

# Region-wise quality indication SEI message

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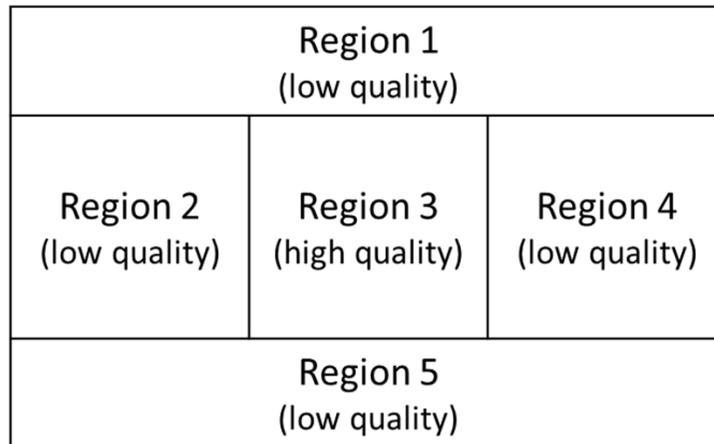
(JCTVC-AA0030)

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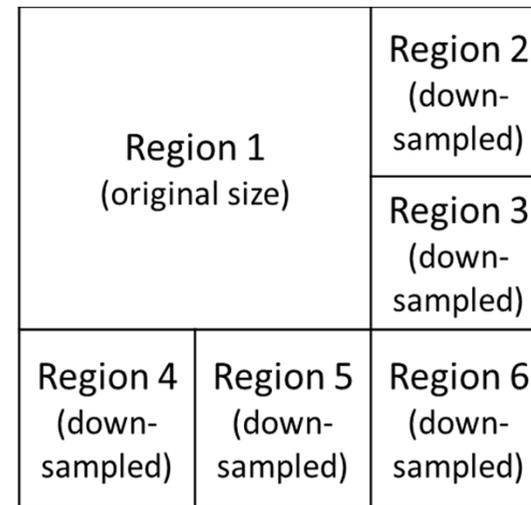
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- In the application of 360 video, a selected region of an entire picture is played on a display.
  - The size of the picture for 360 view is 4K or higher.
- Due to the bandwidth limitation in delivery, region-wise different picture quality is in discussion with regards to the region of interest.
  - Examples
    - region-wise different PQ offset
    - region-wise different spatial resolution
  - Pros and cons
    - Pros: more bits could be allocated for the most interested regions.
    - Cons: unintended artifacts, such as region boundary edges, could be introduced.
- In receivers, picture quality is important regardless of the delivery burdens.
  - Post-processing could be performed to alleviate the unrealistic edges before display the generated viewport on a display.

- Two types of quality degradation is considered for 360 video
  - (a) region-wise quantization
    - e.g. ERP encoded with region-wise difference quantization
      - low quantization parameter for the central region
      - higher quantization parameter for the other regions.
  - (b) region-wise spatial down-sampling
    - e.g. down-sampled CMP
      - original size for the most interested face
      - down-sampling (spatially degraded) for the other regions.



(a)



(b)

- To improve viewer experience, region-wise processing is needed according to the quality degradation characteristics, such as,
  - type of quality degradation
  - level of quality difference
  - detailed information for quality degradation
- In addition, spherical coordinate is proposed for each rectangular regions to provide a direct relationship between the rectangular region and the corresponding viewpoint.

# Proposed region-wise quality indication

JCTVC-AA0030

	Descriptor
region_wise_quality_indication(payloadSize) {	
<b>region_wise_quality_indication_id</b>	ue(v)
<b>region_wise_quality_indication_cancel_flag</b>	u(1)
if( !region_wise_quality_indication_cancel_flag ) {	
<b>region_wise_quality_indication_persistence_flag</b>	u(1)
<b>region_wise_spherical_coordinate_flag</b>	u(1)
<b>quality_indication_type</b>	u(4)
<b>number_of_region_minus1</b>	u(8)
for( i = 0; i <= number_of_region_minus1; i++ ) {	
<b>region_top_offset[ i ]</b>	u(8)
<b>region_left_offset[ i ]</b>	u(8)
<b>region_bottom_offset[ i ]</b>	u(8)
<b>region_right_offset[ i ]</b>	u(8)
if( region_wise_spherical_coordinate_flag ) {	
<b>region_yaw_center[ i ]</b>	i(16)
<b>region_pitch_center[ i ]</b>	i(16)
<b>region_roll_center[ i ]</b>	i(16)
<b>region_yaw_range[ i ]</b>	u(16)
<b>region_pitch_range[ i ]</b>	u(16)
}	
<b>region_quality_indication_level[ i ]</b>	u(8)
<b>region_quality_indication_info[ i ]</b>	u(8)
}	
}	
}	

- Proposed to define a new SEI message for region-wise quality indication
  - type of quality degradation
  - level of quality difference
  - detailed information for quality degradation
- In addition, spherical coordinate is provided for each rectangular regions.
- Receivers could improve the image quality when the difference quality of images are seen in a viewport by using the information provided.

**Thank you**