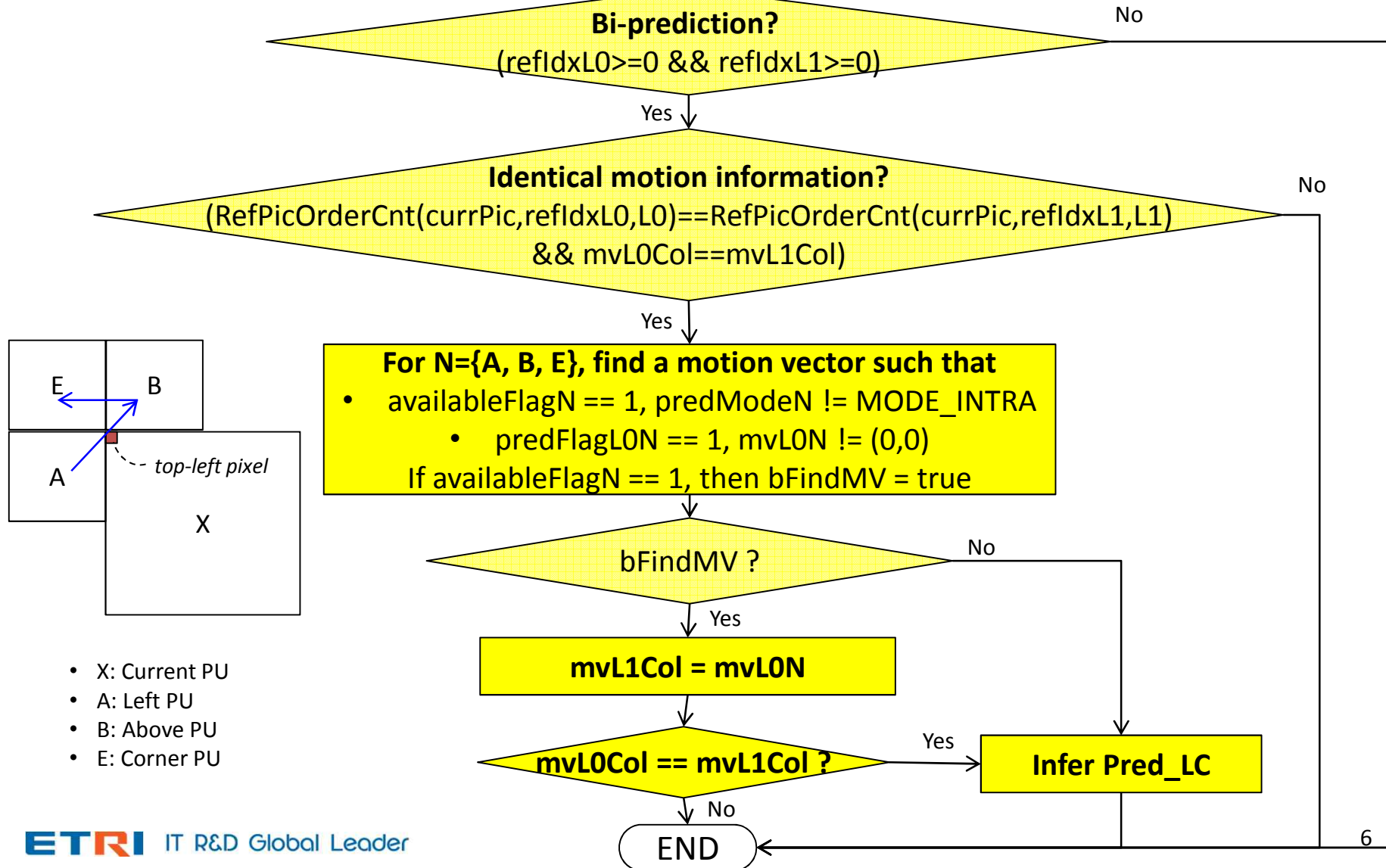
## ❑ Method A + Method-2(JCTVC-F356)

- ❖ Even with Method-A, the identical motion information cases could still remain.
- ❖ In this case, Method-2 of JCTVC-F356 could be utilized for reducing motion compensation complexity.

## □ Method B

HM 3.0 Derivation process of reference indices  
for temporal merging candidate

HM 3.0 TMVP derivation process



# Experimental Results

## ❑ Method A

❖ Left: by ETRI, Right: by BBC (a cross-checker)

	Random Access HE			Random Access LC		
	Y	U	V	Y	U	V
Class A	-0.1	0.0	0.1	0.0	-0.1	0.1
Class B	0.0	-0.1	-0.1	0.0	0.0	0.0
Class C	0.0	0.1	0.0	0.0	0.0	0.0
Class D	0.0	-0.1	-0.1	0.0	-0.1	-0.1
Class E						
<b>Overall</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
Enc Time[%]	100%			100%		
Dec Time[%]	101%			101%		

	Low delay B HE			Low delay B LC		
	Y	U	V	Y	U	V
Class A						
Class B	-0.3	-0.5	-0.7	-0.6	-1.0	-1.2
Class C	-0.3	-0.6	-0.6	-0.3	-0.6	-0.6
Class D	-0.1	-0.1	-0.1	-0.2	-0.2	-0.3
Class E	-0.2	-0.7	-0.9	-0.6	-1.1	-1.6
<b>Overall</b>	<b>-0.2</b>	<b>-0.5</b>	<b>-0.5</b>	<b>-0.4</b>	<b>-0.7</b>	<b>-0.9</b>
Enc Time[%]	100%			100%		
Dec Time[%]	94%			95%		

	Random Access HE			Random Access LC		
	Y	U	V	Y	U	V
Class A	-0.1	0.0	0.1	0.0	-0.1	0.1
Class B	0.0	-0.1	-0.1	0.0	0.0	0.0
Class C	0.0	0.1	0.0	0.0	0.0	0.0
Class D	0.0	-0.1	-0.1	0.0	-0.1	-0.1
Class E						
<b>Overall</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
Enc Time[%]	98%			98%		
Dec Time[%]	97%			102%		

	Low delay B HE			Low delay B LC		
	Y	U	V	Y	U	V
Class A						
Class B	-0.3	-0.5	-0.7	-0.6	-1.0	-1.2
Class C	-0.3	-0.6	-0.6	-0.3	-0.6	-0.6
Class D	-0.1	-0.1	-0.1	-0.2	-0.2	-0.3
Class E	-0.2	-0.7	-0.9	-0.6	-1.1	-1.6
<b>Overall</b>	<b>-0.2</b>	<b>-0.5</b>	<b>-0.5</b>	<b>-0.4</b>	<b>-0.7</b>	<b>-0.9</b>
Enc Time[%]	99%			99%		
Dec Time[%]	94%			95%		

# Experimental Results

## ❑ Method B

❖ Left: by ETRI, Right: by BBC (a cross-checker)

	Random Access HE			Random Access LC		
	Y	U	V	Y	U	V
Class A	0.0	0.1	0.0	0.0	-0.1	0.2
Class B	0.0	-0.1	0.0	0.0	0.0	0.0
Class C	0.0	0.0	0.0	0.0	0.0	0.0
Class D	0.0	-0.1	-0.1	0.0	-0.1	-0.1
Class E						
<b>Overall</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
Enc Time[%]	100%			100%		
Dec Time[%]	100%			101%		

	Low delay B HE			Low delay B LC		
	Y	U	V	Y	U	V
Class A						
Class B	-0.3	-0.4	-0.4	-0.7	-0.9	-1.0
Class C	-0.3	-0.6	-0.7	-0.4	-0.6	-0.8
Class D	-0.2	-0.3	-0.1	-0.2	-0.7	0.0
Class E	-0.3	-0.9	-1.1	-0.7	-1.8	-1.5
<b>Overall</b>	<b>-0.3</b>	<b>-0.5</b>	<b>-0.5</b>	<b>-0.5</b>	<b>-0.9</b>	<b>-0.8</b>
Enc Time[%]	101%			101%		
Dec Time[%]	95%			98%		

	Random Access HE			Random Access LC		
	Y	U	V	Y	U	V
Class A	0.0	0.1	0.0	0.0	-0.1	0.2
Class B	0.0	-0.1	0.0	0.0	0.0	0.0
Class C	0.0	0.0	0.0	0.0	0.0	0.0
Class D	0.0	-0.1	-0.1	0.0	-0.1	-0.1
Class E						
<b>Overall</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
Enc Time[%]	100%			100%		
Dec Time[%]	96%			98%		

	Low delay B HE			Low delay B LC		
	Y	U	V	Y	U	V
Class A						
Class B	-0.3	-0.4	-0.4	-0.7	-0.9	-1.0
Class C	-0.3	-0.6	-0.7	-0.4	-0.6	-0.8
Class D	-0.2	-0.3	-0.1	-0.2	-0.7	0.0
Class E	-0.3	-0.9	-1.1	-0.7	-1.8	-1.5
<b>Overall</b>	<b>-0.3</b>	<b>-0.5</b>	<b>-0.5</b>	<b>-0.5</b>	<b>-0.9</b>	<b>-0.8</b>
Enc Time[%]	100%			100%		
Dec Time[%]	94%			93%		



# Conclusion

- ❑ This contribution proposes a method for improving coding efficiency for bi-predictive Merge/SKIP PUs.
- ❑ Combined with a motion compensation reduction method in JCTVC-F356, the proposed method achieves both coding performance improvement and decoding time reduction.

	RA-HE		RA-LC		LDB-HE		LDB-LC	
	BDR	DT	BDR	DT	BDR	DT	BDR	DT
Method A	0.0%	N/A	0.0%	N/A	-0.2%	N/A	-0.4%	N/A
Method B	0.0%	100%	0.0%	101%	-0.3%	95%	-0.5%	98%

- ❑ It is recommended that the propose method to be further tested on HM 4 as a CE, with the related proposals such as JCTVC-F325 (Toshiba)



***Thank You Very Much !***

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