Parallel Processing Entry Point Indication For Low Delay Applications

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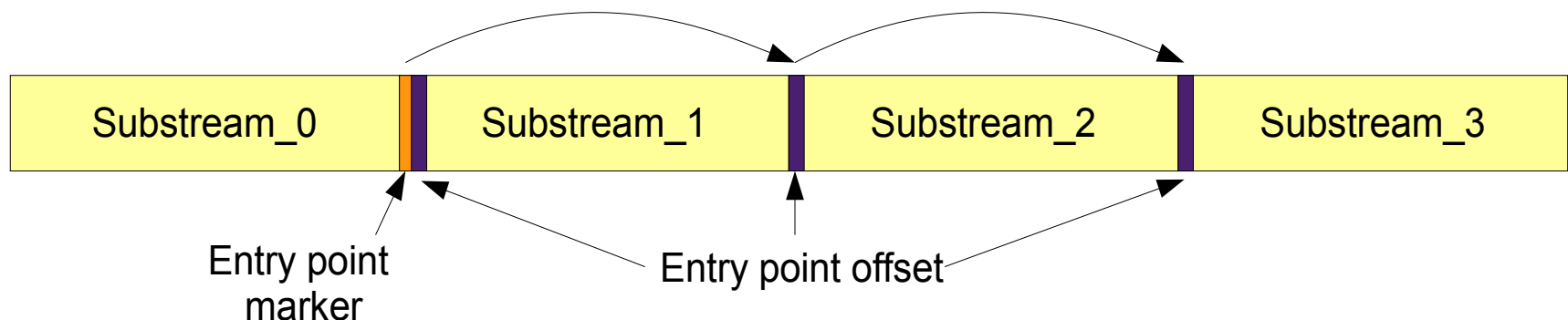
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Problem Statement

- Entry point indicators needed for parallel decoding

- Two existing schemes

  - Slice header table

    - More efficient than markers

    - Delay and buffering issues – need to write entire slice payload before slice header can be completed

  - Entry marker codes (24-bit unique codeword)

    - No delay and buffering issues

    - Not very efficient approach

- Proposal: replace two approaches with a single, low delay, efficient scheme

Proposal Outline

- Use one entry point marker to indicate start of second substream or tile

- Use offset byte scheme to indicate position of following substreams or tiles

- Zero delay for writing first WPP line or tile

- Cannot output following substreams until first substream is finished
  - => writing an offset byte at the beginning of the following substream or tile does not incur any significant delay

| Substream_0 | Substream_1 | Substream_2 | Substream_3 |

Entry point marker

Entry point offset

Offset Byte Coding

- ue(v) coding of offset length in existing scheme is not efficient for higher bit-lengths
  - Replace with fixed length offset bit indicator
- 3 bits for offset_len_idc
  - Number of bits for offset calculated using
    - EntryPointOffsetLength = (offset_len_idc + 1) << 2

Results

- ## Reference: HM-6.1

  - WaveFrontSynchro = 1

  - WaveFrontFlush = 1

  - WaveFrontSubstreams = PicHeightInCtbs

- ## Tested: Modified HM-6.1

  - Settings as above

	All Intra Main			All Intra HE10		
	Y	U	V	Y	U	V
Class A	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class B	0.0%	0.0%	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%	0.0%	0.0%	0.0%	0.0%	0.0%
Class E	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Overall	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class F	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Enc Time[%]		#NUM!			#NUM!	
Dec Time[%]		#NUM!			#NUM!	

Results: Continued

	Random Access Main		
	Y	U	V
Class A	0.1%	0.1%	0.1%
Class B	0.1%	0.1%	0.1%
Class C	0.2%	0.2%	0.2%
Class D	0.3%	0.3%	0.3%
Class E			
Overall	0.2%	0.2%	0.2%
	0.2%	0.2%	0.2%
Class F	0.2%	0.1%	0.1%
Enc Time[%]	#NUM!		
Dec Time[%]	#NUM!		

	Low delay B Main		
	Y	U	V
Class A			
Class B	0.1%	0.1%	0.1%
Class C	0.2%	0.1%	0.1%
Class D	0.3%	0.2%	0.2%
Class E	1.1%	0.9%	0.9%
Overall	0.4%	0.3%	0.3%
	0.4%	0.3%	0.3%
Class F	0.3%	0.2%	0.2%
Enc Time[%]	#NUM!		
Dec Time[%]	#NUM!		

Proposed Supporting Modifications

- Required
  - Removal of the entry point index table in slice_header()
  - Modify slice_data() syntax to implement the proposed scheme
- Optional
  - Update syntax description text to reflect updated slice_data() syntax and to improve clarity
  - Impose a constraint where entry points must be specified for all LCU lines for wavefronts, and entry points must be specified for all tiles
    - Remove num_substreams_minus1 from PPS, as it can be inferred from the number of LCU lines
    - Remove tile_idx_minus1, as this can be inferred by mandating an entry point for every tile