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[JCTVC-F359]

Deblocking Filter Modification for Constrained Intra Prediction

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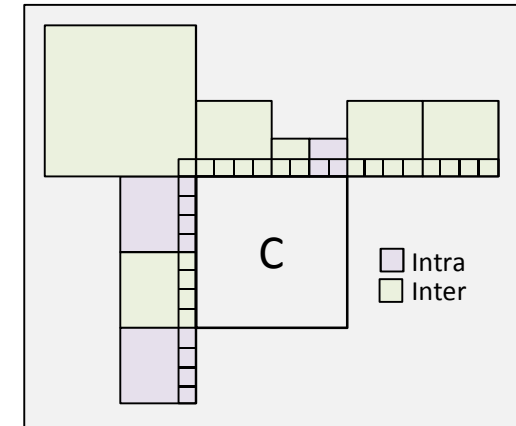
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Introduction

❑ Constrained Intra Prediction (CIP)

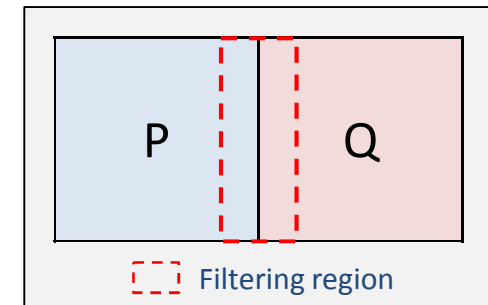
- ❖ Purpose: Intra blocks in one frame are not affected by a corruption or errors of another frame.
- ❖ Method: CIP only allows reconstructed pixels from intra blocks in the same slice for prediction of the current block.



Constrained intra prediction

❑ Deblocking filter

- ❖ To enhance subjective quality by reducing blocking artifacts and improving continuity of block boundary.



Deblocking filter

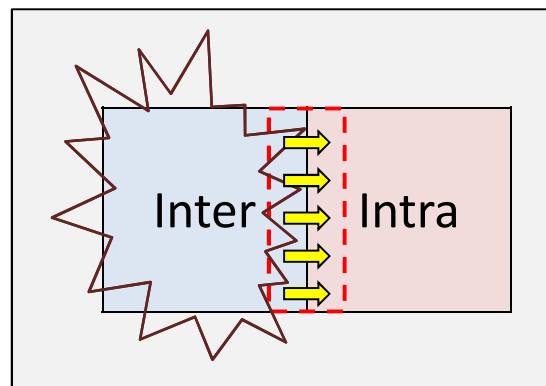
❑ HM3.2 does not consider `constrained_intra_pred_flag` at deblocking filtering process.

- ❖ Deblocking filtering process should be modified for CIP.

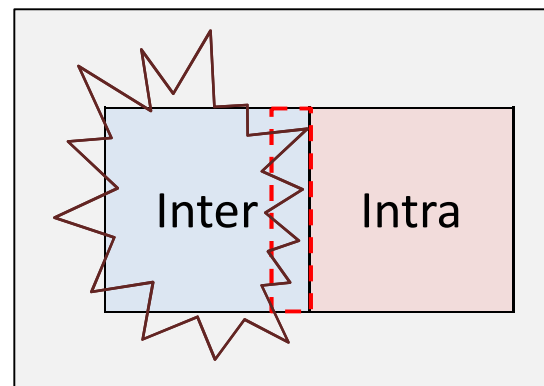
Issue & Proposal

❑ When `constrained_intra_pred_flag = 1`

- ❖ Issue: If an inter coded block is not correctly reconstructed (e.g. when the reference frame has been lost), the errors of the inter block would be propagated to neighboring intra blocks by HM3 deblocking process.
- ❖ Proposal:
 - If current block is Intra and neighboring block is Inter, the **Intra** block boundary pixels are not filtered.
 - If current block is Inter and neighboring block is Intra, the **Intra** block boundary pixels are not filtered.



HM3.0



Proposal

 Filtering region

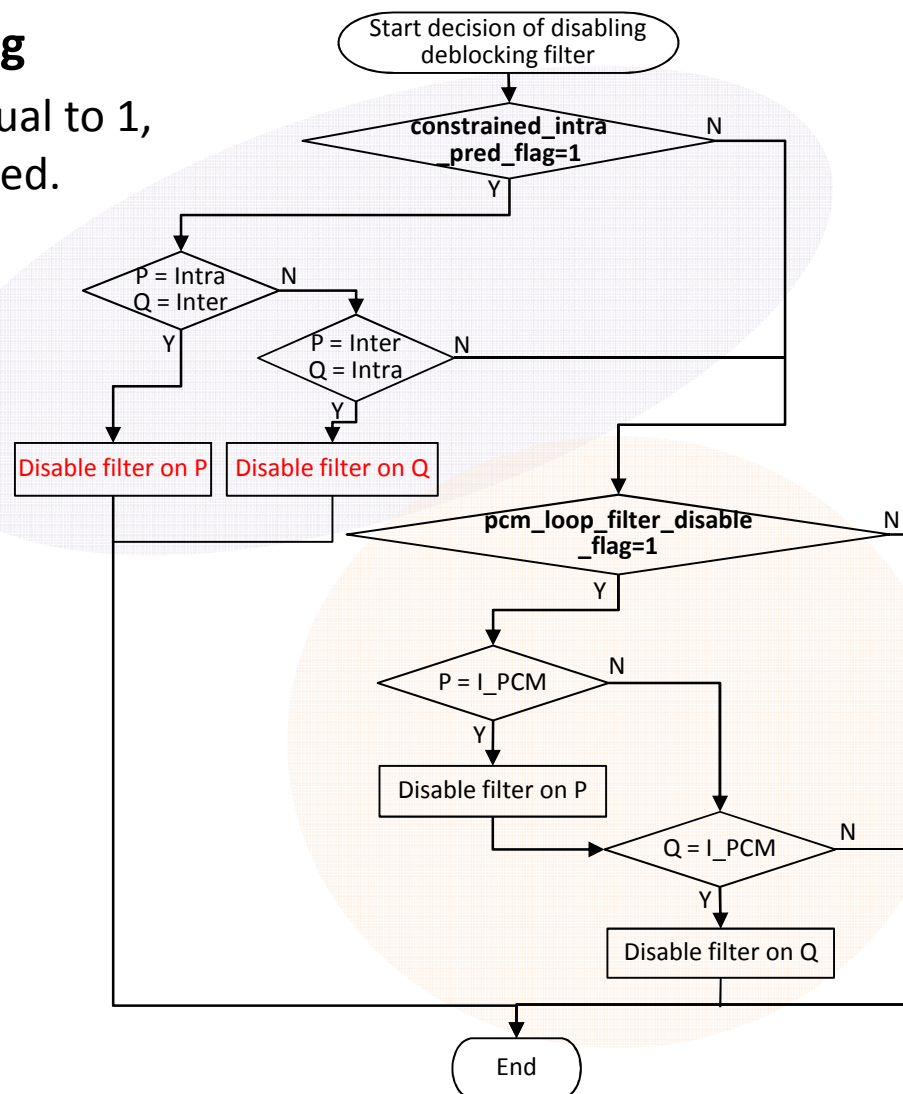
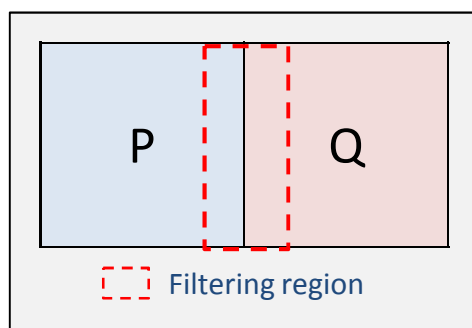
Harmonization with PCM deblocking

❑ HM3.2: pcm_loop_filter_disable_flag

- ❖ If pcm_loop_filter_disable_flag is equal to 1, samples in I_PCM block are not filtered.

❑ Harmonization

- ❖ pcm_loop_filter_disable_flag
- ❖ constrained_intra_pred_flag



< A Flowchart of decision for disabling deblocking filter >

Experimental results

❑ Anchor: HM3.2rc1

- ❖ constrained_intra_pred_flag = 1
- ❖ Cross-checked by Panasonic (JCTVC-F651)

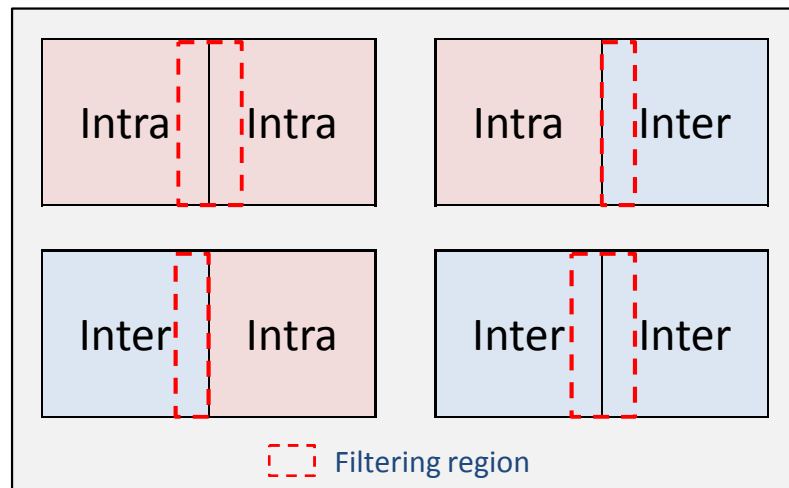
	Random Access HE			Random Access LC		
	Y	U	V	Y	U	V
Class A	0.1	0.5	0.5	0.1	0.8	0.7
Class B	0.1	0.4	0.5	0.1	0.5	0.5
Class C	0.0	0.6	0.5	0.1	0.6	0.7
Class D	0.1	0.4	0.3	0.0	0.4	0.3
Class E						
Overall	0.1	0.5	0.5	0.1	0.6	0.6
Enc Time[%]	100%			100%		
Dec Time[%]	101%			100%		

	Low delay B HE			Low delay B LC		
	Y	U	V	Y	U	V
Class A						
Class B	0.0	0.0	-0.3	0.0	0.1	-0.2
Class C	0.1	0.2	0.0	0.0	0.3	0.2
Class D	0.0	0.2	0.2	0.0	0.2	0.2
Class E	0.0	-0.1	-0.3	0.0	0.0	0.2
Overall	0.0	0.1	-0.1	0.0	0.2	0.1
Enc Time[%]	100%			100%		
Dec Time[%]	101%			100%		

Conclusions

❑ Proposal: Modification of deblocking filtering process for CIP

- ❖ When `constrained_intra_pred_flag = 1`,
- ❖ To prevent error propagation from inter to intra block



	Y/U/V (BD-rate)		Enc/Dec Time (%)	
	HE	LC	HE	LC
RA	0.1/0.5/0.5	0.1/0.6/0.6	100/101	100/100
LD	0.0/0.1/-0.1	0.0/0.2/0.1	100/101	100/100

- ❑ BD-rate increase due to the proposed method is negligible
- ❑ Impacts on subjective quality is unnoticeable
- ❑ Suggest the proposal to be adopted into the HM

Thank You Very Much !

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