

JVET-00238

AHG17: Parameters in SPS or slice headers



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Observation



- Some parameter values in the slice header are constant in all slice headers in the entire CTC for VTM 5.0

Slice parameter name	Descriptor	Constant value in			
		AI	RA	LDB	LDP
dep_quant_enabled_flag	u(1)	1	1	1	1
short_term_ref_pic_set_sps_flag	u(1)	0		1	1
slice_temporal_mvp_enabled_flag	u(1)			1	1
mvd_l1_zero_flag	u(1)			1	
collocated_from_l0_flag	u(1)			0	
six_minus_max_num_merge_cand	ue(v)	0	0	0	0
five_minus_max_num_affine_merge_cand	ue(v)		0	0	0
max_num_merge_cand_minus_max_num_triangle_cand	ue(v)		1	1	

Proposal Summary



- This contribution proposes a mechanism to enable signaling some of the slice parameters in VVC either in the SPS or in the slice header. This is beneficial for saving bits when slice parameters stay constant in all slice headers in the CVS.
- The following changes to VVC are proposed:
 - Decode a `sps_or_slice_flag` in the SPS that specifies whether the parameter values of the syntax elements in the list to the right may conditionally be signalled in the SPS or slice headers, or if they are always signaled in slice headers.
 - If `sps_or_slice_flag` is equal to 1, then for each of the above syntax elements:
 - Decode a corresponding syntax element in the SPS.
 - If the value of the corresponding syntax element in the SPS is equal to 0, then the parameter value is signalled by a syntax element in the slice header.
 - Otherwise, the parameter value for the slice header syntax element is derived as the value of the corresponding syntax element in the SPS minus 1.

dep_quant_enabled_flag
ref_pic_list_sps_flag
slice_temporal_mvp_enabled_flag
mvd_l1_zero_flag
collocated_from_l0_flag
six_minus_max_num_merge_cand
five_minus_max_num_subblock_merge_cand
max_num_merge_cand_minus_max_num_triangle_cand

Proposed syntax changes



	Descriptor
seq_parameter_set_rbsp() {	
...	
sps_or_slice_flag	u(1)
if(sps_or_slice_flag) {	
sps_or_slice_dep_quant_enabled_flag	tu(v)
for(i = 0; i < 2; i++)	
sps_or_slice_ref_pic_list_sps_flag[i]	tu(v)
sps_or_slice_temporal_mvp_enabled_flag	tu(1-v)
sps_or_slice_mvd_l1_zero_flag	tu(v)
sps_or_slice_collocated_from_l0_flag	tu(v)
sps_or_slice_six_minus_max_num_merge_cand	ue(v)
sps_or_slice_five_minus_max_num_subblock_merge_cand	ue(v)
sps_or_slice_max_num_merge_cand_minus_max_num_triangle_cand	ue(v)
}	
if(sps_or_slice_temporal_mvp_enabled_flag != 1)	
sps_sbtmvp_enabled_flag	u(1)
...	
}	

- If the SPS codeword is equal to 0
 - The value is signaled in the slice header syntax element
- If the SPS codeword is > 0
 - The value is the SPS codeword minus 1
 - No corresponding syntax element in the slice header

	Descriptor
slice_header() {	
...	
if((NalUnitType != IDR_W_RADL && NalUnitType != IDR_N_LP) sps_idr_rpl_present_flag) {	
for(i = 0; i < 2; i++) {	
if(num_ref_pic_lists_in_sps[i] > 0 && !sps_or_slice_ref_pic_list_sps_flag[i] && (i == 0 (i == 1 && rpl1_idx_present_flag)))	
ref_pic_list_sps_flag[i]	u(1)
...	
if(slice_type != I) {	
if(!sps_or_slice_temporal_mvp_enabled_flag)	
slice_temporal_mvp_enabled_flag	u(1)
if(slice_type == B && !sps_or_slice_mvd_l1_zero_flag)	
mvd_l1_zero_flag	u(1)
...	
if(slice_temporal_mvp_enabled_flag) {	
if(slice_type == B && !sps_or_slice_collocated_from_l0_flag)	
collocated_from_l0_flag	u(1)
}	
...	
if(!sps_or_slice_six_minus_max_num_merge_cand)	
six_minus_max_num_merge_cand	ue(v)
if(sps_affine_enabled_flag && !sps_or_slice_five_minus_max_num_subblock_merge_cand)	
five_minus_max_num_subblock_merge_cand	ue(v)
...	
if(sps_triangle_enabled_flag && MaxNumMergeCand >= 2 && !sps_or_slice_max_num_merge_cand_minus_max_num_triangle_cand)	
max_num_merge_cand_minus_max_num_triangle_cand	ue(v)
} else if(sps_ibc_enabled_flag && !sps_or_slice_six_minus_max_num_merge_cand)	
six_minus_max_num_merge_cand	ue(v)
...	
if(!sps_or_slice_dep_quant_enabled_flag)	
dep_quant_enabled_flag	u(1)
...	
byte_alignment()	
}	

Results for CTC



All Intra Main10					
Over VTM-5.0					
	Y	U	V	EncT	DecT
Class A1	0.00%	0.00%	0.00%	98%	98%
Class A2	0.00%	0.00%	0.00%	99%	100%
Class B	0.00%	0.00%	0.00%	98%	99%
Class C	0.00%	0.00%	0.00%	105%	102%
Class E	0.00%	0.00%	0.00%	94%	95%
Overall	0.00%	0.00%	0.00%	99%	99%
Class D	0.00%	0.00%	0.00%	98%	100%
Class F	0.00%	0.00%	0.00%	100%	100%

Random Access Main 10					
Over VTM-5.0					
	Y	U	V	EncT	DecT
Class A1	0.00%	0.00%	0.00%	100%	98%
Class A2	0.00%	0.00%	0.00%	100%	100%
Class B	-0.01%	-0.01%	-0.01%	99%	97%
Class C	-0.02%	-0.02%	-0.02%	99%	91%
Class E					
Overall	-0.01%	-0.01%	-0.01%	99%	96%
Class D	-0.07%	-0.06%	-0.07%	98%	95%
Class F	-0.02%	-0.02%	-0.02%	105%	91%

Low delay B Main10					
Over VTM-5.0					
	Y	U	V	EncT	DecT
Class A1					
Class A2					
Class B	-0.02%	-0.01%	-0.02%	101%	98%
Class C	-0.04%	-0.04%	-0.04%	102%	100%
Class E	-0.25%	-0.20%	-0.20%	97%	99%
Overall	-0.08%	-0.07%	-0.07%	100%	99%
Class D	-0.13%	-0.11%	-0.11%	103%	105%
Class F	-0.12%	-0.09%	-0.10%	100%	97%

Low delay P Main10					
Over VTM-5.0					
	Y	U	V	EncT	DecT
Class A1					
Class A2					
Class B	-0.01%	-0.01%	-0.01%	100%	101%
Class C	-0.02%	-0.02%	-0.02%	101%	102%
Class E	-0.08%	-0.07%	-0.07%	100%	101%
Overall	-0.03%	-0.03%	-0.03%	101%	101%
Class D	-0.05%	-0.04%	-0.04%	104%	105%
Class F	-0.05%	-0.05%	-0.05%	102%	101%

- No changes in PSNR. Gains come purely from removing signaling of constant values in slice headers
- Estimated results for non-CTC examples with multiple slices per picture

	Estimated BD-rate (Y)		
Slices per picture	RA	LDB	LDP
6	-0.06%	-0.48%	-0.18%
24 (OMAF example)	-0.24%	-1.92%	-0.72%

Proposal Summary, repeated



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