

AHG8: On Adaptive Resolution Change (ARC) High-Level Syntax (HLS)

J. Samuelsson, S. Deshpande, A. Segall



Proposal summary

1. Introduce PicSizeUnit to be used as unit for signalling all syntax elements that express picture width and height
2. Introduce conformance window for “reduced resolution pictures”
3. Use output resolution for calculating scaling factor between current picture and reference pictures

Design goals

- A. Allow the same flexibility for signaling width and height of reduced picture resolution as for full picture resolutions.
- B. Minimize signaling overhead, both when ARC is used and when it is not used.
- C. The exact width and height of different reduced resolution pictures should not have to be decided at the start of the CVS.

SPS

seq_parameter_set_rbsp() {	Descriptor
...	
~~—pic_width_in_luma_samples~~	~~ue(v)~~
~~—pic_height_in_luma_samples~~	~~ue(v)~~
pic_size_unit_minus1	ue(v)
max_pic_width_in_pic_size_units_minus1	ue(v)
max_pic_height_in_pic_size_units_minus1	ue(v)
...	
}	

The variable PicSizeUnit is derived as follows:

$$\text{PicSizeUnit} = (\text{pic_size_unit_minus1} + 1)$$

PPS

pic_parameter_set_rbsp() {	Descriptor
...	
pic_size_different_from_max_flag	u(1)
if (pic_size_different_from_max_flag) {	
pic_width_in_pic_size_units_minus1	ue(v)
pic_height_in_pic_size_units_minus1	ue(v)
pps_conformance_window_flag	u(1)
if(pps_conformance_window_flag) {	
pps_conf_win_left_offset	ue(v)
pps_conf_win_right_offset	ue(v)
pps_conf_win_top_offset	ue(v)
pps_conf_win_bottom_offset	ue(v)
}	
}	
...	
}	

Scale factor

The variables PicOutputWidthL and PicOutputHeightL are derived as follows:

$$\text{PicOutputWidthL} = \text{pic_width_in_pic_size_units} * \text{PicSizeUnit} - \text{SubWidthC} * (\text{pps_conf_win_right_offset} + \text{pps_conf_win_left_offset})$$

$$\text{PicOutputHeightL} = \text{pic_height_in_pic_size_units} * \text{PicSizeUnit} - \text{SubHeightC} * (\text{pps_conf_win_bottom_offset} + \text{pps_conf_win_top_offset})$$

The variables HoriScaleFp and VertScaleFp are derived as follows:

$$\text{HoriScaleFp} = (\text{RefPicOutputWidthL} \ll 14) / \text{PicOutputWidthL}$$

$$\text{VertScaleFp} = (\text{RefPicOutputHeightL} \ll 14) / \text{PicOutputHeightL}$$

where RefPicOutputWidthL and RefPicOutputHeightL are the PicOutputWidthL and the PicOutputHeightL of the picture used for reference, respectively.

Impact on non-ARC use cases

Cost: 1 bit in the PPS

Gain: PicSizeUnit will generally make it possible to reduce the number of bits for signalling width and height. Example 3840x2160 can be signalled with $15 + 9 + 7 = 31$ bits instead of $23 + 23 = 46$ bits

Proposal summary

1. Introduce PicSizeUnit to be used as unit for signalling all syntax elements that express picture width and height
2. Introduce conformance window for “reduced resolution pictures”
3. Use output resolution for calculating scaling factor between current picture and reference pictures



SHARP[®]
LABORATORIES
OF AMERICA

The logo is centered on a background of a blue sky with white, fluffy clouds. The word "SHARP" is in a large, bold, red sans-serif font. A small registered trademark symbol (®) is located at the bottom right of the word. A thin horizontal line is positioned directly below "SHARP". Below this line, the words "LABORATORIES" and "OF AMERICA" are stacked in a smaller, black, all-caps sans-serif font.