

The background is a solid green color with a repeating pattern of white line-art icons. These icons include various nautical items like anchors, lifebuoys, and compasses, as well as outdoor and travel-related symbols like a bird, a lightning bolt, a sun, and a seashell.

**MEDIATEK**

**JVET-Q0181**

# **AHG9: On signalling of virtual boundary**

**Authors: Chih-Yao Chiu, Chun-Chia Chen, Chih-Wei Hsu, Lulin Chen,  
Ching-Yeh Chen, Yu-Wen Huang, Shaw-Min Lei**

**Presenter: Chih-Wei Hsu**

# Overview

- Problem definition

Current signalling of virtual boundary (VB) introduces redundancy when the content is 360-degree video and GDR is enabled

- Two methods are proposed

1. Provide override mechanism for VB
2. Signal extra VB for GDR picture

# Introduction

- In VVC Draft 7,

Signalling of virtual boundary (VB) is present in either SPS or PH

SPS RBSP syntax

... ..
<b>sps_virtual_boundaries_present_flag</b>
if( <b>sps_virtual_boundaries_present_flag</b> ) {
... .. // Specify the number and position of VBs
}
... ..

PH RBSP syntax

... ..
if( ! <b>sps_virtual_boundaries_present_flag</b> ) {
... .. // Specify the number and position of VBs
}
... ..

- VB is applicable to 360 video or GDR pictures



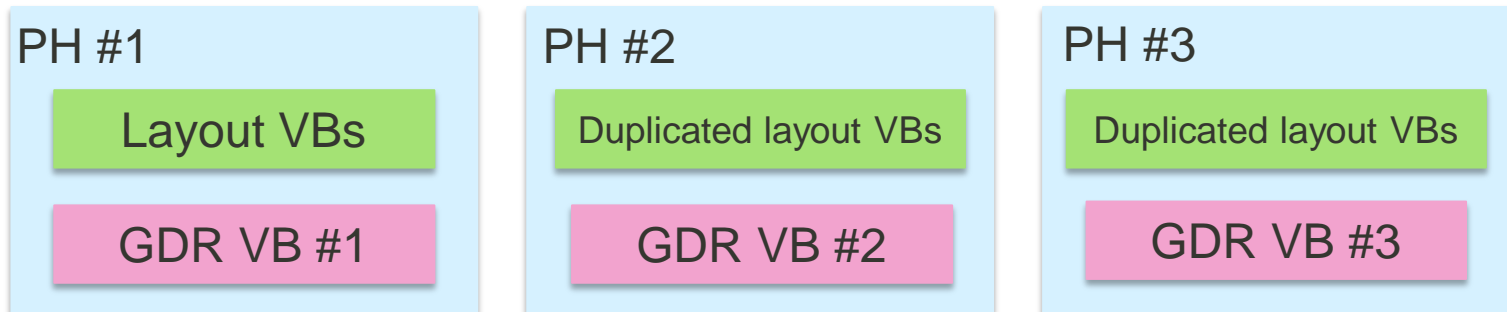
Layout VB



GDR-dedicated VB

# Problem Description

- When the content is 360-degree video and GDR is enabled
  - Both layout VBs and GDR VB need to be specified in PH
  - **Signalling duplicated layout VBs in PH introduces redundancy**



# Method 1: Override VBs in PH

SPS RBSP syntax

... ..
<b>sps_virtual_boundaries_present_flag</b>
if( sps_virtual_boundaries_present_flag ) {
<b>sps_virtual_boundaries_override_enabled_flag</b>
<b>sps_num_ver_virtual_boundaries</b>
for( i = 0; i < sps_num_ver_virtual_boundaries; i++ )
<b>sps_virtual_boundaries_pos_x[ i ]</b>
... ..
}
... ..

PH RBSP syntax

... ..
if( !sps_virtual_boundaries_present_flag
<b>sps_virtual_boundaries_override_enabled_flag</b> ) {
<b>ph_virtual_boundaries_present_flag</b>
if( ph_virtual_boundaries_present_flag ) {
<b>ph_num_ver_virtual_boundaries</b>
for( i = 0; i < ph_num_ver_virtual_boundaries; i++ )
<b>ph_virtual_boundaries_pos_x[ i ]</b>
... ..
}
}
... ..

## ■ Benefits

- For pictures outside the GDR recovery period, layout VBs are signalled in SPS rather than PH to avoid redundancy

# Method 2: Signal GDR-dedicated VB in PH

PH RBSP syntax

.....
if ( gdr_enabled_flag ) {
<b>ph_gdr_dedicated_virtual_boundary_present_flag</b>
if(ph_gdr_dedicated_virtual_boundaries_present_flag) {
<b>ph_gdr_dedicated_virtual_boundary_is_ver_flag</b>
<b>ph_gdr_dedicated_virtual_boundary_pos</b>
}
}
.....

## ■ Benefits

- For pictures outside the GDR recovery period, layout VBs are signalled in SPS rather than PH to avoid redundancy
- For pictures in GDR recovery period, only one GDR VB needs to be signalled
  - No need to override the layout VBs in PH

# Conclusion

- Current signalling of VB introduces redundant bits when the content is 360-degree video and GDR is enabled
- Proposed methods alleviate the problem by
  1. Override the VBs in PH if needed
  2. Signal GDR-dedicated VB for each GDR picture