

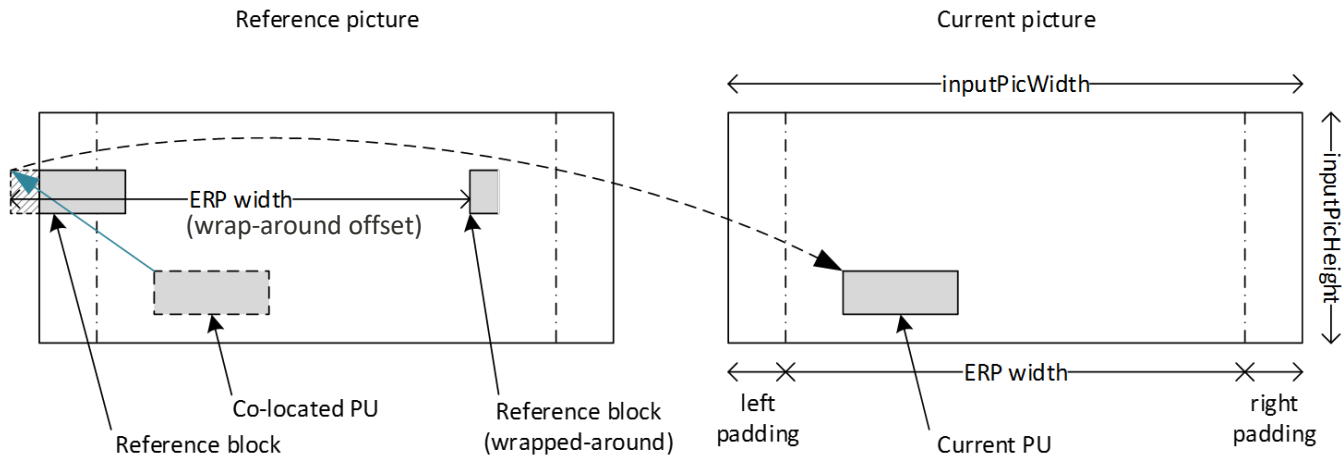


# AHG6/AHG9: Signalling wrap-around for subpictures

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# Introduction

- Wrap-around motion compensation
  - The horizontal wrap-around motion compensation can improve the visual quality of reconstructed 360 videos with the ERP format.



# Introduction

- Subpicture
  - One of the main use cases is the viewport-dependent 360 streaming.



full 360 ERP

viewing direction

# Wrap-around Direction



vertical wrap-around

# Proposed Methods

- Add wrap-around motion compensation support for subpictures
- Wrap-around can be horizontal or vertical
- Option 1: Signal wrap-around with a direction flag and offset for each subpicture when enabling
- Option 2: Enable wrap-around with constraints

# Option 1

seq_parameter_set_rbsp( ) {	Descriptor
...	
<b>subpics_present_flag</b>	u(1)
if( subpics_present_flag ) {	
<b>sps_num_subpics_minus1</b>	u(8)
for( i = 0; i <= sps_num_subpics_minus1; i++ ) {	
<b>subpic_ctu_top_left_x[ i ]</b>	u(v)
<b>subpic_ctu_top_left_y[ i ]</b>	u(v)
<b>subpic_width_minus1[ i ]</b>	u(v)
<b>subpic_height_minus1[ i ]</b>	u(v)
<b>subpic_treated_as_pic_flag[ i ]</b>	u(1)
<b>loop_filter_across_subpic_enabled_flag[ i ]</b>	u(1)
if( subpic_treated_as_pic_flag[ i ] ) {	
<b>subpic_ref_wraparound_enabled_flag[ i ]</b>	u(1)
if( subpic_ref_wraparound_enabled_flag[ i ] ) {	
<b>subpic_ref_wraparound_horizontal_flag[ i ]</b>	u(1)
<b>subpic_ref_wraparound_offset_minus1[ i ]</b>	ue(v)
}	
}	
}	
}	
...	

# Option 2

seq_parameter_set_rbsp( ) {	Descriptor
...	
<b>subpics_present_flag</b>	u(1)
if( subpics_present_flag ) {	
<b>sps_num_subpics_minus1</b>	u(8)
for( i = 0; i <= sps_num_subpics_minus1; i++ ) {	
...	
<b>subpic_treated_as_pic_flag[ i ]</b>	u(1)
<b>loop_filter_across_subpic_enabled_flag[ i ]</b>	u(1)
if( subpic_treated_as_pic_flag[ i ] && sps_ref_wraparound_enabled_flag ) {	
<b>subpic_ref_wraparound_enabled_flag[ i ]</b>	u(1)
if( subpic_ref_wraparound_enabled_flag[ i ] ) {	
<b>subpic_ref_wraparound_horizontal_flag[ i ]</b>	u(1)
}	
}	
}	
}	
...	

It is a requirement of bitstream conformance that subpic\_ref\_wraparound\_horizontal\_flag[ i ] shall not be equal to 1 when subpic\_ref\_wraparound\_enabled\_flag[ i ] is equal to 1 and the value of subpic\_width\_minus1[ i ] is not equal to PicWidthInCtbsY – 1.

It is a requirement of bitstream conformance that subpic\_ref\_wraparound\_horizontal\_flag[ i ] shall not be equal to 0 when subpic\_ref\_wraparound\_enabled\_flag[ i ] is equal to 1 and the value of subpic\_height\_minus1[ i ] is not equal to PicHeightInCtbsY – 1.

# Summary

- Propose to signal wrap-around for subpictures.
- Wrap-around can be horizontal or vertical.
- Two options are proposed
  - Signal wrap-around with a direction flag and offset for each subpicture when enabling
  - Enable wrap-around with constraints on subpicture width / height



**Thank you!**