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AHG4/AHG9: Syntax for restricting slices and WPP

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Overall Summary

- In HEVC, both slice and WPP coding structures can coexist
  - With normative constraint on the encoder side
  - Slice must end in a LCU row if the slice starts in the middle of the LCU row

- Practical decoders may still have to deal with bitstreams that unintentionally violate the constraint

- In this contribution, conditions to signal end_of_slice_flag are changed to better guide an encoder to follow the constraint
  - Unintentional violation of the constraints can be avoided

- Simulation results reportedly show no bit rate increases and unchanged run time for the proposed syntax changes

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Introduction

- In HEVC, slice and WPP coding structures can coexist

- JCTVC-I0361 was adopted to limit the coexistence of slices and WPP
  - If slice starts in the middle of an LCU row, it must end in that LCU row
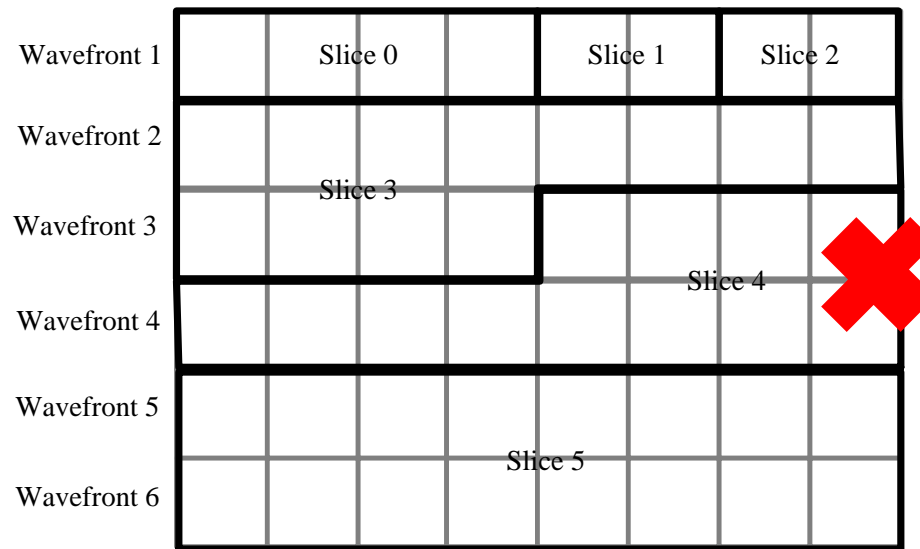
Problem Definition

- Only constraint on encoder side, no normative change on bitstream syntax

- Decoder is likely to receive illegal bitstreams
  - Decoder complexity is increased in order to handle illegal bitstreams in practical products

- Propose to embed the constraint to bitstream syntax
  - Avoid inadvertent violation of the restriction by encoders
  - Relieve decoders from having to deal with illegal bitstreams

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Proposed Method

- If slice starts in the middle of an LCU row
  - The end_of_slice_flag of the last slice granularity unit (LCU or CU) of the LCU row is not explicitly coded and is inferred as true
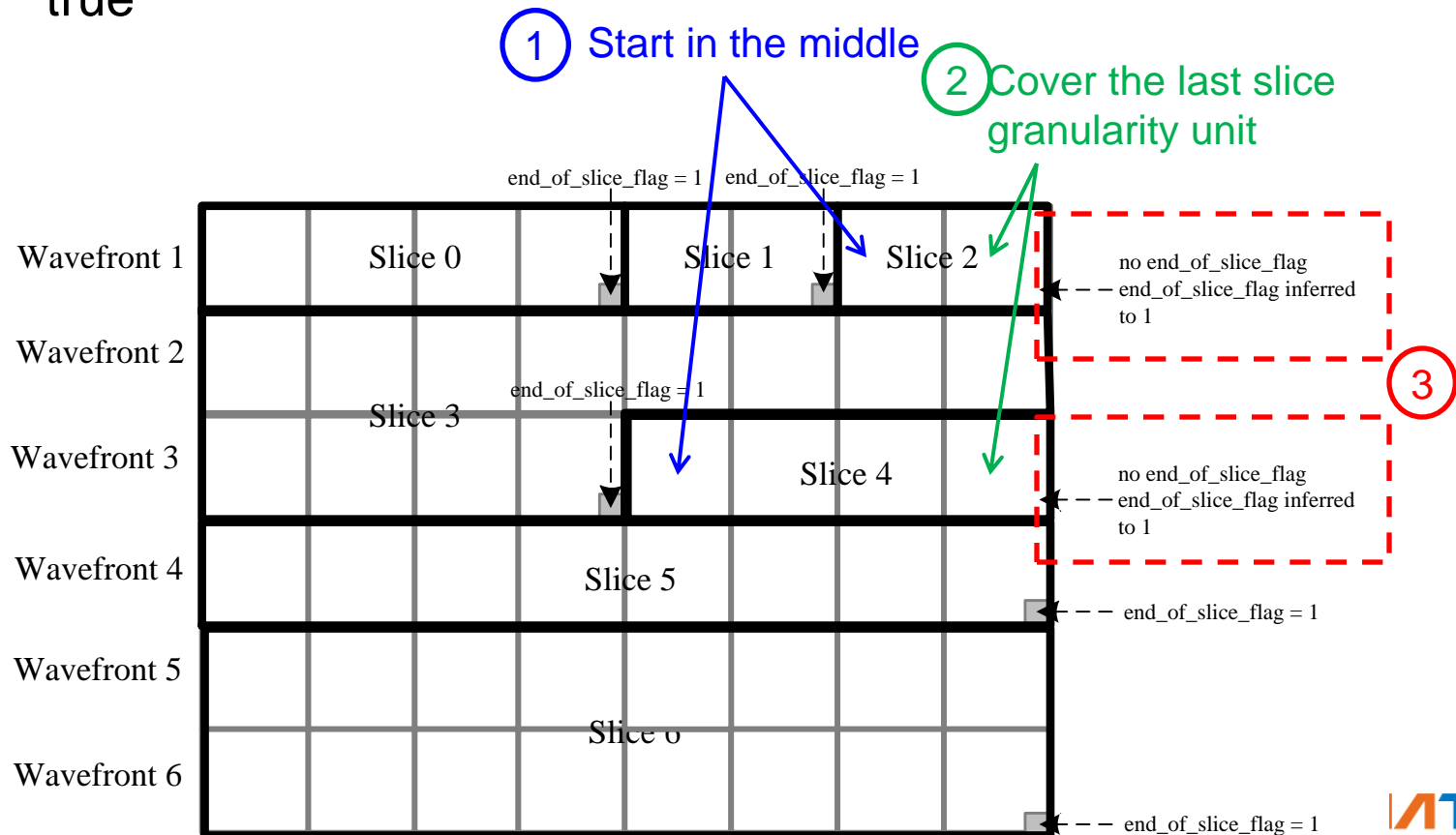
Simulation Results

- Anchor: HM-7.0-dev, revision 2458

- **SliceMode**: 1; **SliceArgument**: 4
    - Maximum 4 LCU per slice

- One WPP substream per LCU row

- AI-Main, RA-Main, LB-Main are tested
    - No significant impact on BD-rates and run time

	All Intra Main		
	Y	U	V
Class A	0.0%	0.0%	0.0%
Class B	0.0%	0.0%	0.0%
Class C	0.0%	0.0%	0.0%
Class D	0.0%	0.0%	0.0%
Class E	0.0%	0.0%	0.0%
Class F	0.0%	0.0%	0.0%
Overall	0.0%	0.0%	0.0%
	0.0%	0.0%	0.0%
Enc Time[%]	99%		
Dec Time[%]	100%		

	Random Access Main		
	Y	U	V
Class A	0.0%	0.0%	0.0%
Class B	0.0%	0.0%	0.0%
Class C	0.0%	0.0%	0.0%
Class D	0.0%	0.0%	0.0%
Class E			
Class F	0.0%	0.0%	0.0%
Overall	0.0%	0.0%	0.0%
	0.0%	0.0%	0.0%
Enc Time[%]	100%		
Dec Time[%]	96%		

	Low delay B Main		
	Y	U	V
Class A			
Class B	0.0%	0.0%	0.0%
Class C	0.0%	0.0%	0.0%
Class D	0.0%	0.0%	0.0%
Class E	0.0%	0.0%	0.0%
Class F	0.0%	0.0%	0.0%
Overall	0.0%	0.0%	0.0%
	0.0%	0.0%	0.0%
Enc Time[%]	100%		
Dec Time[%]	99%		

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Conclusions

- In this contribution, normative syntax change for the constraint on the coexistence of WPP and slices is proposed.

- If slice starts in the middle of an LCU row,
  - The end_of_slice_flag of the last slice granularity unit (LCU or CU) of the LCU row is not explicitly coded and is inferred as true

- By doing this, inadvertent violation of the restriction by encoders can be avoided.

- Relieve decoders from having to deal with illegal bitstreams that violate the constraint .

- Simulation results reportedly show the proposed method has no impact on coding efficiency or run time.

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