



AHG21: LONG-TERM PICTURES AND PRUNING OF REFERENCE PICTURE SETS

JCTVC-G637

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PROPOSAL

Adopt the latest AHG21 candidate WD text with the following modifications:

- › Part One: Include the long-term picture syntax and semantics from the October 18 AHG21 candidate Working Draft (ftp://ftp.hhi.de/ahg21/JCTVC-F803_d1_Buffer_Descriptions_display_process_suggestion_r1.doc)
- › Part Two: Include syntax for omitting reference pictures from the PPS reference picture set.

LONG-TERM SYNTAX – PPS

pic_parameter_set_rbsp() {	Descriptor
pic_parameter_set_id	ue(v)
seq_parameter_set_id	ue(v)
entropy_coding_mode_flag	u(1)
num_<u>short term</u>_ref_pic_sets	ue(v)
for(idx = 0; idx < num_short_term_ref_pic_sets; idx++)	
short_term_ref_pic_set(idx)	
<u>long term ref pics present flag</u>	<u>u(1)</u>
<u>if(long_term_ref_pics_present_flag)</u>	
<u>delta_poc_lt_len_minus4</u>	<u>ue(v)</u>
...	
}	

LONG-TERM SYNTAX – SLICE HEADER

slice_header() {	Descriptor
...	
pic_order_cnt_lsb	u(v)
<u>short term</u> ref_pic_set_pps_flag	u(1)
if(!short_term_ref_pic_set_pps_flag)	
short_term_ref_pic_set(num_short_term_ref_pic_sets)	
else {	
short_term_ref_pic_set_idx	u(v)
}	
<u>if(long_term_ref_pics_present_flag) {</u>	
<u>num long term pics</u>	<u>ue(v)</u>
<u>for(i = 0; i < num_long_term_pics; i++) {</u>	
<u>delta_poc_lt_minus1[i]</u>	<u>u(v)</u>
<u>used_by_curr_pic_lt_flag[i]</u>	<u>u(1)</u>
<u>}</u>	
<u>}</u>	
...	
}	

PART TWO - MOTIVATION

- › Consider the AHG21 config file for random access below

#	Type	POC	QPoffset	temporal_id	ref_buf_size	ref_pic	#ref_pics	reference pictures
Frame1:	B	8	1	0	4	1	4	-8 -10 -12 -14
Frame2:	B	4	2	0	2	1	3	-4 -6 4
Frame3:	B	2	3	0	2	1	4	-2 -4 2 6
Frame4:	B	6	3	0	2	1	5	-2 -4 -6 -8 2
Frame5:	B	1	4	0	2	0	6	-1 -3 1 3 5 7
Frame6:	B	3	4	0	2	0	5	-1 -3 1 3 5
Frame7:	B	5	4	0	2	0	4	-1 -3 1 3
Frame8:	B	7	4	0	2	0	4	-1 -3 -5 1

- › The highlighted reference pictures are not available in the first GOP following a random access point.
- › This means that for each of those pictures, either an additional reference picture set has to be added to the set of reference picture sets in the PPS, or the reference picture sets have to be explicitly signaled.
- › We propose to include the possibility to signal the number of pictures to remove from the RPS
- › The impact on syntax, semantics and decoding process is very small

PRUNING - PPS

pic_parameter_set_rbsp() {	Descriptor
pic_parameter_set_id	ue(v)
seq_parameter_set_id	ue(v)
entropy_coding_mode_flag	u(1)
num_short_term_ref_pic_sets	ue(v)
for(idx = 0; idx < num_short_term_ref_pic_sets; idx++)	
short_term_ref_pic_set(idx)	
<u>omit_pics_info_present_flag</u>	<u>u(1)</u>
...	
}	

omit_pics_info_present_flag equal to 0 specifies that no coded pictures referring to the picture parameter set omits reference pictures from the short-term reference picture set included in the picture parameter set. **omit_pics_info_present_flag** equal to 1 specifies that a coded picture referring to the picture parameter set can omit reference pictures from the short-term reference picture set included in the picture parameter set

PRUNING – SLICE HEADER

slice_header() {	Descriptor
...	
pic_order_cnt_lsb	u(v)
short_term_ref_pic_set_pps_flag	u(1)
if(!short_term_ref_pic_set_pps_flag)	
short_term_ref_pic_set(num_short_term_ref_pic_sets)	
else {	
short_term_ref_pic_set_idx	u(v)
if(omit_pics_info_present_flag)	
num_omitted_pics	ue(v)
}	
...	
}	

num_omitted_pics specifies the number of the negative short-term reference pictures that are to be omitted from the reference picture set in the picture parameter set with index short_term_ref_pic_set_idx. The value of num_omitted_pics shall be in the range of 0 to NumNegativePics[StRpsIdx], inclusive. When not present, the value of num_long_term_pics shall be inferred to be equal to 0.

DECODING PROCESS CHANGE

```
for( i = 0, j = 0, k = 0; i < NumNegativePics[ StRpsIdx ] - num_omitted_pics ; i++ ) {  
    if( UsedByCurrPicS0[ StRpsIdx ][ i ] )  
        RefPicSetStCurr0[ j++ ] = PicOrderCnt + DeltaPocS0[ StRpsIdx ][ i ]  
    else  
        RefPicSetStFoll0[ k++ ] = PicOrderCnt + DeltaPocS0[ StRpsIdx ][ i ]  
}  
NumRpsStCurr0 = j  
NumRpsStFoll0 = k
```

- › The decoder will omit num_omitted_pics from the reference picture set.
- › Pictures will be removed in increasing POC order starting from the lowest POC in the PPS reference picture set for the current slice

Example:

- › POC = 20
- › Reference picture set = { -8, -10, -12, -14 }
- › num_omitted_pics = 2
- › Output reference picture set = { -8, -10 }

SUMMARY

- › Part One:
 - Include the long-term picture syntax and semantics from the October 18 AHG21 candidate Working Draft

- › Part Two
 - Include syntax for omitting reference pictures from the PPS reference picture set.
 - Very minor WD changes

- › Combination of part one and two
 - Reducing the number of short-terms from the PPS RPS by omission flag and introduction of long-terms enables replacement of reference pictures from a PPS RPS.



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