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JCTVC-K0173:
AHG9: On VPS

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Agenda

- Introduction
- Semantics of “temporal_id_nesting_flag”
- Problem Statement
- Proposed Solution
- Conclusion

Introduction

- Both VPS (Video Parameter Set) and SPS (Sequence Parameter Set) contain syntax elements “max_temporal_layers_minus1” and “temporal_id_nesting_flag”.
- If the value of max_temporal_layers_minus1 is 0, it means that there is only one temporal layer, and in this case temporal_id_nesting_flag becomes meaningless.
- JCTVC-0183 proposed to remove this redundancy, and adopted as change in semantics.

Semantics of “temporal_id_nesting_flag”

- **vps_temporal_id_nesting_flag**, when **vps_max_sub_layers_minus1** is **greater than 0**, specifies whether inter prediction is additionally restricted for coded video sequences referring to the video parameter set. When **vps_max_sub_layers_minus1** is equal to 0, **vps_temporal_id_nesting_flag** has no meaning and may have any value.
- **sps_temporal_id_nesting_flag**, when **sps_max_sub_layers_minus1** is **greater than 0**, specifies whether inter prediction is additionally restricted for coded video sequences referring to the sequence parameter set. When **vps_temporal_id_nesting_flag** is equal to 1, **sps_temporal_id_nesting_flag** shall be equal to 1. When **sps_max_sub_layers_minus1** is equal to 0, **sps_temporal_id_nesting_flag** has no meaning, and when **sps_max_sub_layers_minus1** is equal to 0 and **vps_temporal_id_nesting_flag** is equal to 1, **sps_temporal_id_nesting_flag** may have any value.

Problem Statement [1/]

Need to wait for parsing of `vps_max_sub_layers_minus1` to know if it is meaningful or not

	Descriptor
▪ <code>video_parameter_set_rbsp()</code> {	
▪ <code>video_parameter_set_id</code>	u(4)
▪ <code>vps_temporal_id_nesting_flag</code>	u(1)
▪ <code>vps_reserved_zero_2bits</code>	u(2)
▪ <code>vps_reserved_zero_6bits</code>	u(6)
▪ <code>vps_max_sub_layers_minus1</code>	u(3)
▪ <code>profile_and_level(1, vps_max_sub_layers_minus1)</code>	
▪ <code>vps_reserved_zero_12bits</code>	u(12)
▪ <code>for(i = 0; i <= vps_max_sub_layers_minus1; i++)</code> {	
▪ <code> vps_max_dec_pic_buffering[i]</code>	ue(v)
▪ <code> vps_max_num_reorder_pics[i]</code>	ue(v)
▪ <code> vps_max_latency_increase[i]</code>	ue(v)
▪ <code>}</code>	

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Problem Statement [2/]

	Descriptor
seq_parameter_set_rbsp() {	
video_parameter_set_id	u(4)
sps_max_sub_layers_minus1	u(3)
sps_reserved_zero_bit	u(1)
profile_and_level(1, sps_max_sub_layers_minus1)	
seq_parameter_set_id	ue(v)
chroma_format_idc	ue(v)
if(chroma_format_idc == 3)	
separate_colour_plane_flag	u(1)
...	u(1)
sample_adaptive_offset_enabled_flag	u(1)
if(pcm_enabled_flag)	
pcm_loop_filter_disable_flag	u(1)
sps_temporal_id_nesting_flag	u(1)
num_short_term_ref_pic_sets	ue(v)
for(i = 0; i < num_short_term_ref_pic_sets; i++)	
short_term_ref_pic_set(i)	
...	u(1)

With SPS the order is OK

Proposed Solution

	Descriptor
▪ video_parameter_set_rbsp() {	
▪ video_parameter_set_id	u(4)
▪ vps_temporal_id_nesting_flag	u(1)
▪ vps_reserved_zero_2bits	u(2)
▪ vps_reserved_zero_6bits	u(6)
▪ vps_max_sub_layers_minus1	u(3)
▪ vps_temporal_id_nesting_flag	u(1)
▪ profile_and_level(1, vps_max_sub_layers_minus1)	
▪ vps_reserved_zero_12bits	u(12)
▪ for(i = 0; i <= vps_max_sub_layers_minus1; i++) {	
▪ vps_max_dec_pic_buffering[i]	ue(v)
▪ vps_max_num_reorder_pics[i]	ue(v)
▪ vps_max_latency_increase[i]	ue(v)
▪ }	

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Should be located somewhere after vps_max_sub_layers_minus1

Conclusion

- If the value of `max_temporal_layers_minus1` is 0, it means that there is only one temporal layer, and in this case `temporal_id_nesting_flag` becomes meaningless.
- JCTVC-0183 proposed to remove this redundancy, and adopted as change in semantics.
- However, in the current VPS specification `temporal_id_nesting_flag` is located before `max_sub_layers_minus1`, so it is not possible to know immediately whether it is meaningful or not during the parsing process.
 - In SPS this problem does not exist.
- It is proposed to change the place of `temporal_id_nesting_flag` after `max_sub_layers_minus1` in VPS.
- It is recommended that this modification be integrated into HEVC specification text.

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