

Non-CE9: Improvement to parallelized merge/skip modes (of JCTVC-F069)

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JCTVC-G164



Parallelized Merge/Skip of JCTVC-F069 (JCTVC-G085)

- **Proposed at the Torino meeting**
- **Compensate the loss caused when parallel ME is performed with the current HM design**
 - *The loss is caused by the fact that merge/skip mode cannot be used inside the MER (Motion Estimation Region) due to the neighboring dependency of merge/skip mode.*
- **The loss can be significantly reduced with JCTVC-F069 method**

Parallelized Merge/Skip of JCTVC-F069 (JCTVC-G085)

- **JCTVC-F069 method**
 - Send a slice level syntax element to signal the parallel ME level
 - Based on the value of this syntax element, MER is defined
 - Modification to the merge/skip list construction process for the parallel merge/skip
 - *If a neighboring PU and the current PU belong to a same MER, the neighboring PU is treated as unavailable*

- **This proposal advocates JCTVC-F069 method**

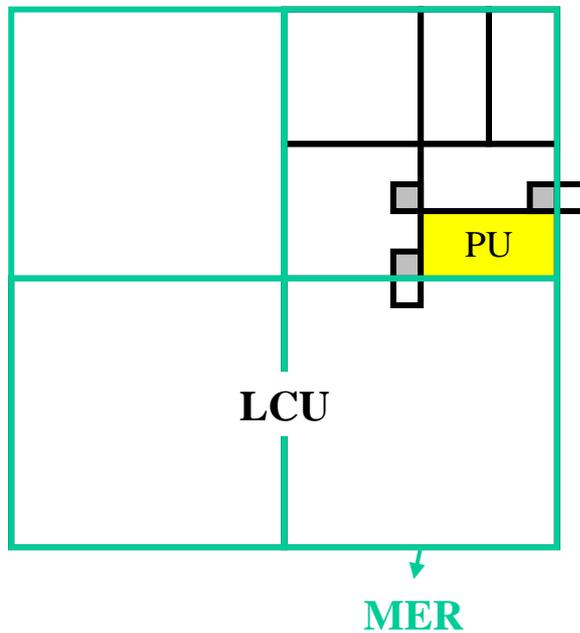
- **Based on JCTVC-F069 design, small modification is made to improve the coding efficiency further**

Proposed method

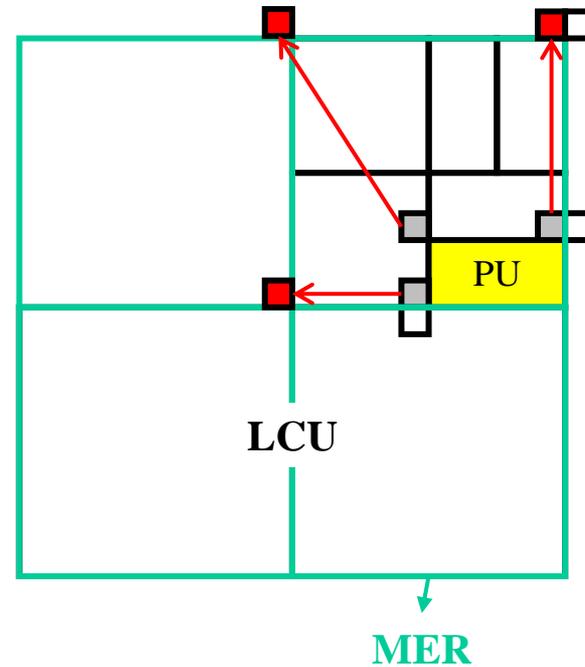
Modification to JCTVC-F069

- If a MVP candidate and the current PU belong to a same MER,
 - *JCTVC-F069* : The MVP candidate is treated as unavailable
 - *Proposed method* : use the MVP candidate of MER

□ unavailable MVPs (neighboring PUs are not coded yet) □ MVPs inside MER (Marked as unavailable by JCTVC-F069) ■ MVPs of MER



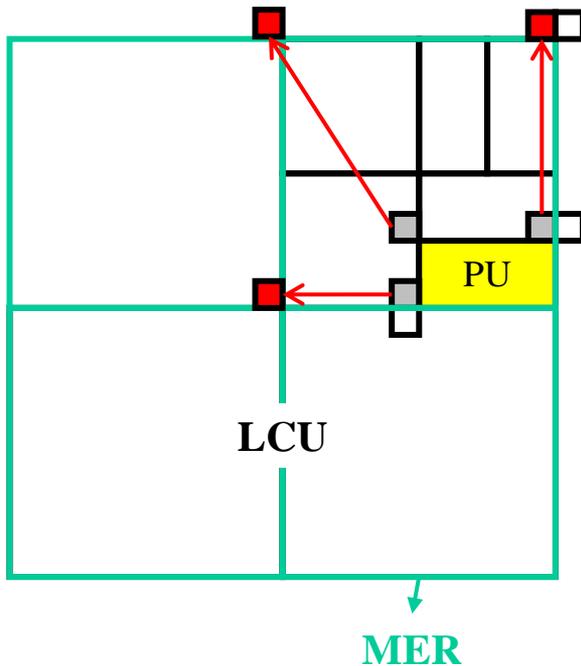
JCTVC-F069



Proposed

Proposed method

- Change to MVP list construction process of JCTVC-F069



// JCTVC-F069

- A1 → Unavailable due to parallel merge/skip
- B1 → Unavailable due to parallel merge/skip
- B0 → unavailable
- A0 → unavailable
- B2 → Unavailable due to parallel merge/skip
- Col → Added to the list

// Proposal : Derive the candidates which became unavailable due to parallel merge/skip from outside MER

- Derive A1 of MER
- Derive B1 of MER
- Derive B2 of MER

List before 1st pruning

: { Col, A1, B1, B2 }

Simulation

- **3 Tests are simulated**

1. vs No PME
2. vs HM PME level N
3. vs JCTVC-F069 PME level N

- **Software used**

- The software provided by TI on the CE9 reflector which enables to test “No PME”, “HM PME level N” and “JCTVC-F069”
- Proposed method is implemented in this software

- **Results are cross-verified by TI and Samsung**

Simulation results

- The gain of the proposed method relative to “**JCTVC-F069 PME level N**”
 - Anchor : JCTVC-F069 software PME level N

		JCTVC-F069 PME + Prop.				
	PME Level	RA-HE	RA-LC	LB-HE	LB-LC	Avg.
BD rate Y (%)	64	-0.8%	-1.0%	-0.9%	-1.3%	-1.0%
	32	-0.6%	-0.7%	-0.7%	-0.9%	-0.7%
	16	-0.2%	-0.3%	-0.3%	-0.3%	-0.3%
	8	0.0%	0.0%	0.0%	0.0%	0.0%
EncT (%)	64	103%	103%	102%	101%	102%
	32	101%	102%	101%	101%	101%
	16	101%	101%	100%	101%	101%
	8	100%	100%	100%	100%	100%
DecT (%)	64	101%	100%	101%	102%	101%
	32	100%	100%	101%	101%	101%
	16	100%	101%	100%	100%	100%
	8	99%	101%	99%	100%	100%

Simulation results

- The gain of JCTVC-F069 and the proposed method relative to “**HM PME level N**”
 - Anchor : Modified HM (AMVP encoder speedup disabled) PME level N

		JCTVC-F069 PME					JCTVC-F069 PME + Prop.				
	PME Level	RA-HE	RA-LC	LB-HE	LB-LC	Avg.	RA-HE	RA-LC	LB-HE	LB-LC	Avg.
BD rate Y (%)	64	-4.0%	-4.5%	-4.3%	-5.9%	-4.7%	-4.8%	-5.4%	-5.1%	-7.1%	-5.6%
	32	-3.4%	-3.5%	-4.4%	-5.0%	-4.1%	-3.9%	-4.1%	-5.1%	-5.9%	-4.8%
	16	-1.9%	-1.8%	-2.6%	-2.5%	-2.2%	-2.1%	-2.0%	-2.9%	-2.9%	-2.5%
	8	-0.2%	-0.2%	-0.3%	-0.3%	-0.3%	-0.2%	-0.2%	-0.3%	-0.3%	-0.3%
EncT (%)	64	96%	94%	94%	92%	94%	98%	94%	95%	93%	95%
	32	99%	98%	97%	96%	98%	100%	99%	98%	97%	99%
	16	103%	103%	N/A	N/A	103%	104%	104%	N/A	N/A	104%
	8	101%	101%	N/A	N/A	101%	101%	N/A	N/A	N/A	101%
DecT (%)	64	101%	102%	103%	103%	102%	102%	102%	104%	105%	103%
	32	102%	101%	103%	102%	102%	103%	102%	103%	104%	103%
	16	103%	101%	103%	103%	103%	103%	102%	102%	103%	103%
	8	102%	100%	101%	101%	101%	101%	100%	101%	101%	101%

Simulation results

- BD rate increase of JCTVC-F069 and the proposed method relative to “No PME”
 - Anchor : Modified HM (AMVP encoder speedup disabled) PME level 4

		JCTVC-F069 PME					JCTVC-F069 PME + Prop.				
	PME Level	RA-HE	RA-LC	LB-HE	LB-LC	Avg.	RA-HE	RA-LC	LB-HE	LB-LC	Avg.
BD rate Y (%)	64	2.5%	2.8%	3.5%	4.3%	3.3%	1.7%	1.8%	2.6%	2.9%	2.3%
	32	1.5%	1.6%	2.0%	2.3%	1.8%	0.9%	0.9%	1.3%	1.4%	1.1%
	16	0.5%	0.5%	0.6%	0.7%	0.6%	0.2%	0.3%	0.3%	0.4%	0.3%
	8	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
EncT (%)	64	99%	100%	100%	101%	100%	101%	102%	101%	102%	102%
	32	99%	100%	100%	100%	100%	101%	101%	101%	101%	101%
	16	100%	100%	100%	100%	100%	100%	101%	100%	101%	101%
	8	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
DecT (%)	64	99%	98%	99%	98%	99%	99%	99%	103%	99%	100%
	32	99%	99%	99%	99%	99%	101%	98%	101%	99%	100%
	16	100%	100%	100%	100%	100%	100%	99%	101%	100%	100%
	8	100%	100%	100%	100%	100%	102%	100%	100%	101%	101%

Recommendation

- Recommend to adopt **JCTVC-F069 with the proposed method** to minimize the significant loss caused by the current HM design when PME is enabled