JCTVC-N0215
ON SNR SCALABILITY INDICATION

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Introduction

- Spatial and SNR scalability are signaled in the same category (scalability_mask)
- The benefits to indicate SNR scalability
  - Resampling process of sample and motion field are for spatial scalability, not necessary for SNR scalability
  - Some inter-layer filters (SCE3) may achieve significant gain on SNR scalability, not spatial scalability
  - Certain applications may prefer single-loop design for SNR scalability only
  - The sample grid work (SCE1) addresses spatial scalability, not SNR scalability
- 3 options are proposed for discussion

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Proposed SNR scalability indication (option 1)

scalability_mask index	Scalability dimension	ScalabilityId mapping
0	multiview	ViewId
1	Spatial scalability	DependencyId
2	SNR scalability	SnrId
3-15	Reserved	

```
for (i = 0; i <= vps_max_layers_minus1; i++) {
    for( smIdx= 0, j =0; smIdx< 16; smIdx ++ )
      if( ( i ! = 0 )  &&  scalability_mask[ smIdx ] )
            ScalabilityId[ i ][ smIdx ] = dimension_id[ i ][ j++ ]
      else
            ScalabilityId[ i ][ smIdx ] = 0
    ViewId[ layer_id_in_nuh[ i ] ] = ScalabilityId[ i ][ 0 ]
    DependencyId [ layer_id_in_nuh[ i ] ] = ScalabilityId[ i ][ 1 ]
    SnrId [ layer_id_in_nuh[ i ] ] = ScalabilityId[ i ][ 2 ]
}
```

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Proposed SNR scalability indication (option 2)

vps_extension( ) {	Descriptor
…	
max_one_active_ref_layer_flag	u(1)
direct_dep_type_len_minus2	ue(v)
for(i = 1; i <= vps_max_layers_minus1; i++)	
for(j = 0; j < i; j++)	
if(direct_dependency_flag[i][j]) {	
SNR_scalability_flag[i][j]	u(1)
direct_dependency_type[i][j]	u(v)
}	
single_layer_for_non_irap_flag	u(1)
}	

SNR_scalability_flag equal to 1 specifies the scalability between layers with nuh_layer_id equal to layer_id_in_nuh[i] and nuh_layer_id equal to layer_id_in_nuh[j] is SNR scalability. SNR_scalability_flag equal to 0 specifies the scalability between layers with nuh_layer_id equal to layer_id_in_nuh[i] and nuh_layer_id equal to layer_id_in_nuh[j] is not SNR scalability. When SNR_scalability_flag is not present, it is inferred to be equal to 0.

SHVC WD2 G.8.1.4 can be simplified as below:

– ~~if PicWidthInSamplesL is equal to RefLayerPicWidthInSamplesL and PicHeightInSamplesL is equal to RefLayerPicHeightInSamplesL and the values of ScaledRefLayerLeftOffset, ScaledRefLayerTopOffset, ScaledRefLayerRightOffset and ScaledRefLayerBottomOffset are all equal to 0.~~ if SNR_scalability_flag[nuh_layer_id][dRlIdx] is set to 1,

  rsPicSample is set equal to rlPicSample,

  When alt_collocated_indication_flag is equal to 1, rsPicMotion is set equal to rlPicMotion.

– otherwise, rsPic is derived as follows:

  The picture sample resampling process as specified in subclause G.8.1.4.1 is invoked with the sample values of rlPicSample as input, and with the resampled sample values of rsPicSample as output.

  When alt_collocated_indication_flag is equal to 1, the picture motion field resampling process as specified in subclause G.8.1.4.2 is invoked with rlPicMotion as input, and with the resampled motion field of rsPicMotion as output.

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Proposed SNR indication (option 3.1)

sps_extension( ) {	Descriptor
inter_view_mv_vert_constraint_flag	u(1)
sps_extension_vui_parameters( )	
num_SNR_scalability_flags	ue(v)
for (j = 0; j < num_SNR_scalability_flags; j ++)	
SNR_scalability_flag[j]	u(1)
num_scaled_ref_layer_offsets	ue(v)
for(i = 0; i < num_scaled_ref_layer_offsets; i++) {	
scaled_ref_layer_left_offset[i]	se(v)
scaled_ref_layer_top_offset[i]	se(v)
scaled_ref_layer_right_offset[i]	se(v)
scaled_ref_layer_bottom_offset[i]	se(v)
}	
}	

num_SNR_scalability_flags specifies the number of SNR_scalability_flag signaled in SPS extension.

SNR_scalability_flag[j] equal to 1 specifies the scalability between current layer with layer ID equal to nuh_layer_id and its j-th direct reference layer is SNR scalability. SNR_scalability_flag[j] equal to 0 specifies the scalability between current layer and j-th direct reference layer is not SNR scalability. When SNR_scalability_flag is not present, it is inferred to be equal to 0.

In general the value of *num_SNR_scalability_flags* should be equal to the number of direct reference layers of the current enhancement layer.

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Proposed SNR indication (option 3.2)

sps_extension( ) {	Descriptor
inter_view_mv_vert_constraint_flag	u(1)
sps_extension_vui_parameters( )	
num_ref_layers	ue(v)
for (i= 0; i< num_ref_layers; i ++) {	
SNR_scalability_flag[i]	u(1)
~~**num_scaled_ref_layer_offsets**~~	~~ue(v)~~
~~for(i = 0; i < num_scaled_ref_layer_offsets; i++) {~~	
scaled_ref_layer_left_offset[i]	se(v)
scaled_ref_layer_top_offset[i]	se(v)
scaled_ref_layer_right_offset[i]	se(v)
scaled_ref_layer_bottom_offset[i]	se(v)
}	
}	

num_ref_layers specifies the number of reference layers signaled in SPS extension.

SNR_scalability_flag[i] equal to 1 specifies the scalability between current layer with layer ID equal to nuh_layer_id and its i-th direct reference layer is SNR scalability. SNR_scalability_flag[i] equal to 0 specifies the scalability between current layer and i-th direct reference layer is not SNR scalability. When SNR_scalability_flag is not present, it is inferred to be equal to 0.

In general the value of *num_ref_layers* should be equal to the number of direct reference layers of the current enhancement layer.

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Conclusion

- SNR scalability indication would simplify the codec initialization and memory allocation for specific applications

- Suggest to adopt SNR scalability indication into SHVC

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