

JVET-P0368

AHG17: On selectively signal slice header parameters in PPS



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Background



- The `constant_slice_header_params_enabled_flag` in VVC enables some parameters to be signaled either in PPS or in each slice header
- If the PPS syntax element for a parameter is equal to 0, then the parameter is signaled in the slice header, otherwise the value for the parameter is constant for all slices and equal to the PPS syntax element minus 1

	Descriptor
<code>pic_parameter_set_rbsp() {</code>	
<code>...</code>	
<code>constant_slice_header_params_enabled_flag</code>	u(1)
<code>if(constant_slice_header_params_enabled_flag) {</code>	
<code>pps_dep_quant_enabled_idc</code>	u(2)
<code>for(i = 0; i < 2; i++)</code>	
<code>pps_ref_pic_list_sps_idc[i]</code>	u(2)
<code>pps_temporal_mvp_enabled_idc</code>	u(2)
<code>pps_mvd_l1_zero_idc</code>	u(2)
<code>pps_collocated_from_l0_idc</code>	u(2)
<code>pps_six_minus_max_num_merge_cand_plus1</code>	ue(v)
<code>pps_five_minus_max_num_subblock_merge_cand_plus1</code>	ue(v)
<code>pps_max_num_merge_cand_minus_max_num_triangle_cand_plus1</code>	ue(v)
<code>}</code>	
<code>...</code>	
<code>}</code>	

Additional constant slice parameters in CTC



- A new analysis has been performed on VTM master from 2019-09-13 (we refer to it here as 6.1+)
- Additional slice parameters that stay constant in all bitstreams for the CTC have been identified

Parameter	Code word	In CTC always equal to			Estimated number of bits saved in a slice		
		RA	LDB	LDP	RA	LDB	LDP
num_ref_idx_active_override_flag	u(1)	0	0	0	1	1	1
slice_disable_bdof_dmvr_flag	u(1)	0			1		
slice_lmcs_aps_id	u(2)	0	0	0	2	2	2
slice_chroma_residual_scale_flag	u(1)		1	1		1	1
collocated_ref_idx	ue(v)	0	0	0	1	1	1
slice_log2_diff_min_qt_min_cb_luma	ue(v)	1	1	1	3	3	3
slice_max_mtt_hierarchy_depth_luma	ue(v)	3	3	3	5	5	5
slice_log2_diff_max_bt_min_qt_luma	ue(v)						
slice_log2_diff_max_tt_min_qt_luma	ue(v)	3	3	3	5	5	5
Summary					18	18	18

Proposal



- We propose the following additional syntax elements to PPS for the constant slice header functionality in VVC
 - pps_num_ref_idx_active_override_idc
 - pps_disable_bdof_dmvr_idc
 - pps_lmcs_aps_id_idc
 - pps_chroma_residual_scale_idc
 - pps_collocated_ref_idx_plus1
 - pps_log2_diff_min_qt_min_cb_luma_plus1
 - pps_max_mtt_hierarchy_depth_luma_plus1
 - pps_log2_diff_max_bt_min_qt_luma_plus1
 - pps_log2_diff_max_tt_min_qt_luma_plus1
- BD rates for AI/RA/LDB/LDP compared to a VTM 6.1+ anchor are reported to be
 - 0.00%/-0.04%/-0.13%/-0.14% for the additional parameters
 - 0.00%/-0.05%/-0.21%/-0.17% for all constant slice parameters

pic parameter set rbsp() {	Descriptor
...	
constant slice header params enabled flag	u(1)
if(constant slice header params enabled flag) {	
pps dep quant enabled idc	u(2)
pps_num_ref_idx_active_override_idc	u(2)
for(i = 0; i < 2; i++)	
pps ref pic list sps idc[i]	u(2)
pps temporal mvp enabled idc	u(2)
pps_disable_bdof_dmvr_idc	u(2)
pps_lmcs_aps_id_idc	u(3)
pps_chroma_residual_scale_idc	u(2)
pps mvd l1 zero idc	u(2)
pps collocated from l0 idc	u(2)
pps_collocated_ref_idx_plus1	ue(v)
pps six minus max num merge cand plus1	ue(v)
pps five minus max num subblock merge cand plus1	ue(v)
pps max num merge cand minus max num triangle cand plus1	ue(v)
pps_log2_diff_min_qt_min_cb_luma_plus1	ue(v)
pps_max_mtt_hierarchy_depth_luma_plus1	ue(v)
pps_log2_diff_max_bt_min_qt_luma_plus1	ue(v)
pps_log2_diff_max_tt_min_qt_luma_plus1	ue(v)
}	
...	
}	

Results for the additional constant slice parameters



	All intra		
	Y	U	V
Class A1	0.00%	0.00%	0.00%
Class A2	0.00%	0.00%	0.00%
Class B	0.00%	0.00%	0.00%
Class C	0.00%	0.00%	0.00%
Class E	0.00%	0.00%	0.00%
Overall	0.00%	0.00%	0.00%
Class D	0.00%	0.00%	0.00%
Class F	0.00%	0.00%	0.00%

	Random Access		
	Y	U	V
Class A1	-0.02%	-0.02%	-0.02%
Class A2	-0.02%	-0.02%	-0.01%
Class B	-0.03%	-0.03%	-0.03%
Class C	-0.07%	-0.07%	-0.07%
Class E			
Overall	-0.04%	-0.04%	-0.04%
Class D	-0.21%	-0.21%	-0.21%
Class F	-0.07%	-0.07%	-0.07%

	Low delay B		
	Y	U	V
Class A1			
Class A2			
Class B	-0.03%	-0.03%	-0.03%
Class C	-0.08%	-0.07%	-0.07%
Class E	-0.36%	-0.34%	-0.35%
Overall	-0.13%	-0.12%	-0.12%
Class D	-0.22%	-0.21%	-0.21%
Class F	-0.21%	-0.18%	-0.19%

	Low delay P		
	Y	U	V
Class A1			
Class A2			
Class B	-0.03%	-0.03%	-0.03%
Class C	-0.08%	-0.07%	-0.07%
Class E	-0.41%	-0.38%	-0.38%
Overall	-0.14%	-0.13%	-0.13%
Class D	-0.21%	-0.20%	-0.21%
Class F	-0.20%	-0.19%	-0.19%

Anchor: VTM master (6.1+) with constant_slice_header_params_enabled_flag equal to 1 for RA, LDB and LDP
Test: The proposed solution

Results for all constant slice parameters



	All intra		
	Y	U	V
Class A1	0.00%	0.00%	0.00%
Class A2	0.00%	0.00%	0.00%
Class B	0.00%	0.00%	0.00%
Class C	0.00%	0.00%	0.00%
Class E	0.00%	0.00%	0.00%
Overall	0.00%	0.00%	0.00%
Class D	0.00%	0.00%	0.00%
Class F	0.00%	0.00%	0.00%

	Random Access		
	Y	U	V
Class A1	-0.02%	-0.02%	-0.02%
Class A2	-0.02%	-0.02%	-0.02%
Class B	-0.04%	-0.05%	-0.05%
Class C	-0.09%	-0.09%	-0.09%
Class E			
Overall	-0.05%	-0.05%	-0.05%
Class D	-0.27%	-0.27%	-0.27%
Class F	-0.08%	-0.08%	-0.08%

	Low delay B		
	Y	U	V
Class A1			
Class A2			
Class B	-0.05%	-0.05%	-0.05%
Class C	-0.12%	-0.11%	-0.11%
Class E	-0.61%	-0.57%	-0.58%
Overall	-0.21%	-0.20%	-0.20%
Class D	-0.35%	-0.32%	-0.33%
Class F	-0.33%	-0.30%	-0.31%

	Low delay P		
	Y	U	V
Class A1			
Class A2			
Class B	-0.04%	-0.04%	-0.04%
Class C	-0.10%	-0.09%	-0.09%
Class E	-0.49%	-0.45%	-0.46%
Overall	-0.17%	-0.16%	-0.16%
Class D	-0.27%	-0.26%	-0.26%
Class F	-0.24%	-0.23%	-0.23%

Anchor: VTM master (6.1+) with constant_slice_header_params_enabled_flag equal to 0

Test: The proposed solution

