

Simplified Context modeling for Transform Coefficient Coding

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Current HEVC in CABAC # Number of Context

758 different context indexes per **each slice-type** are defined in TMuC v0.9-hm.

448 different context indexes are defined for significant map & last flags.

Actual number of „used“ context index is „244“ due to no 2x2 and over 64x64 transform coefficients coding.

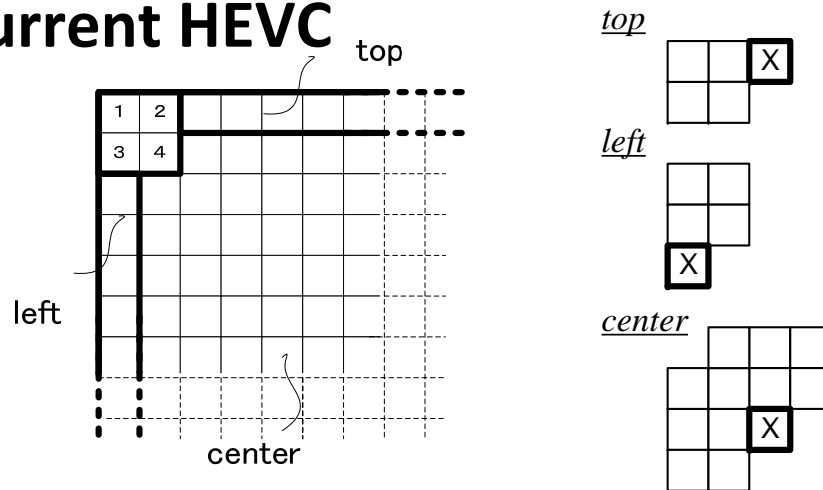
→ „460“ per **all slice-type** are defined at AVC high-profile (HEVC current situation)

Impact of number of context

Internal memory size, processing for initialization (multi-slices cases)

If it is same performance, small number would be desirable.

In current HEVC



Top		Left		Center	
count	Index	count	Index	count	Index
0	4	0	7	0	10
1, 2	5	1, 2	8	1, 2	11
3, 4	6	3, 4	9	3, 4	12
				5, 6	13
				7, 8, 9, 10	14

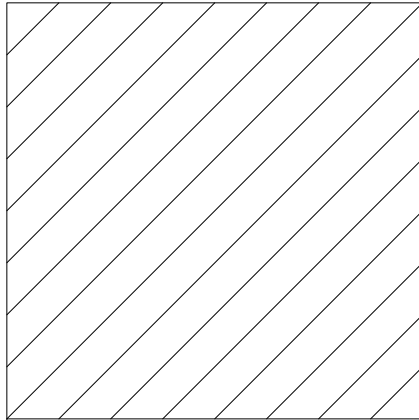
Actual used context for significant map coding

Significant Map	Total	Block Group	Luma/Chroma	Segmentation
for Low frequency for 16x16-32x32	16	2	2	4
for High frequency for 16x16-32x32	44	2	2	11
for 4x4, 8x8 block	64	2	2	16
Total	124			

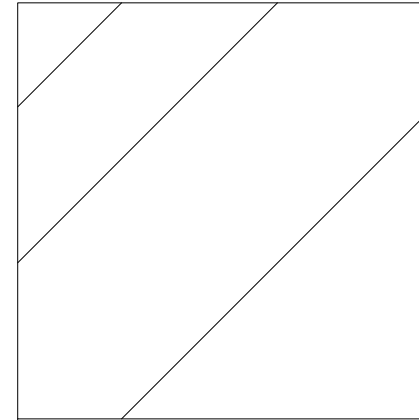
Proposed significant map coding

Significant Map	Total	Block Group	Luma/Chroma	Segmentation
for Low frequency for 8x8-32x32	24	3	2	4
for High frequency for 8x8-32x32	44	2	2	11
for 4x4	32	1	2	16
Total	100			

In current HEVC



Proposal



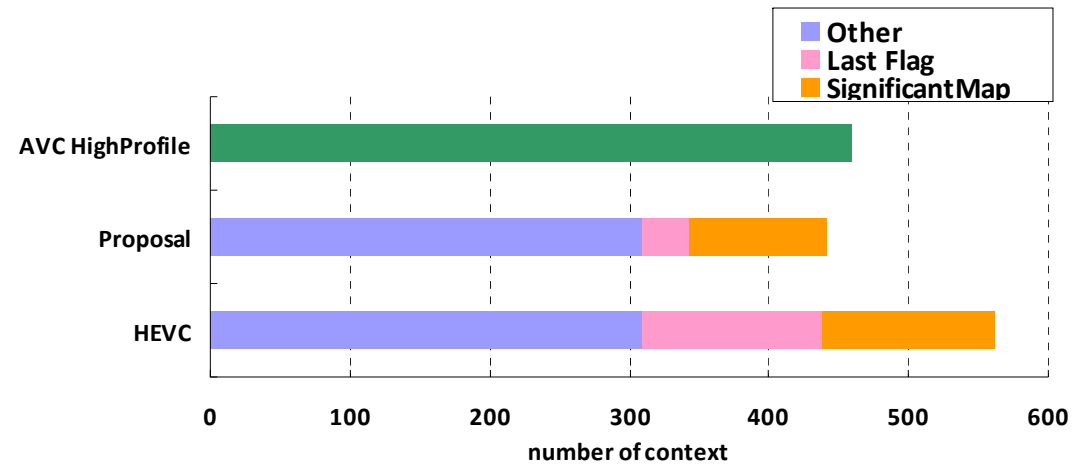
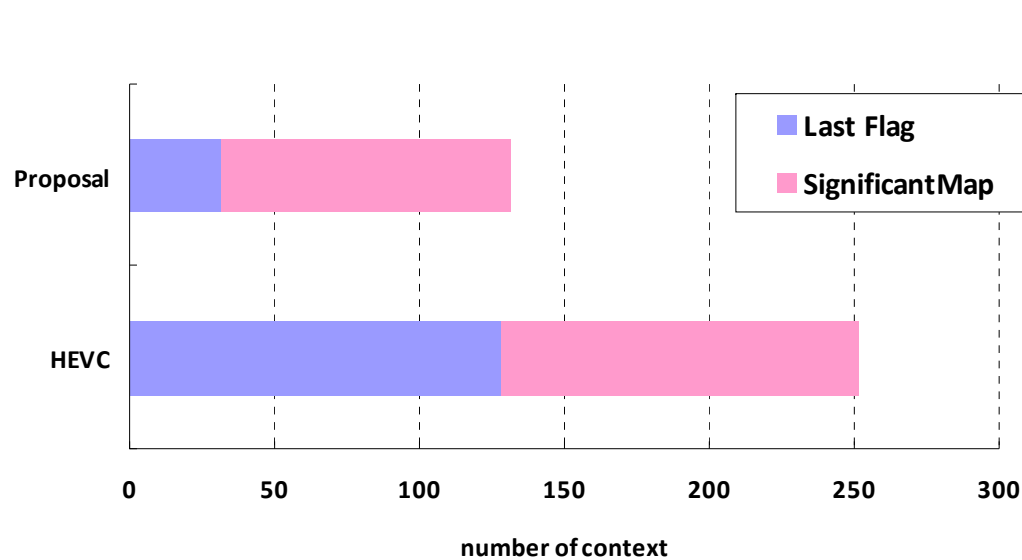
Actual used context for significant map coding

	Total	Block Group	Luma/Chroma	Segmentation
Last Flag	128	4	2	16

Proposed significant map coding

	Total	Block Group	Luma/Chroma	Segmentation
Last Flag	32	4	2	4

Performance of Number of Contexts



AVC High Profile value contains different slice type.

Simulation results for each settings.

	Significant Map			Last Flag			Significant Map + Last Flag		
	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate
Intra	-0.2	-0.1	0.0	0.1	0.1	0.1	-0.2	0.0	0.0
Random access	0.0	0.1	0.2	0.1	0.0	0.1	0.0	0.1	0.2
Low Delay	0.0	0.1	0.4	0.0	0.1	0.0	0.0	0.2	0.4

Our proposal (SignificantMap & Last Flag)

	Intra				
	Y BD-rate	U BD-rate	V BD-rate	% sig count	% last count
Class A	0.0	-0.2	0.0	-0.33%	-0.07%
Class B	-0.1	0.0	0.0	-0.75%	-0.10%
Class C	-0.2	0.0	0.0	0.10%	-0.02%
Class D	-0.1	0.1	0.2	0.24%	-0.07%
Class E	-0.4	-0.3	0.0	-0.90%	-0.06%
All	-0.2	0.0	0.0	-0.33%	-0.06%
Enc Time[%]	97%				
Dec Time[%]	99%				

	Random access				
	Y BD-rate	U BD-rate	V BD-rate	% sig count	% last count
Class A	0.0	0.0	0.1	-0.72%	-0.42%
Class B	0.0	-0.1	0.0	-1.27%	-0.44%
Class C	-0.1	0.1	0.1	0.40%	-0.54%
Class D	0.0	0.5	0.6	0.82%	-0.56%
Class E					
All	0.0	0.1	0.2	-0.19%	-0.49%
Enc Time[%]	97%				
Dec Time[%]	98%				

	Low delay				
	Y BD-rate	U BD-rate	V BD-rate	% sig count	% last count
Class A					
Class B	0.2	0.1	0.0	-1.61%	-0.67%
Class C	0.0	0.4	0.6	0.49%	-0.98%
Class D	0.1	0.0	1.0	1.11%	-1.04%
Class E	-0.2	0.3	0.2	-0.66%	-1.02%
All	0.0	0.2	0.4	-0.17%	-0.93%
Enc Time[%]	97%				
Dec Time[%]	98%				

Our proposal could reduce significant number of contexts and reduce the throughput of bins without any significant performance drop.

It is proposed to be discussed this in CE about this subjects.