

The background of the slide is a solid green color with a repeating pattern of white line-art icons. These icons include various nautical and marine elements such as anchors, lifebuoys, seashells, jellyfish, fish, and a sun. There are also some geometric shapes like triangles and circles interspersed among the nautical items.

MEDIATEK

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AHG9: On inter-layer referencing of ALF

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Introduction

- In the current version of VVC Specification Draft 7
 - Inter-layer referencing is supported for reference picture list (RPL).
 - Inter-layer reference picture (ILRP) can be used as a long-term reference picture in the RPL.
 - Only pictures from the same access unit (AU) with the current picture, and with `nuh_layer_id` less than the `nuh_layer_id` of the current layer, are considered as valid reference pictures for RPL
 - ALF is signalled in APSs with `aps_params_type` equal to `ALF_APS`.
 - APSs within one layer cannot be referenced by another layer.

Proposal

- Proposed to add support of inter-layer referencing for ALF APSs, i.e., ALF APSs can reference APSs of the same type from different layers
- In order to simplify data access within different layers, similar constraints to those of RPL are suggested.
 - Only APSs from a direct reference layer can be referenced
 - The referenced APSs shall be the APSs available in a picture unit (PU) which is in the same AU with the current picture, and with `nuh_layer_id` less than the `nuh_layer_id` of the current picture.
- Two kinds of syntax designs are proposed
 - The first design allows controlling inter-layer referencing on SPS level.
 - The second design further extends on/off control to a PH/SH level.

1. Signalling on/off control and reference layer for inter-layer referencing of ALF in the SPS

- On-off flag is signalled in the SPS, to indicate whether inter-layer referencing of ALF is allowed in the CLVS.
- If inter-layer referencing of ALF is allowed in the CLVS, an index is signalled.
 - e.g., `sps_alf_inter_layer_idx` that indicates which reference layer from the list of the direct reference layers is signalled.
 - An index shall be constrained in the range of 0 to `NumDirectRefLayers[GeneralLayer[nuh_layer_id]]`.

	Descriptor
<code>seq_parameter_set_rbsp() {</code>	
<code>...</code>	
<code>sps_alf_enabled_flag</code>	<code>u(1)</code>
<code>if (sps_alf_enabled_flag) {</code>	
<code>sps_alf_inter_layer_ref_enabled_flag</code>	<code>u(1)</code>
<code>if (sps_alf_inter_layer_ref_enabled_flag)</code>	
<code>sps_alf_inter_layer_idx</code>	<code>ue(v)</code>
<code>}</code>	
<code>...</code>	

2. Optional disabling of the inter-layer referencing in the PH or SH

- In addition to Method 1, signal one enabling flag in each PH/SH
 - Will indicate on-off control of inter-layer referencing in the current picture/slice
 - Some pictures/slices in a CLVS may reference APSs from a different layer, while others reference APSs from the current layer
- APS ID will be signalled after the flag indicating inter-layer referencing on/off in the PH/SH
 - Will indicate that APSs with the signalled IDs are from the reference layer only when inter-layer referencing is enabled
 - e.g., `pic_alf_aps_id_luma[]` and `pic_alf_aps_id_chroma` depending on `ph_alf_inter_layer_ref_enabled_flag` in PH
 - e.g., `slice_alf_aps_id_luma[]` and `slice_alf_aps_id_chroma` depending on `slice_alf_inter_layer_ref_enabled_flag` in SH

2. Optional disabling of the inter-layer referencing in the PH or SH

picture_header_rbsp() {	Descriptor
...	...
if(sps_alf_enabled_flag) {	
pic_alf_enabled_present_flag	u(1)
if(pic_alf_enabled_present_flag) {	
pic_alf_enabled_flag	u(1)
if(pic_alf_enabled_flag) {	
if(sps_alf_inter_layer_ref_enabled_flag)	
ph_alf_inter_layer_ref_enabled_flag	u(1)
pic_num_alf_aps_ids_luma	u(3)
for(i = 0; i < pic_num_alf_aps_ids_luma; i++)	
pic_alf_aps_id_luma[i]	u(3)
if(ChromaArrayType != 0)	
pic_alf_chroma_idc	u(2)
if(pic_alf_chroma_idc)	
pic_alf_aps_id_chroma	u(3)
}	
}	
}	
...	...

slice_header() {	Descriptor
...	
if(sps_alf_enabled_flag && !pic_alf_enabled_present_flag) {	
slice_alf_enabled_flag	u(1)
if(slice_alf_enabled_flag) {	
if(sps_alf_inter_layer_ref_enabled_flag)	
slice_alf_inter_layer_ref_enabled_flag	u(1)
slice_num_alf_aps_ids_luma	u(3)
for(i = 0; i < slice_num_alf_aps_ids_luma; i++)	
slice_alf_aps_id_luma[i]	u(3)
if(ChromaArrayType != 0)	
slice_alf_chroma_idc	u(2)
if(slice_alf_chroma_idc)	
slice_alf_aps_id_chroma	u(3)
}	
}	
...	

Summary

- Two kinds of syntax designs are proposed.
 - The first design allows controlling inter-layer referencing on SPS level.
 - The second design further extends on/off control to a PH/SH level.
- It is suggested to adopt Method 1 or Method 2 into the next version of VVC Specification Draft.