

# **Removal of input picture size constraint and picture cropping offset parameters in sequence parameter set**

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# Introduction

## ❖ Committee Draft (CD) & HM6.0

- picture width and height are signalled in **sample unit**
  - *pic\_width\_in\_luma\_samples* and *pic\_height\_in\_luma\_samples* in SPS
- A constraint on picture width and height exists
  - picture width and height shall be **integer multiple of minimum CU size**
- Picture cropping process
  - Invoked when picture width and/or height is not integer multiple of minimum CU size
  - supports general functionality by signalling **four picture cropping offset parameters** (*pic\_crop\_left\_offset*, *pic\_crop\_right\_offset*, *pic\_crop\_top\_offset*, and *pic\_crop\_bottom\_offset*) in SPS

## ❖ Proposal

- **Removal of constraint** on picture width and height
- Position change of picture cropping offset parameters from **SPS to SEI**
  - mandatory picture cropping is conducted in the decoding process when width and/or height of input picture is not multiple of minimum CU size

# CD & HM6.0

## ❖ Snippet of SPS brought from the CD text

- picture width and height are signalled in sample unit. ue(v)
- 4 picture cropping offset parameters

seq_parameter_set_rbsp( ) {	Descriptor
profile_idc	u(8)
reserved_zero_8bits /* equal to 0 */	u(8)
level_idc	u(8)
seq_parameter_set_id	ue(v)
chroma_format_idc	ue(v)
if( chroma_format_idc == 3 )	
separate_colour_plane_flag	u(1)
max_temporal_layers_minus1	u(3)
pic_width_in_luma_samples	ue(v)
pic_height_in_luma_samples	ue(v)
pic_cropping_flag	u(1)
if( pic_cropping_flag ) {	
pic_crop_left_offset	ue(v)
pic_crop_right_offset	ue(v)
pic_crop_top_offset	ue(v)
pic_crop_bottom_offset	ue(v)
}	

# Proposed (1)

## ❖ Removal of constraint on picture width and height

- **pic\_width\_in\_luma\_samples** specifies the width of each decoded picture in units of luma samples. **pic\_width\_in\_luma\_samples** shall not be equal to 0 and ~~shall be an integer multiple of  $(1 \ll \text{Log2MinCbSize})$~~ . The variable **PicWidthInSamplesL** is derived as follows.
- $$\text{PicWidthInSamplesL} = \text{Ceil}(\text{pic\_width\_in\_luma\_samples} \div (1 \ll \text{Log2MinCbSize})) * (1 \ll \text{Log2MinCbSize})$$
- **pic\_height\_in\_luma\_samples** specifies the height of each decoded picture in units of luma samples. **pic\_height\_in\_luma\_samples** shall not be equal to 0 and ~~shall be an integer multiple of  $(1 \ll \text{Log2MinCbSize})$~~ . The variable **PicHeightInSamplesL** is derived as follows.
- $$\text{PicHeightInSamplesL} = \text{Ceil}(\text{pic\_height\_in\_luma\_samples} \div (1 \ll \text{Log2MinCbSize})) * (1 \ll \text{Log2MinCbSize})$$

# Proposed (2)

## ❖ Position change of picture cropping offset parameters from **SPS** to **SEI**

seq_parameter_set_rbsp( ) {	Descriptor	
profile_idc	u(8)	
reserved_zero_8bits /* equal to 0 */	u(8)	
level_idc	u(8)	
seq_parameter_set_id	ue(v)	
chroma_format_idc	ue(v)	
if( chroma_format_idc == 3 )		
separate_colour_plane_flag	u(1)	
max_temporal_layers_minus1	u(3)	
pic_width_in_luma_samples	ue(v)	
pic_height_in_luma_samples	ue(v)	
pic_cropping_flag	u(1)	
if( pic_cropping_flag ) {		
pic_crop_left_offset	ue(v)	
pic_crop_right_offset	ue(v)	
pic_crop_top_offset	ue(v)	
pic_crop_bottom_offset	ue(v)	
}		

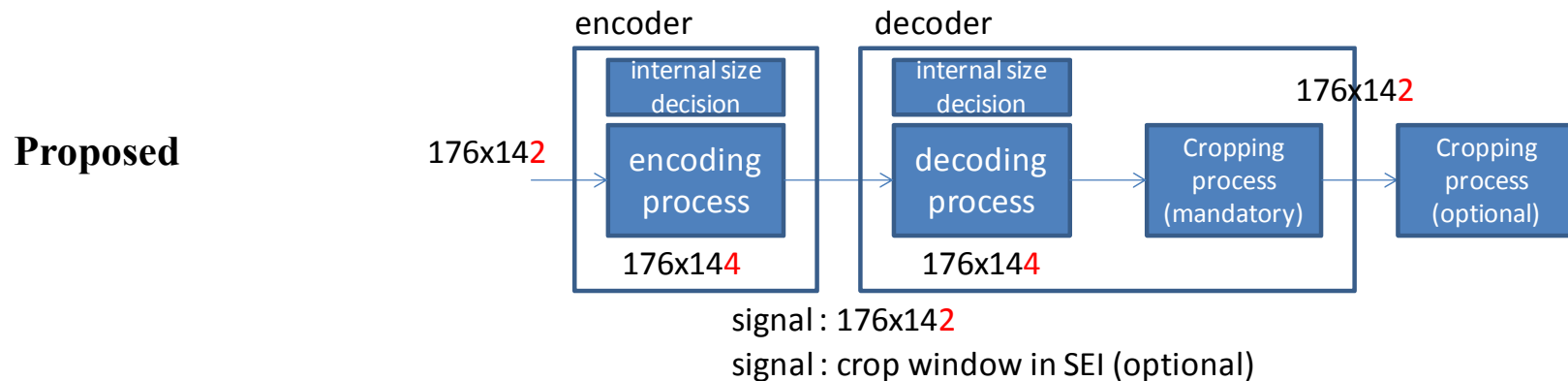
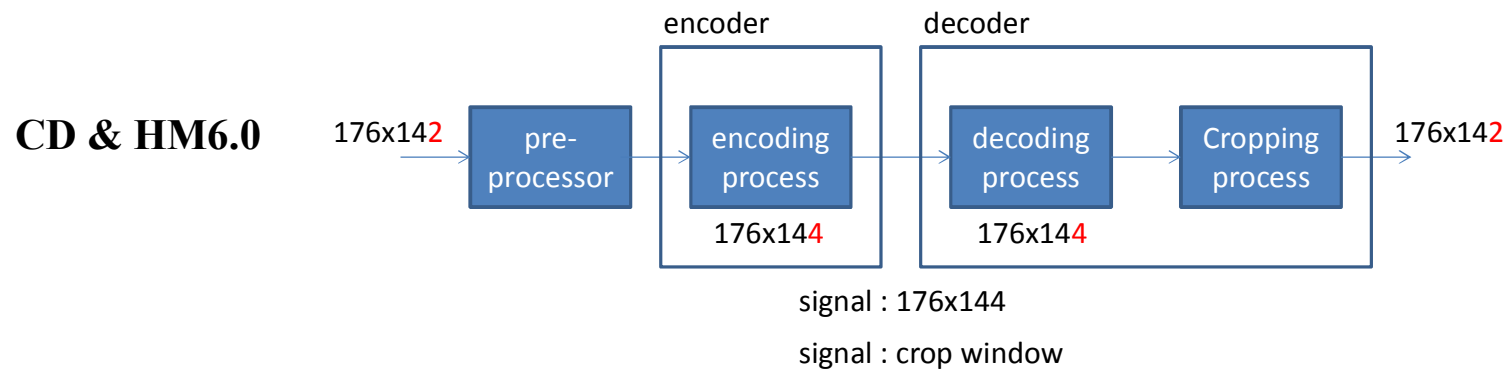
**SPS**

picture_cropping_offset_parameter( payloadSize ) {	Descriptor	
pic_cropping_flag	u(1)	
if( pic_cropping_flag ) {		
pic_crop_left_offset	ue(v)	
pic_crop_right_offset	ue(v)	
pic_crop_top_offset	ue(v)	
pic_crop_bottom_offset	ue(v)	
}		
}		

**SEI**

# Example

- ❖ Resolution of input picture is 176x142 and minimum CU size is 8



# Conclusions

- ❖ Removal of a constraint on picture width and height was proposed.
- ❖ Based on the proposal, it was also suggested to move the position of picture cropping offset parameters from SPS to SEI.
  - **Mandatory picture cropping is conducted in the decoding process when width and/or height of input picture is not multiple of minimum CU size**
- ❖ By this modification, general cropping functionality is kept as optional and only mandatory cropping process is kept in the decoding process.
- ❖ It is recommended to adopt this proposal in the HEVC standard.