

# JVET-P0362

## AHG17: NAL unit header extension to extend the number of layers



Rickard Sjöberg, Martin Pettersson, Mitra Damghanian (Ericsson)

# Background – NAL unit header



Current syntax (VVC-d6):

- 6 bits used for nuh\_layer\_id
- Provide a maximum of 64 layer ids.
- Sufficient for many applications.
- More layer id values are desirable for some use-cases e.g. lenslet array.

<code>nal_unit_header( ) {</code>	<b>Descriptor</b>
<code>forbidden_zero_bit</code>	f(1)
<code>nuh_reserved_zero_bit</code>	u(1)
<code>nuh_layer_id</code>	u(6)
<code>nal_unit_type</code>	u(5)
<code>nuh_temporal_id_plus1</code>	u(3)
<code>}</code>	

# Proposal



- We propose a variable length NAL unit header design to provide a larger range of layer id values.
- 56 layers using a 2-byte NAL unit header and 2104 layers using a 3-byte NAL unit header.

<code>nal_unit_header( ) {</code>	<b>Descriptor</b>
<b>forbidden_zero_bit</b>	f(1)
<b>nuh_reserved_zero_bit</b>	u(1)
<b>nuh_layer_id</b>	u(6)
<b>nal_unit_type</b>	u(5)
<b>nuh_temporal_id_plus1</b>	u(3)
<b>if( nuh_layer_id &gt;= 56 )</b>	
<b>nuh_layer_id_extension_value</b>	<b>u(8)</b>
<b>}</b>	

If nuh\_layer\_id is smaller than 56:

LayerID = nuh\_layer\_id

Otherwise:

LayerID = 56 + ( ( nuh\_layer\_id - 56 ) \* 256 ) + nuh\_layer\_id\_extension\_value

# Proposal

## Semantics



### VVC

**nuh\_layer\_id** specifies the identifier of the layer to which a VCL NAL unit belongs or the identifier of a layer to which a non-VCL NAL unit applies.

The value of `nuh_layer_id` shall be the same for all VCL NAL units of a coded picture. The value of `nuh_layer_id` of a coded picture or a layer access unit is the value of the `nuh_layer_id` of the VCL NAL units of the coded picture or the layer access unit.

### Proposed

**nuh\_layer\_id** is used to derive the variable `LayerID`.

**nuh\_layer\_id\_extension\_value** is used to derive the variable `LayerID`. When `nuh_layer_id_extension_value` is not present, it is inferred to be equal to 0. The variable `LayerID`, which specifies the identifier of the layer to which a VCL NAL unit belongs or the identifier of a layer to which a non-VCL NAL unit applies, is derived as follows:

- If `nuh_layer_id` is smaller than 56, `LayerID` is set equal to `nuh_layer_id`
- Otherwise, `LayerID` is derived as follows:

$$\text{LayerID} = 56 + ((\text{nuh\_layer\_id} - 56) * 256) + \text{nuh\_layer\_id\_extension\_value} \quad (\text{X-XX})$$

The value of `LayerID` shall be the same for all VCL NAL units of a coded picture. The value of `LayerID` of a coded picture or a layer access unit is the value of the `LayerID` of the VCL NAL units of the coded picture or the layer access unit.

NOTE X – `LayerID` values 0 to 55 are signaled using a 2 byte NAL unit header. `LayerID` values 56 to 2103 are signaled using a 3 byte NAL unit header.

[Ed. (RSS): Replace occurrences of `nuh_layer_id` with `LayerID` throughout the specification.]



# Proposal



If nuh\_layer\_id is smaller than 56:

LayerID = nuh\_layer\_id

Otherwise:

LayerID = 56 + ( ( nuh\_layer\_id - 56 ) \* 256 ) + nuh\_layer\_id\_extension\_value

nal_unit_header( ) {	Descriptor
<b>forbidden_zero_bit</b>	f(1)
<b>nuh_reserved_zero_bit</b>	u(1)
<b>nuh_layer_id</b>	u(6)
<b>nal_unit_type</b>	u(5)
<b>nuh_temporal_id_plus1</b>	u(3)
if( nuh_layer_id >= 56 )	
<b>nuh_layer_id_extension_value</b>	u(8)
}	

—  $N = 2^{(6+4)} - 255 * V$

V: the number of LayerID values using a 2-byte NAL unit header

N: the number of LayerID values using a 3-byte NAL unit header