

JCTVC-J0187:

On temporal_mvp_enable_flag

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Agenda

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- Proposed Method
- Simulation Condition
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Introduction

- In HEVC both spatial and temporal motion vector prediction can be applied for each PU.
 - Motion information of spatially surrounding PUs is stored in line buffer, but
 - the one of the PUs in the reference frames are stored in memory
 - So extracting tmvp requires more complexity than smvp.
 - On the other hand, using both tmvp and smvp provides better coding efficiency than just using smvp only.
- To provide method for trade-off b/w coding efficiency and complexity
 “temporal_mvp_enable_flag” is specified.

Proposed Method

- For further degree of freedom b/w coding efficiency and complexity, it is proposed to split “temporal_mvp_enable_flag” into “temporal_mvp_enable_flag”_L0” and “temporal_mvp_enable_flag_L1”

Simulation Condition

- Test -1: TMVP_on vs TMVP_off
 - Anchor – HM-7.0
 - Tested – HM-7.0 with --TMVP=0
- Test -2: TMVP_on vs TMVP_L0_on& TMVP_L1_on
 - Anchor – HM-7.0
 - Tested – Proposed Src with –TMVP_L0=1&--TMVP_L1=0
- There is an inconsistency between HM-7.0 and CD text:
 - in HM-7.0 temporal_mvp_enable_flag is transmitted in SPS but according to CD text it should be transmitted in SliceHeader.
 - **In HM-7.1 this inconsistency has been resolved.**
 - In common test conditions one picture contains only one slice so difference of overhead b/w HM-7.0 and -7.1 can be ignored.
- The author would like to thank ETRI for crosschecking (JCTVC-J0361)

Simulation Result [1/]

Test -1:

Anchor – HM-7.0

Tested – HM-7.0 with --TMVP=0

	Random Access Main			Random Access HE10		
	Y	U	V	Y	U	V
Class A	2.6%	2.1%	2.4%	2.7%	2.1%	2.4%
Class B	2.4%	1.6%	1.7%	2.3%	1.5%	1.5%
Class C	2.4%	2.2%	2.4%	2.4%	2.2%	2.2%
Class D	2.8%	2.2%	2.4%	2.8%	2.2%	2.1%
Class E						
Overall	2.5%	2.0%	2.2%	2.5%	2.0%	2.0%
	2.5%	2.0%	2.2%	2.5%	2.0%	2.0%
Class F	1.0%	1.2%	1.1%	1.1%	1.2%	1.2%
Enc Time[%]	100%			100%		
Dec Time[%]	99%			99%		
	Low delay B Main			Low delay B HE10		
	Y	U	V	Y	U	V
Class A						
Class B	2.7%	1.7%	1.6%	2.5%	1.6%	1.7%
Class C	2.8%	2.6%	2.9%	2.8%	2.8%	2.9%
Class D	2.5%	1.8%	2.5%	2.5%	2.2%	2.3%
Class E	2.2%	2.1%	1.8%	2.4%	2.2%	2.4%
Overall	2.6%	2.0%	2.2%	2.6%	2.2%	2.3%
	2.6%	2.0%	2.2%	2.5%	2.2%	2.3%
Class F	2.3%	2.4%	2.6%	1.9%	2.0%	3.2%
Enc Time[%]	100%			100%		
Dec Time[%]	96%			95%		

Simulation Result [2/]

Test -2:

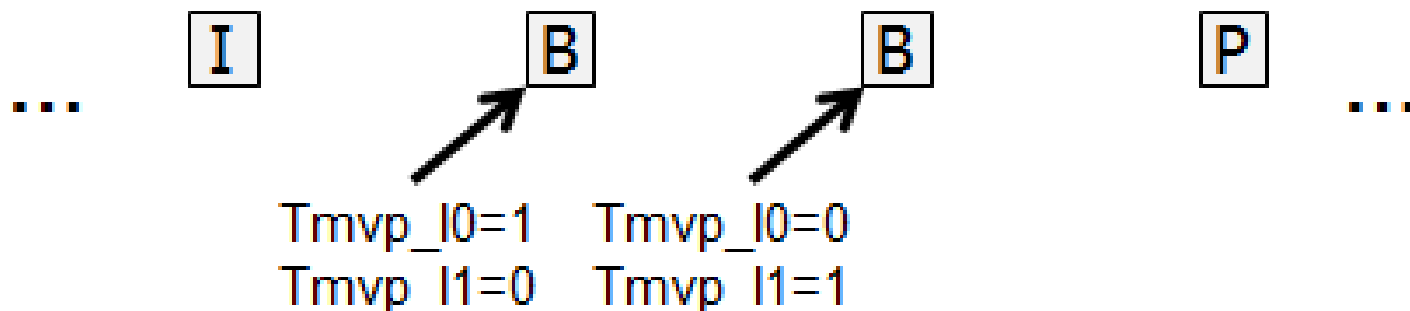
Anchor – HM-7.0

Tested – Proposed Src with –TMVP_L0=1&--TMVP_L1=0

	Random Access Main			Random Access HE10		
	Y	U	V	Y	U	V
Class A	1.6%	1.2%	1.5%	1.6%	1.3%	1.4%
Class B	1.8%	1.2%	1.2%	1.7%	1.2%	1.1%
Class C	1.7%	1.6%	1.7%	1.7%	1.6%	1.6%
Class D	2.0%	1.6%	1.6%	2.1%	1.6%	1.6%
Class E						
Overall	1.8%	1.4%	1.5%	1.8%	1.4%	1.4%
	1.8%	1.4%	1.5%	1.8%	1.4%	1.4%
Class F	0.7%	0.8%	0.8%	0.6%	0.7%	0.8%
Enc Time[%]	101%			101%		
Dec Time[%]	99%			99%		
	Low delay B Main			Low delay B HE10		
	Y	U	V	Y	U	V
Class A						
Class B	0.4%	0.1%	0.3%	0.3%	0.2%	0.3%
Class C	0.3%	0.4%	0.3%	0.3%	0.3%	0.3%
Class D	0.2%	-0.1%	0.7%	0.2%	0.6%	-0.1%
Class E	0.2%	0.1%	-0.3%	0.4%	0.1%	0.1%
Overall	0.3%	0.1%	0.3%	0.3%	0.3%	0.2%
	0.3%	0.1%	0.3%	0.3%	0.3%	0.2%
Class F	0.0%	0.0%	0.1%	0.2%	0.3%	1.0%
Enc Time[%]	99%			99%		
Dec Time[%]	99%			98%		

Remark

- If, for example, GOP structure is traditional $m=3$, setting TMVP as shown in the following figure would provide a good trade-off between coding efficiency and complexity.



Conclusion

- In this contribution it is proposed to
 - Split “temporal_mvp_enable_flag” into
 - “temporal_mvp_enable_flag”_L0” and “temporal_mvp_enable_flag_L1”
- Disabling of TMVP causes loss in coding efficiency by 2.5%, 2.5%, 2.6% and 2.6% with RA_Main, RA_HE10, LB_Main, and LB_HE10 conditions respectively.
- Just by disabling TMVP_L1, loss becomes 1.8%, 1.8%, 0.3% and 0.3% with each of the conditions.
 - Further compensation on loss of efficiency can be expected by adaptive setting of TMVP_L0 and L1, depends on the GOP structure.
- It is recommended to adopt this feature into HEVC DIS.



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