Non-CE8:
Coding tree level signaling of alf_cu_flag

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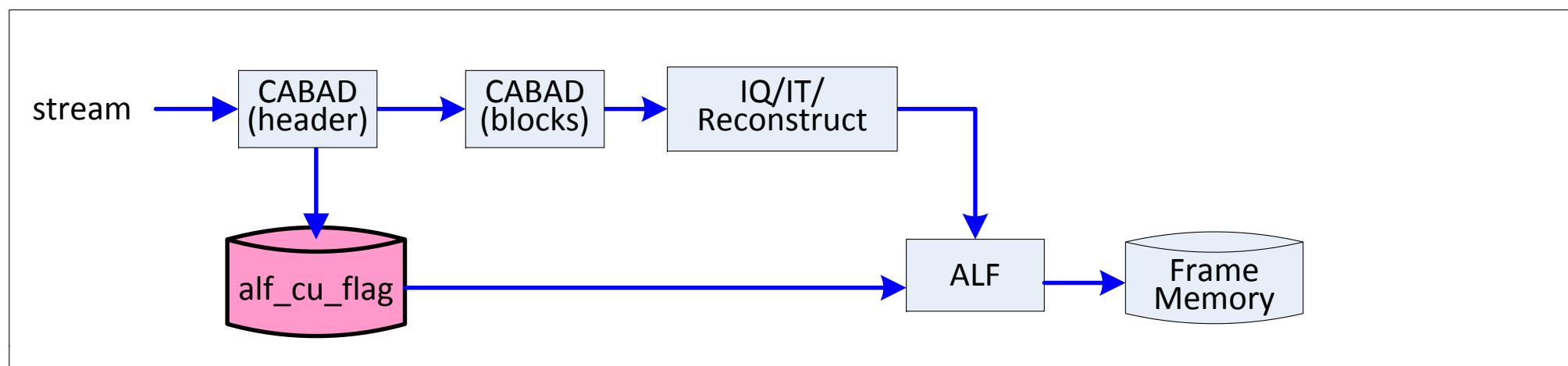
Panasonic Corporation

Panasonic ideas for life

Motivation

- ✓ **All of alf_cu_flags to be referred in a slice needs to be stored once in a buffer memory in HEVC decoder**

- ✓ **The amount of buffer memory is larger than 4 luma pixel lines buffer in the worst case (16,200byte for 4K2K)**

Proposal

- ✓ **To signal alf_cu_flag in coding tree syntax so that decoder doesn't need to store all of the flags in a slice**

7.3.3.6   Adaptive loop filter coding unit control parameter syntax

alf_cu_control_param() {	Descriptor
if(adaptive_loop_filter_flag) {	
alf_cu_control_flag	u(1)
if(alf_cu_control_flag) {	
alf_cu_control_max_depth	ue(v)
~~alf_length_cu_control_info~~	se(v)
~~for(i = 0; i < NumAlfCuFlag; i++)~~	
~~alf_cu_flag[i]~~	u(1) | ae(v)
}	
}	
}	

3.5 Coding tree syntax

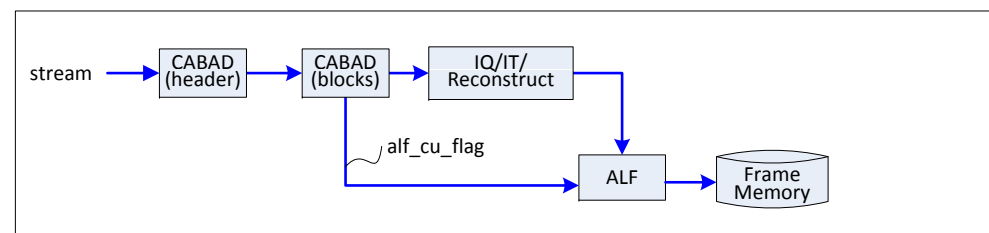| coding_tree(x0, y0, log2CUSize) {	Descriptor
…	
if(adaptive_loop_filter_flag && alf_cu_control_flag) {	
cuDepth = Log2MaxCUSize – log2CUSize	
if(cuDepth <= alf_cu_control_max_depth)	
if(cuDepth == alf_cu_control_max_depth ||	
split_coding_unit_flag[x0][y0] == 0)	
~~AlfCuFlagIdx++~~	
alf_cu_flag	
}	
…	
if(split_coding_unit_flag[x0][y0]) {	
…	
} else {	
if(adaptive_loop_filter_flag && alf_cu_control_flag)	
AlfCuFlag[x0][y0] = ~~alf_cu_flag[AlfCuFlagIdx]~~ alf_cu_flag	
…	
}	
return moreDataFlag	
}	

On decoder side

Decoder is not required to have a buffer memory for alf_cu_flags

HM4.0

Proposed

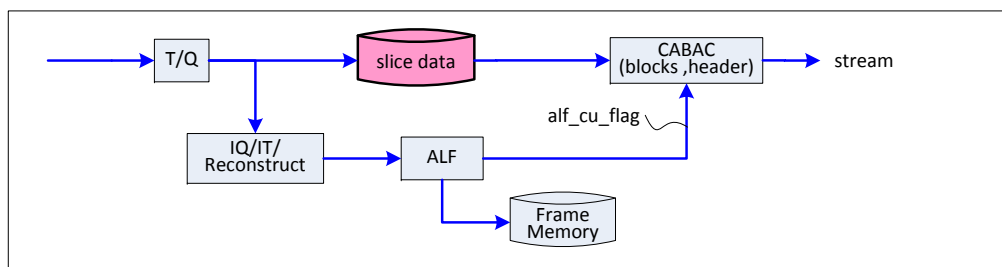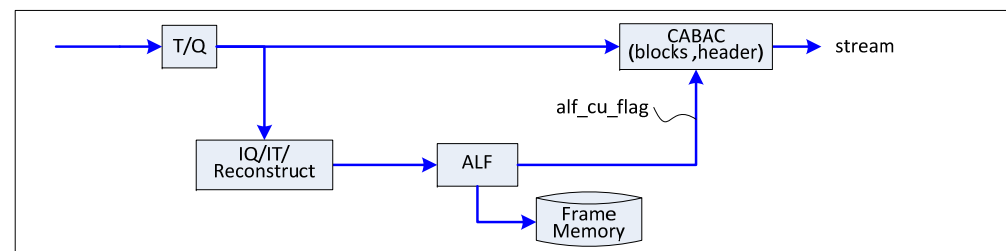## On encoder side

Less complex and lower latency encoder design becomes possible

HM4.0 and Proposed (with ALF parameters optimization)

Proposed (with pre-designed filter)

Tested: Proposal with ALF parameter optimization

Anchor: HM4.0

X-check: JCTVC-G938 (Cisco)

	All Intra HE		
	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%
Overall	0.0%	0.0%	0.0%
	0.0%	0.0%	0.0%
Enc Time[%]	100%		
Dec Time[%]	100%		

	Random Access HE		
	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			
Overall	0.0%	0.0%	0.0%
	0.0%	0.0%	0.0%
Enc Time[%]	100%		
Dec Time[%]	100%		

	Low delay B HE		
	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%
Overall	0.0%	0.0%	0.0%
	0.0%	0.0%	0.0%
Enc Time[%]	100%		
Dec Time[%]	100%		

	Low delay P HE		
	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%
Overall	0.0%	0.0%	0.0%
	0.0%	0.0%	0.0%
Enc Time[%]	100%		
Dec Time[%]	100%		

A coding tree level signaling of alf_cu_flag is proposed

✓ Decoder is not required to have a buffer memory for alf_cu_flags

✓ Less complex and lower latency encoder design becomes possible
Encoder design for ALF parameters optimization is still possible

It is suggested to consider the inclusion of this proposal in the HEVC WD