



MEDIATEK

JVET-N0112

Simplification of context modeling for coding CU split decisions

Authors: Shih-Ta Hsiang, Shawmin Lei

Presenter: Zhi-Yi Lin

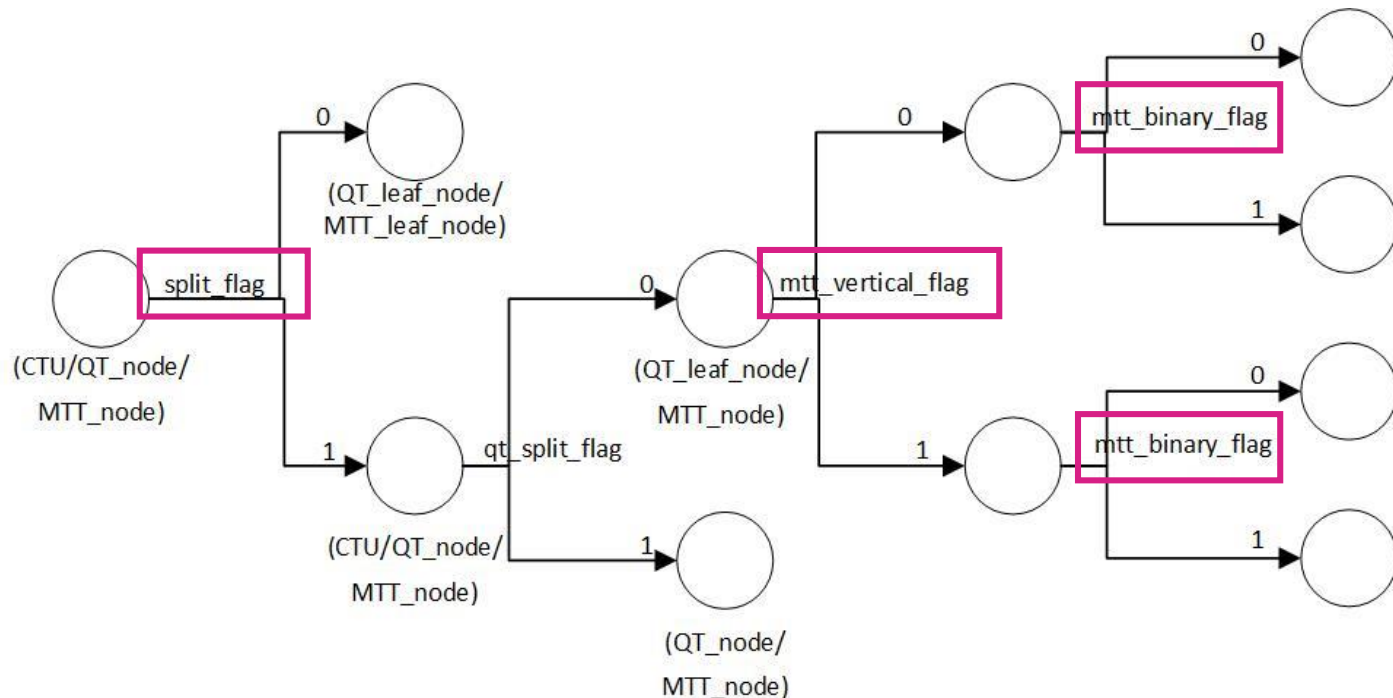
Overall Summary

- A split-first signaling scheme for coding CU partitioning decisions was adopted into VVC Draft 4 (JVET-M0421)
- Propose the simplified context modeling schemes for split flags
 - split_cu_flag, mtt_split_cu_vertical_flag and mtt_split_cu_binary_flag
 - Simplify the context modeling process
 - Reduce 5 context variables

	AI	RA	LB
	Y	Y	Y
split_cu_flag	-0.01%	-0.01%	-0.04%
mtt_split_cu_vertical_flag	0.02%	0.02%	0.02%
mtt_split_cu_binary_flag	0.01%	0.01%	0.01%

Context Modeling for Split-First Signaling

- qt_split_flag: same as the previous method in VVC Draft 4
- Simplify the context modeling schemes for split_cu_flag, mtt_split_cu_vertical_flag, and mtt_split_cu_binary_flag



split_cu_flag

- Method in VVC Draft 4
 - $\text{ctxInc} = ((\text{widthC} > \text{widthA})? 1 : 0) + ((\text{heightC} > \text{heightL})? 1 : 0) + 3 * ((2A_{QT} + A_{BH} + A_{BV} + A_{TH} + A_{TV} - 1) / 3)$
 - 9 context variables
 - Two neighbouring CUs' width and height
 - The split availability (five split types) of the current CU
- Proposed method
 - $\text{ctxInc} = ((\text{widthC} > \text{widthA})? 1 : 0) + ((\text{heightC} > \text{heightL})? 1 : 0) + 3 * ((\text{btDepthC} < 2)? \text{btDepthC} : 2)$
 - 9 context variables
 - Two neighbouring CUs' width and height
 - The btDepth of the current CU

Results – simplified split_cu_flag

* Thank Technicolor
for cross-checking

	All Intra Main10				
	Over VTM-4.0				
	Y	U	V	EncT	DecT
Class A1	-0.01%	-0.08%	-0.14%	96%	100%
Class A2	-0.03%	0.12%	-0.03%	101%	100%
Class B	-0.01%	-0.05%	0.02%	101%	101%
Class C	0.01%	0.01%	0.14%	102%	99%
Class E	0.02%	-0.01%	-0.06%	99%	98%
Overall	-0.01%	-0.01%	0.00%	100%	100%
Class D	0.02%	0.12%	-0.02%	102%	101%
Class F	-0.02%	0.02%	0.02%	103%	105%
	Random access Main10				
	Over VTM-4.0				
	Y	U	V	EncT	DecT
Class A1	-0.03%	-0.06%	-0.05%	101%	100%
Class A2	-0.03%	0.08%	0.01%	102%	102%
Class B	0.00%	0.11%	-0.16%	103%	97%
Class C	0.00%	-0.07%	-0.04%	99%	100%
Overall	-0.01%	0.02%	-0.07%	101%	99%
Class D	-0.04%	-0.02%	0.00%	99%	99%
Class F	0.00%	-0.05%	0.16%	100%	98%
	Low delay B Main10				
	Over VTM-4.0				
	Y	U	V	EncT	DecT
Class B	-0.04%	-0.22%	-0.23%	104%	103%
Class C	-0.05%	0.28%	0.01%	98%	100%
Class E	-0.04%	0.63%	1.72%	99%	101%
Overall	-0.04%	0.16%	0.34%	100%	101%
Class D	-0.06%	0.15%	0.05%	100%	103%
Class F	-0.18%	0.16%	-0.37%	96%	99%

mtt_split_cu_vertical_flag

- Method in VVC Draft 4

- $d_W = \text{widthC} / \text{widthA}$
 $d_H = \text{heightC} / \text{heightL}$
 $d = d_W == d_H ? 0 : (d_W < d_H ? 1 : 2)$
 $\text{ctxInc} = A_{BH} + A_{TH} == A_{BV} + A_{TV} ? d : (A_{BH} + A_{TH} < A_{BV} + A_{TV} ? 3 : 4)$
- 5 context variables

- Proposed method

- $\text{ctxInc} = (\text{widthC} == \text{heightC}) ? 0 : ((\text{widthC} > \text{heightC}) ? 1 : 2)$
- 3 context variables
- The same as the previous method in VVC Draft 3

Results - simplified mtt_split_cu_vertical_flag

* Thank Panasonic
for cross-checking

All Intra Main10					
Over VTM-4.0					
	Y	U	V	EncT	DecT
Class A1	0.01%	0.15%	0.05%	102%	105%
Class A2	0.01%	0.12%	0.01%	103%	105%
Class B	0.02%	0.07%	0.08%	102%	103%
Class C	0.03%	-0.01%	0.02%	102%	100%
Class E	0.03%	0.08%	0.02%	102%	100%
Overall	0.02%	0.08%	0.04%	102%	103%
Class D	0.01%	0.07%	-0.09%	103%	99%
Class F	0.02%	-0.09%	-0.29%	100%	99%
Random access Main10					
Over VTM-4.0					
	Y	U	V	EncT	DecT
Class A1	0.03%	0.03%	0.12%	102%	99%
Class A2	0.02%	-0.09%	-0.01%	101%	102%
Class B	0.00%	0.07%	-0.04%	101%	99%
Class C	0.05%	-0.02%	-0.11%	100%	100%
Overall	0.02%	0.01%	-0.02%	101%	100%
Class D	0.03%	-0.28%	-0.07%	98%	100%
Class F	0.05%	-0.12%	-0.14%	97%	99%
Low delay B Main10					
Over VTM-4.0					
	Y	U	V	EncT	DecT
Class B	0.00%	0.00%	0.01%	96%	101%
Class C	0.06%	0.27%	-0.18%	94%	93%
Class E	-0.01%	0.33%	0.39%	97%	97%
Overall	0.02%	0.17%	0.04%	96%	97%
Class D	-0.06%	0.04%	0.27%	99%	98%
Class F	-0.07%	0.00%	-0.01%	97%	98%

mtt_split_cu_binary_flag

- Method in VVC Draft 4
 - $\text{ctxId} = (\text{mtt_split_cu_vertical_flag} ? 1 : 0) + (\text{btDepthC} < 2 ? 1 : 0)$
 - 4 context variables
- Proposed method
 - $\text{ctxInc} = 0$
 - 1 context variable
 - The same as the previous method in VVC Draft 3

Results - simplified mtt_split_cu_binary_flag

* Thank Panasonic
for cross-checking

All Intra Main10					
Over VTM-4.0					
	Y	U	V	EncT	DecT
Class A1	0.02%	-0.01%	-0.03%	98%	100%
Class A2	0.01%	0.12%	-0.02%	100%	100%
Class B	0.01%	0.02%	0.00%	100%	105%
Class C	0.03%	-0.08%	-0.07%	99%	102%
Class E	0.01%	-0.02%	-0.01%	100%	101%
Overall	0.01%	0.00%	-0.03%	99%	102%
Class D	0.04%	-0.08%	-0.19%	100%	101%
Class F	0.04%	0.05%	-0.14%	99%	101%
Random access Main10					
Over VTM-4.0					
	Y	U	V	EncT	DecT
Class A1	0.00%	0.05%	-0.02%	99%	102%
Class A2	0.00%	0.12%	0.00%	100%	102%
Class B	0.00%	-0.09%	-0.11%	100%	101%
Class C	0.03%	0.19%	-0.13%	99%	98%
Overall	0.01%	0.06%	-0.08%	99%	100%
Class D	0.04%	-0.20%	-0.30%	100%	99%
Class F	-0.02%	-0.04%	-0.07%	100%	101%
Low delay B Main10					
Over VTM-4.0					
	Y	U	V	EncT	DecT
Class B	0.00%	-0.05%	-0.17%	99%	101%
Class C	-0.01%	0.22%	-0.05%	99%	101%
Class E	0.07%	0.72%	0.94%	99%	95%
Overall	0.01%	0.23%	0.15%	99%	100%
Class D	0.04%	0.48%	0.01%	100%	100%
Class F	-0.09%	-0.10%	-0.30%	100%	99%

Conclusions

- Propose to simplify the context modeling for split flags
- split_cu_flag
 - Use the current BT depth for context modeling
 - Simplify the context variable derivation
- mtt_split_cu_vertical_flag and mtt_split_cu_binary_flag,
 - Use the previous context modeling schemes in VVC Draft 3
 - Reduce 5 context variables

	AI	RA	LB
	Y	Y	Y
split_cu_flag	-0.01%	-0.01%	-0.04%
mtt_split_cu_vertical_flag	0.02%	0.02%	0.02%
mtt_split_cu_binary_flag	0.01%	0.01%	0.01%

The background is a solid green color with a repeating pattern of white line-art icons. These icons include various nautical items like anchors, lifebuoys, and seashells, as well as outdoor and travel-related items like a compass, a map, a tent, and a bird in flight. There are also symbols for technology like a smartphone and a Wi-Fi signal.

MEDIATEK

Thank you!