

Syntax Rearrangement for List Combination (JCTVC-G549)

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Summary

❖ List Combination Syntax

- Rearrangement for similar syntax to be gathered together
- Define the default number of LC in PPS like as List0 and List1

❖ Experimental Results

	Random Access HE			Random Access LC		
	Y	U	V	Y	U	V
Class A	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class B	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class C	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class D	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class E						
Overall	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Enc Time[%]	100%			100%		
Dec Time[%]	100%			101%		

	Low delay B HE			Low delay B LC		
	Y	U	V	Y	U	V
Class A						
Class B	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class C	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class D	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class E	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Overall	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Enc Time[%]	100%			100%		
Dec Time[%]	100%			101%		

❖ Cross-check

- Thanks to HUAWEI !!!

Background

- ❖ LC (List Combination) is always used for reference list of uni-prediction in B-slices
- ❖ (# of LC) is derived from (# of List0) and (# of List1)
 $\rightarrow (\# \text{ of LC}) = [0, (\# \text{ of List0}) * (\# \text{ of List1})]$

GOP=8

NumOfReference=4

NumOfReference_L0=2

NumOfReference_L1=2

POC	L0	L1	LC
0	-	-	-
8	0	0	0
4	0,8	8,0	0,8
2	0,4	4,8	0,4,8
6	4,2	8,4	4,8,2
1	0,2	2,4	0,2,4
3	2,0	4,6	2,4,0,6
5	4,2	6,8	4,6,2,8
7	6,4	8,6	6,8,4
16	8,6,4,2	8,6,4,2	8,6,4,2

	1		3		5		7	
		2				6		
				4				
0								8
Display								

WD(F803) Syntax

❖ LC Syntax and Semantics

- **"ref_pic_list_combination_flag"** has redundant information
 - 1 → List0 and List1 are different → Construct LC based on List0 and List1
 - 0 → List0 and List1 are identical → Use List0 as LC
 - Decoder can know the status of List0 and List1 w/o **"ref_pic_list_combination_flag"** syntax

ref_pic_list_combination() {	Descriptor
if(slice_type % 5 == 1) { // b slice	
ref_pic_list_combination_flag	u(1)
if(ref_pic_list_combination_flag) {	
num_ref_idx_lc_active_minus1	ue(v)
ref_pic_list_modification_flag_lc	u(1)
if(ref_pic_list_modification_flag_lc)	
for (i=0; i <= num_ref_idx_lc_active_minus1; i++) {	
pic_from_list_0_flag	u(1)
ref_idx_list_curr	ue(v)
}	
}	
}	
}	

Specify the number of LC

LC reordering part

ref_pic_list_combination_flag equal to 1 indicates that the reference picture list 0 and the reference picture list 1 are combined to be an additional reference picture lists combination used for the prediction units being uni-directional predicted. This flag equal to 0 indicates that the reference picture list 0 and reference picture list 1 are identical thus reference picture list 0 is used as the reference picture lists combination. The reference picture lists combination is set to be empty at the start of the loop defined in this table.

Proposal

- ❖ **Remove** "ref_pic_list_combination_flag" syntax
 - The meaning is redundant because decoder knows the status of List0 and List1 before constructing LC
- ❖ **Move** "num_ref_idx_lc_active_minus1" syntax to slice_header()
Merge LC reordering syntax to "ref_pic_list_modification()"
 - Syntax rearrangement for similar syntax to be gathered together
- ❖ **Define** "num_ref_idx_lc_default_active" syntax in PPS
 - if(0) { (# of LC) will be determined by the status of List0 and List1 automatically }
 - else { (# of LC) = num_ref_idx_lc_default_active }

num_ref_idx_lc_default_active = 0			
POC	L0	L1	LC
0	-	-	-
8	0	0	0
4	0,8	8,0	0,8
2	0,4	4,8	0,4,8
6	4,2	8,4	4,8,2
1	0,2	2,4	0,2,4
3	2,0	4,6	2,4,0,6
5	4,2	6,8	4,6,2,8
7	6,4	8,6	6,8,4
16	8,6,4,2	8,6,4,2	8,6,4,2

num_ref_idx_lc_default_active = 2			
POC	L0	L1	LC
0	-	-	-
8	0	0	0
4	0,8	8,0	0,8
2	0,4	4,8	0,4
6	4,2	8,4	4,8
1	0,2	2,4	0,2
3	2,0	4,6	2,4
5	4,2	6,8	4,6
7	6,4	8,6	6,8
16	8,6,4,2	8,6,4,2	8,6

Proposed Syntax

pic_parameter_set_rbsp() {
pic_parameter_set_id
seq_parameter_set_id
entropy_coding_mode_flag
num_temporal_layer_switching_point_flags
for(i = 0; i < num_temporal_layer_switching_point_flags; i++)
temporal_layer_switching_point_flag[i]
num_ref_idx_l0_default_active_minus1
num_ref_idx_l1_default_active_minus1
num_ref_idx_lc_default_active



Define syntax to set the default number of LC

Move syntax



slice_header() {
lightweight_slice_flag
if(!lightweight_slice_flag) {
slice_type
pic_parameter_set_id
frame_num
if(IdrPicFlag)
idr_pic_id
if(pic_order_cnt_type == 0)
pic_order_cnt_lsb /*
if(slice_type == P slice_type == B) {
num_ref_idx_active_override_flag
if(num_ref_idx_active_override_flag) {
num_ref_idx_l0_active_minus1
if(slice_type == B) {
num_ref_idx_l1_active_minus1
num_ref_idx_lc_active_minus1
}
}
}
ref_pic_list_modification()
if(nal_ref_idc != 0)
dec_ref_pic_marking()
}

Proposed Syntax

ref_pic_list_modification() {	Descriptor
if(slice_type % 5 != 2 && slice_type % 5 != 4) {	
ref_pic_list_modification_flag_l0	u(1)
if(ref_pic_list_modification_flag_l0)	
do {	
modification_of_pic_nums_idc	ue(v)
if(modification_of_pic_nums_idc == 0	
modification_of_pic_nums_idc == 1)	
abs_diff_pic_num_minus1	ue(v)
else if(modification_of_pic_nums_idc == 2)	
long_term_pic_num	ue(v)
} while(modification_of_pic_nums_idc != 3)	
}	
if(slice_type % 5 == 1) {	
ref_pic_list_modification_flag_l1	u(1)
if(ref_pic_list_modification_flag_l1)	
do {	
modification_of_pic_nums_idc	ue(v)
if(modification_of_pic_nums_idc == 0	
modification_of_pic_nums_idc == 1)	
abs_diff_pic_num_minus1	ue(v)
else if(modification_of_pic_nums_idc == 2)	
long_term_pic_num	ue(v)
} while(modification_of_pic_nums_idc != 3)	
ref_pic_list_modification_flag_lc	u(1)
if(ref_pic_list_modification_flag_lc) {	
for (i=0; i <= num_ref_idx_lc_active_minus1; i++) {	
pic_from_list_0_flag	u(1)
ref_idx_list_curr	ue(v)
}	
}	
}	
}	



Merge syntax