

JVET-P0351

AHG12: On Subpicture merging

Ouedraogo Nael
Denoual Franck
Mazé Frédéric

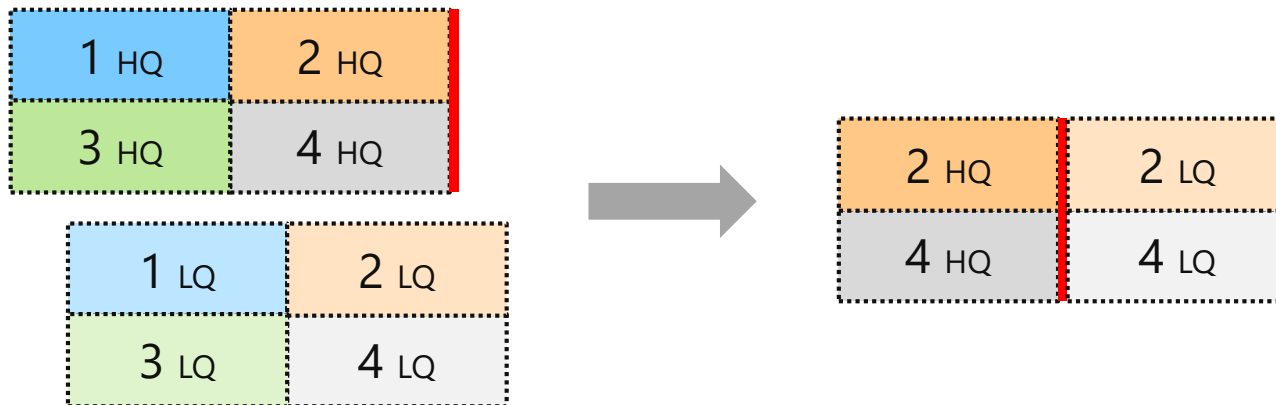
Context

■ Picture size not multiple of CTB size

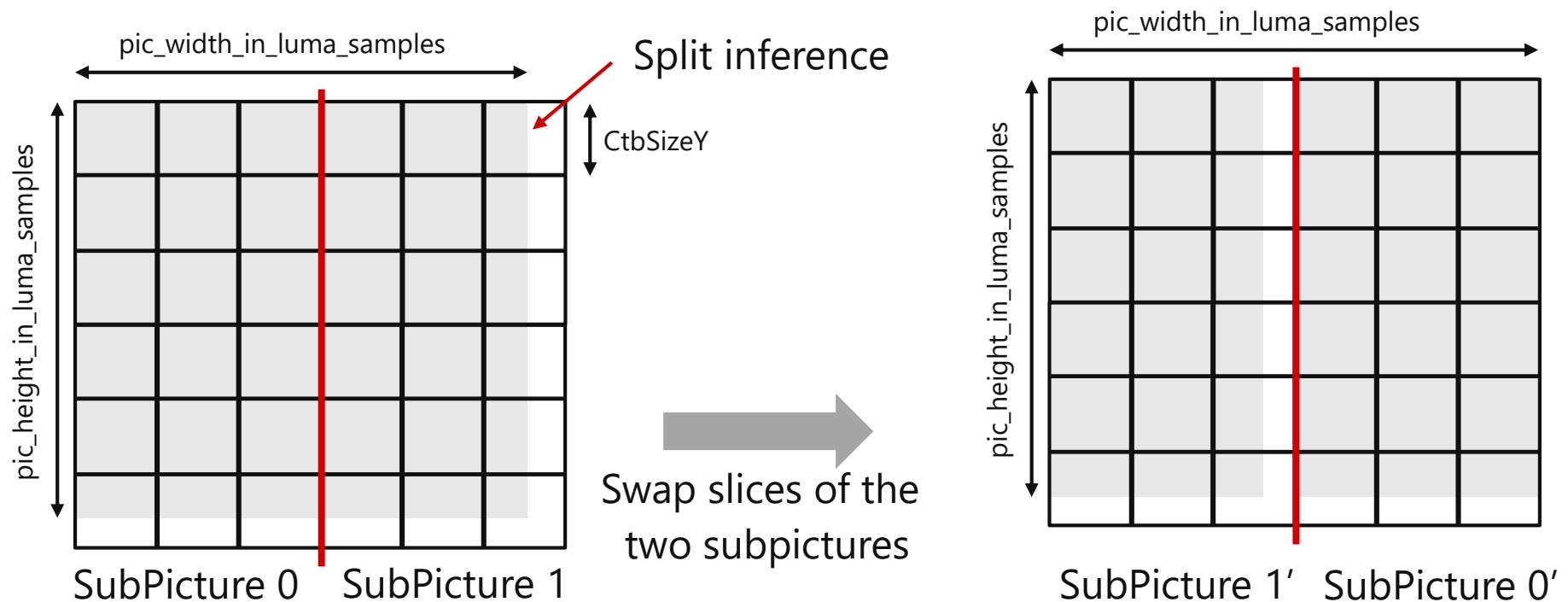
- Triggers split inference of the CTBs on the picture boundaries
- Split is inferred and split flag is not coded when
 - Either CTB right boundary is greater than `pic_width_in_luma_samples`
 - or CTB bottom boundary is greater than `pic_height_in_luma_samples`

■ Merging of subpictures in a new video sequence

- Slices containing the CTBs on the picture boundaries are placed at new locations
- CTBs for which split is inferred are now in the middle of the picture
 - Split is not inferred since inference conditions are not verified
- Limits the possible merging operations without rewriting of Slice data



Context: example of merging issue



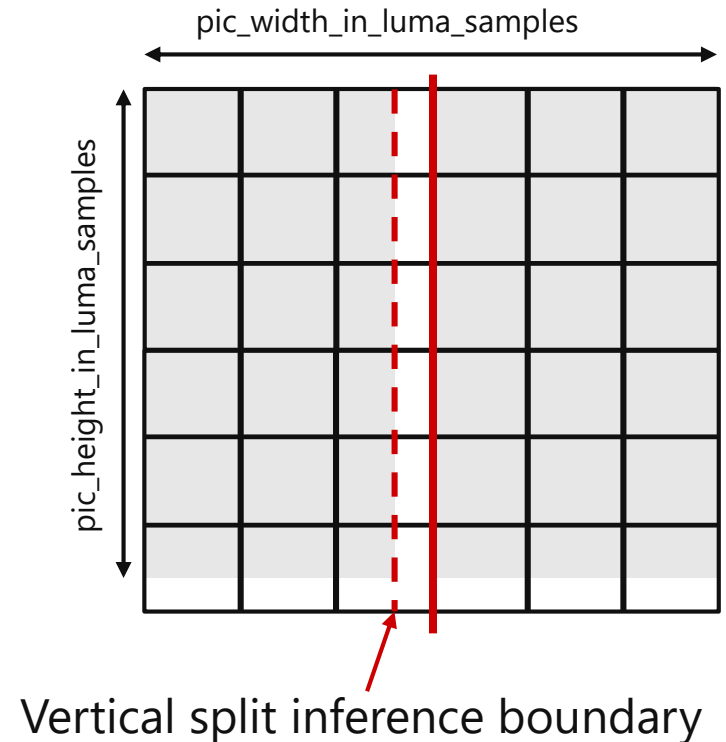
Proposal

■ Define split inference boundaries for subpictures

- Span across the whole picture
- Vertical or Horizontal
- Specified in the SPS

■ CTB is inferred to split

- When current subpicture is crossed by a split inference boundary
- Either CTB right boundary is greater than `SubPicInferenceBoundaryPosX`
- or CTB bottom boundary is greater than `SubPicInferenceBoundaryPosY`



Split boundaries constraints

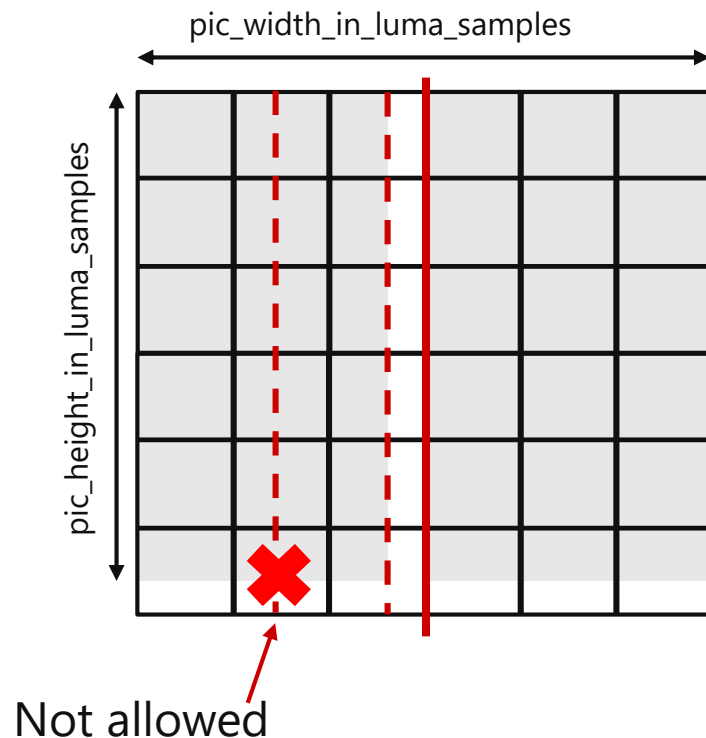
■ Proposed constraints

■ Requirement for subpictures crossed by split inference boundaries

- `subpic_treated_as_pic_flag[i]` equal to 1
- `loop_filter_across_subpic_enabled_flag[i]` equal to 0

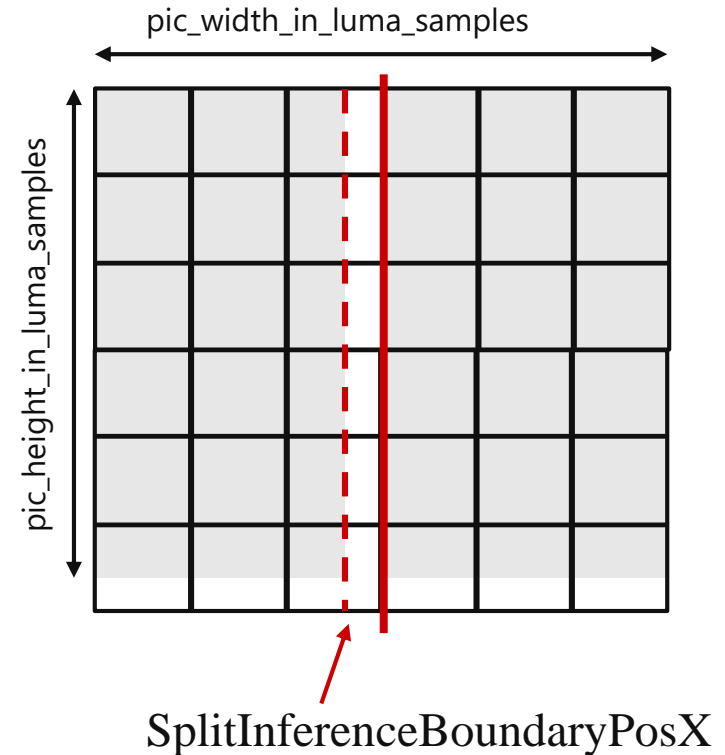
■ Split inference boundary crosses only CTBs

- Of the last CTB columns of subpictures for vertical boundary
- Of the last CTB rows of subpictures for horizontal boundary



SPS syntax

sequence_parameter_set_rbsp() {	Descriptor
[...]	
subpics_present_flag	u(1)
if(subpics_present_flag) {	
max_subpics_minus1	u(8)
subpic_grid_col_width_minus1	u(v)
subpic_grid_row_height_minus1	u(v)
for(i = 0; i < NumSubPicGridRows; i++)	
for(j = 0; j < NumSubPicGridCols; j++)	
subpic_grid_idx[i][j]	u(v)
for(i = 0; i <= NumSubPics; i++) {	
subpic_treated_as_pic_flag[i]	u(1)
loop_filter_across_subpic_enabled_flag[i]	u(1)
}	
subpic_split_inference_flag	u(1)
if(subpic_split_inference_flag) {	
split_inference_boundary_pos_x	u(13)
split_inference_boundary_pos_y	u(13)
}	
}	
[...]	



The location of the vertical split inference boundary `SplitInferenceBoundaryPosX` is derived as follows:

$$\text{SplitInferenceBoundaryPosX} = \text{split_inference_boundary_pos_x} * 4$$

The location of the horizontal split inference boundary `SplitInferenceBoundaryPosY` is derived as follows:

$$\text{SplitInferenceBoundaryPosY} = \text{split_inference_boundary_pos_y} * 4;$$

CTB split inference conditions

When `split_cu_flag` is not present, the value of `split_cu_flag` is inferred as follows:

If one or more of the following conditions are true, the value of `split_cu_flag` is inferred to be equal to 1:

- `SubPicInferenceSplitFlag` equal to 0 and $x0 + cbWidth$ is greater than `pic_width_in_luma_samples`.
- `SubPicInferenceSplitFlag` equal to 0 and $y0 + cbHeight$ is greater than `pic_height_in_luma_samples`.
- `SubPicInferenceSplitFlag` equal to 1 and $x0 + cbWidth$ is greater than `SubPicInferenceBoundaryPosX`
- `SubPicInferenceSplitFlag` equal to 1 and $y0 + cbHeight$ is greater than `SubPicInferenceBoundaryPosY`

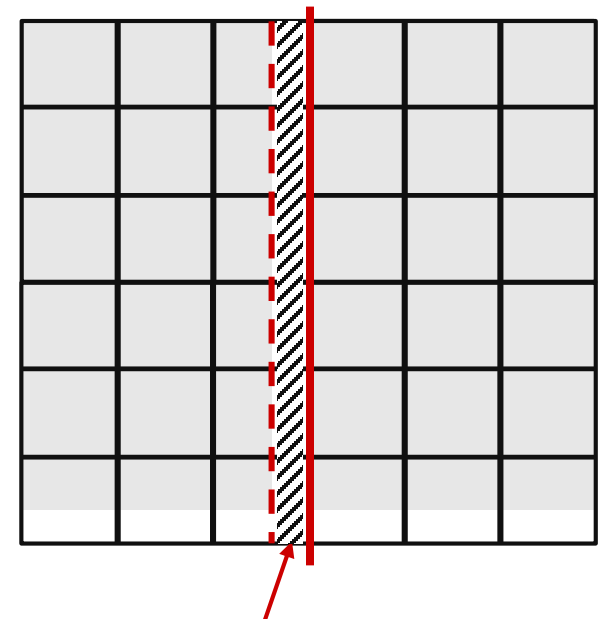
Otherwise, the value of `split_cu_flag` is inferred to be equal to 0.

Exclusion bands for conformance window

■ Band of pixels excluded from the conformance window

- Remove the subpicture areas with non conformant pixels
- Vertical and horizontal bands
- Defines at PPS level

picture_parameter_set_rbsp() {	Descriptor
[...]	
conformance_exclusion_ver_band_flag	u(1)
if (conformance_exclusion_ver_band_flag) {	
conformance_exclusion_ver_band_width_minus1	ue(v)
conformance_exclusion_ver_band_pos_x	ue(v)
}	
conformance_exclusion_hor_band_flag	u(1)
if (conformance_exclusion_hor_band_flag) {	
conformance_exclusion_hor_band_height_minus1	ue(v)
conformance_exclusion_hor_band_pos_y	ue(v)
}	



Vertical exclusion band

Conclusion

■ Proposed changes

- Reduce the limitations on the possible merging operations
- Avoid displaying not conformant pixels when merging subpictures