

JVET-AF0115

Non-EE2: IBC with a further upward-extended reference area for screen content

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■ Motivation / Background

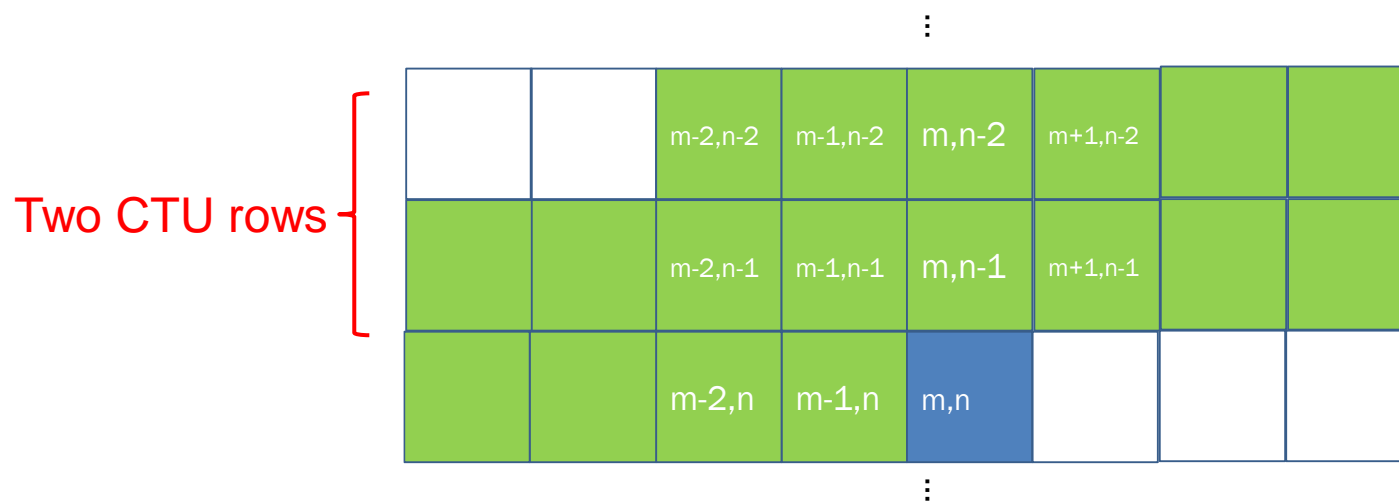
- Enhance coding performance of IBC for screen content
- IBC ref. area in ECM9
 - Two 128x128 CTU rows above in HD resolution or less
 - One 256x256 CTU row above in 4K

■ Proposal: IBC w/ a further upward-extended ref. area only for SCC

- Method 1: Up to picture upper side boundary
- Method 2: Four CTU rows above

■ Results in AI conf.

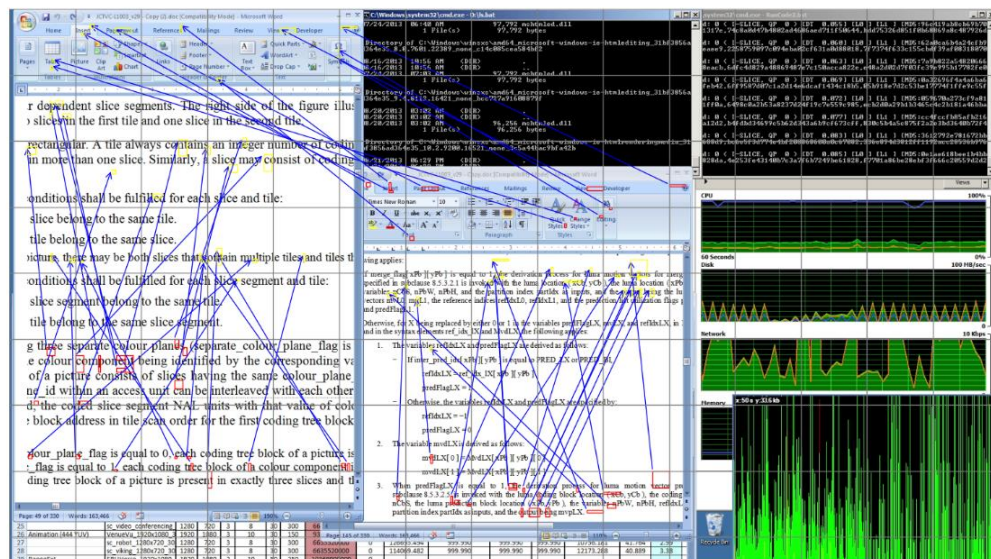
- -1.21% gain for Class TGM
 - Desktop: -3.75%
 - ChineseEditing: -0.80%
- No impact for EncT/DecT



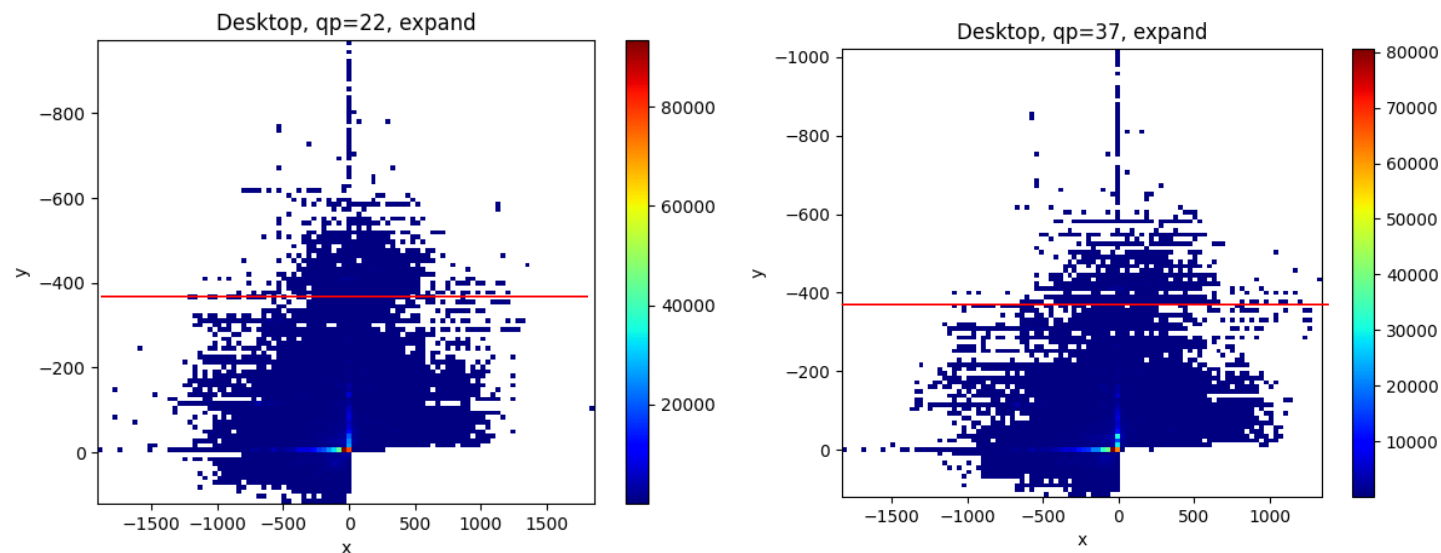
IBC ref. area in ECM-9

Preliminary analysis on further-upward ref. area

- ECM9: Two 128x128 CTU rows above in HD resolution or less
- For SCC, further extension is valuable to achieve additional gains
- Pre-analysis shows certain examples of BVs beyond two CTU rows
 - Not observed in camera captured content



Example of BVs beyond two CTU rows
(Blue arrows: BVs, Grid: CTU)



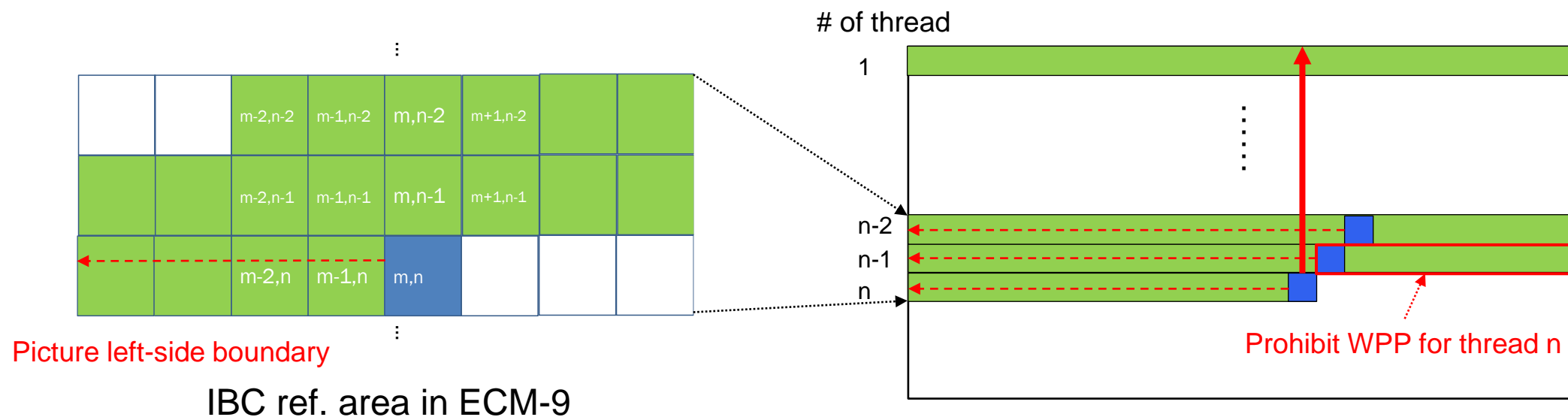
Histogram of BVs for Desktop in AI conf.
(Left: QP22, Right: QP37)

■ Two types of extended ref. areas only for SCC

- Method 1: Up to picture's upper side boundary
- Method 2: Four CTU rows above

■ Required buffer

- Method 1: one picture
 - Acceptable when enabling WPP on multi-threads of H/W decoder
 - However, ECM-9 allows IBC for ref. samples up to picture's right-side boundary, prohibiting WPP

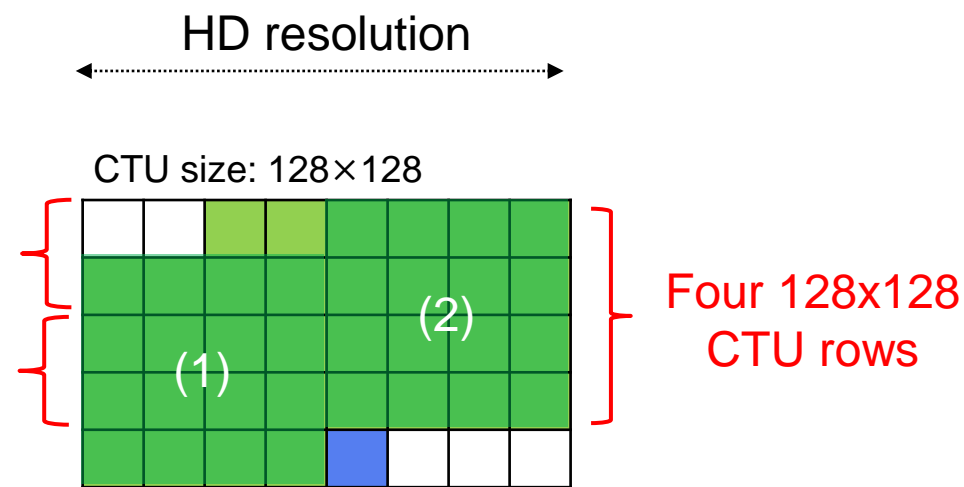
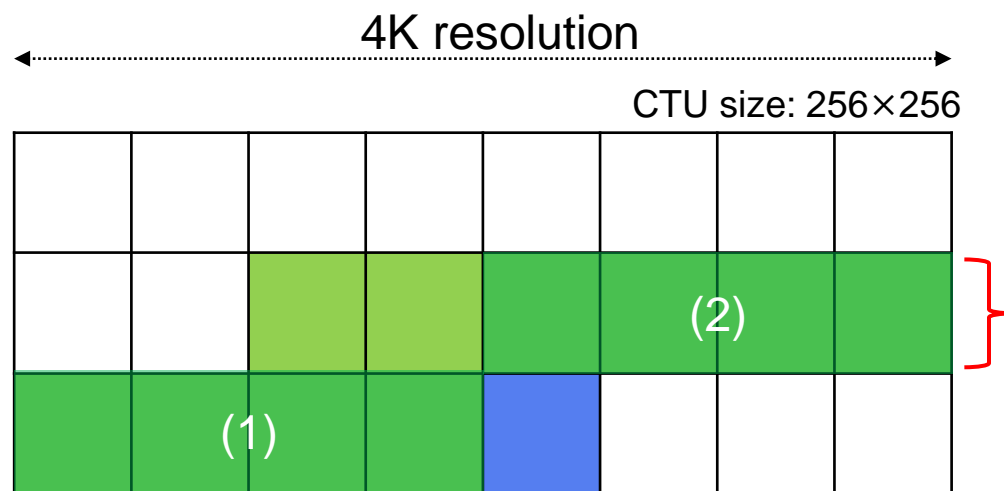


■ Two types of extended ref. areas only for SCC

- Method 1: Up to picture upper side boundary
- Method 2: Four CTU rows above

■ Required buffer

- Method 2: four CTU rows
 - Acceptable only to HD resolution or less because not exceed that of 4K resolution in ECM-9



- Test 1a: Method 1
- Test 1b: ECM-10 with WPP and without right-side reference area
- Test 1c: Test 1a over Test 1b

Test 1a

Test 1b

Test 1c

Class	All Intra Main 10					All Intra Main 10					All Intra Main 10				
	Over ECM-10.0					Over ECM-10.0					Over Test 1b				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
F	-0.18%	-0.31%	-0.13%	100.5%	99.9%	0.90%	0.91%	0.75%	101.2%	99.7%	-0.16%	-0.21%	-0.06%	100.2%	100.1%
TGM	-1.28%	-1.31%	-1.28%	100.0%	99.7%	3.26%	3.20%	3.15%	103.1%	99.7%	-1.08%	-1.10%	-1.09%	99.6%	99.8%
	Random Access Main 10					Random Access Main 10					Random Access Main 10				
	Over ECM-10.0					Over ECM-10.0					Over Test 1b				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
F	-0.09%	-0.01%	-0.07%	100.4%	99.8%	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
TGM	-0.73%	-0.66%	-0.71%	99.9%	100.4%	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

■ Test 1a: Method 1

■ Test 2 : Method 2

Test 1a

Class	All Intra Main 10				
	Over ECM-10.0				
	Y	U	V	EncT	DecT
F	-0.18%	-0.31%	-0.13%	100.5%	99.9%
TGM	-1.28%	-1.31%	-1.28%	100.0%	99.7%
	Random Access Main 10				
	Over ECM-10.0				
	Y	U	V	EncT	DecT
F	-0.09%	-0.01%	-0.07%	100.4%	99.8%
TGM	-0.73%	-0.66%	-0.71%	99.9%	100.4%

Test 2

Class	All Intra Main 10				
	Over ECM-10.0				
	Y	U	V	EncT	DecT
F	-0.14%	-0.22%	-0.10%	100.1%	99.9%
TGM	-1.21%	-1.21%	-1.20%	99.4%	99.3%
	Random Access Main 10				
	Over ECM-10.0				
	Y	U	V	EncT	DecT
F	-0.06%	-0.01%	-0.04%	100.1%	100.0%
TGM	-0.66%	-0.61%	-0.64%	99.9%	100.9%

- IBC w/ upward-extended ref. area for SCC is proposed.
- -1.21% gains over ECM-9 in TGM are confirmed.
- Required buffers can be acceptable.
- It is recommended to study the proposal in the next EE.

	Method 1	Method 2
Coding gain	AI/TGM: -1.28% RA/TGM: -0.73%	AI/TGM: -1.21% RA/TGM: -0.66%
Required buffer	One picture	Four CTU rows
Acceptable case	Enabling WPP on multi-threads of H/W decoder	HD resolution or less
Issue	WPP-enabled bitstream can be decoded on single thread	How to control? → Level information