



# AHG9: On the Proposed Multiplane Image Information SEI Message

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JVET-AF0167

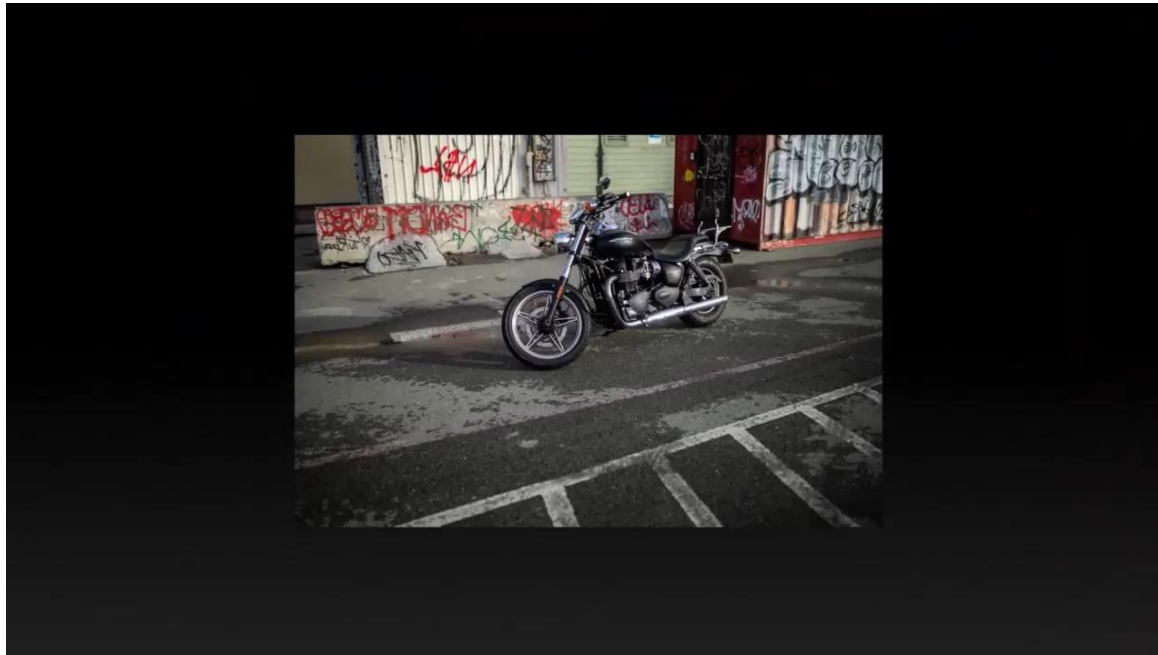
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# Outline

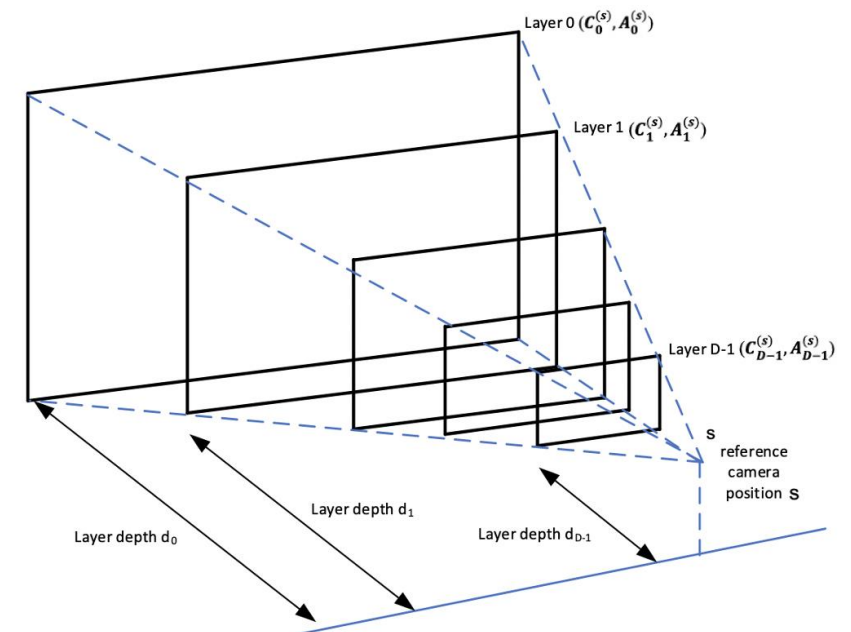
- Proposed multiplane image information SEI
  - Was proposed in JVET-AE0066
- Conclusions

# Multi-Plane Image (MPI)

- A volumetric scene representation using multiple layers of RGBA images.
- Computationally efficient novel view rendering with state of art view synthesis performance
- Enable new viewing experiences using existing image/video transmission infrastructures and viewing devices.



"Local Light Field Fusion: Practical View Synthesis with Prescriptive Sampling Guidelines", Siggraph 2019



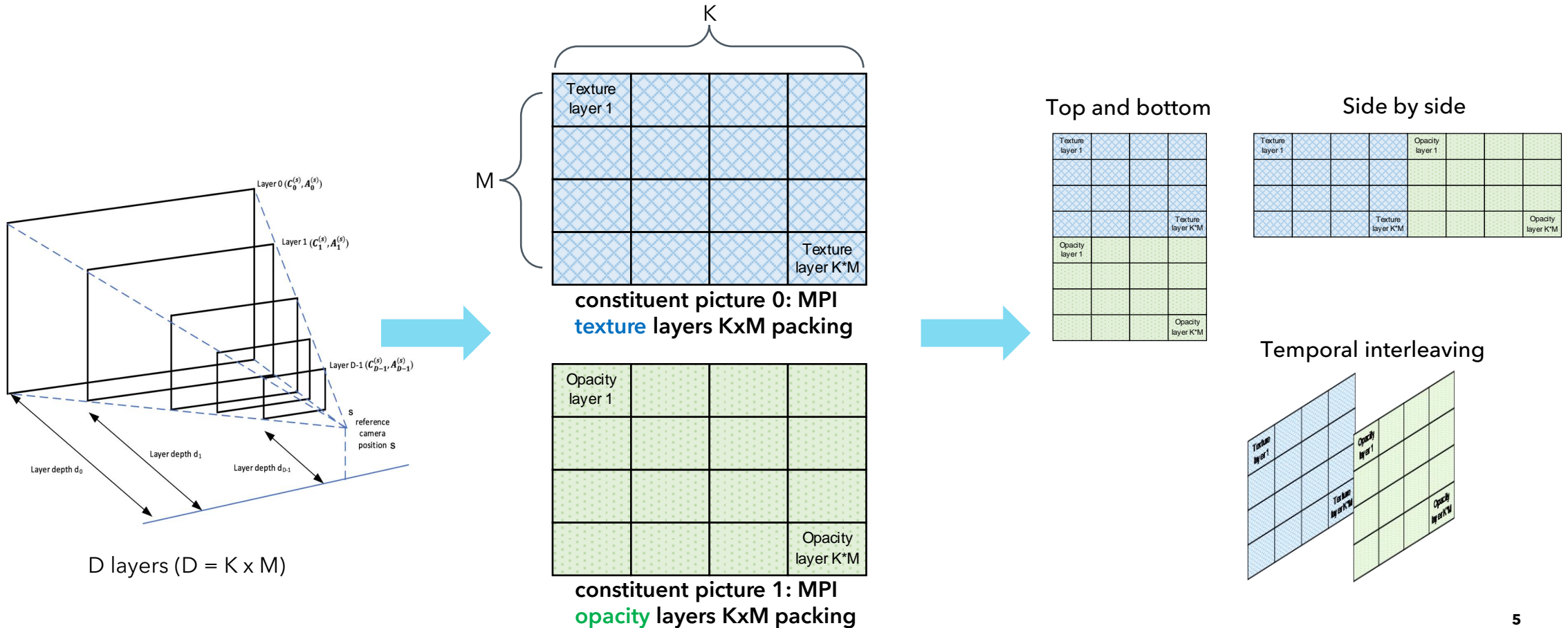
layers are shown in perspective projection.  
they are essentially the same size

# MPI Information SEI: design philosophy

- To create a container/carrier for the MPI based volumetric representation
  - Design method to pack high-dimensional volumetric data into “conventional” 2D video
- To enable distribution of this “container” with existing video distribution infrastructure.
  - Provide the minimal set of metadata for MPI restoration

# MPI layer packing and arrangement

- MPI texture and opacity layers are first spatially packed by  $D=K \times M$  arrangement to form constituent pictures
- two constituent pictures can be packed by different options



# MPI Information SEI: syntax and semantics

	Descriptor
multiplane_image_information( payloadSize ) {	
<b>mpii_num_layers_minus1</b>	ue(v)
<b>mpii_layer_depth_equal_distance_flag</b>	u(1)
if( mpii_layer_depth_equal_distance_flag ) {	
depth_rep_info_element( ZNearSign, ZNearExp, ZNearMantissa, ZNearManLen )	
depth_rep_info_element( ZFarSign, ZFarExp, ZFarMantissa, ZFarManLen )	
} else	
for( i = 0; i <= mpii_num_layer_minus1; i++ )	
depth_rep_info_element( ZSign[ i ], ZExp[ i ], ZMantissa[ i ], ZManLen[ i ] )	
<b>mpii_texture_opacity_interleave_flag</b>	u(1)
if( mpii_texture_opacity_interleave_flag == 0 )	
<b>mpii_texture_opacity_arrangement_flag</b> /* 0: TaB, 1:SbS */	u(1)
<b>mpii_frame_num_layers_in_height_minus1</b>	ue(v)
}	

Layer depth related:  
depth\_rep\_info\_element() has exact same definition as in DRI SEI (ITU-T Rec. H.274 clause 8.22.1.1)

Layer packing & arrangement related

- Syntax and semantics remain the same as in JVET-AE0066.
- Software implementation on VTM22.0 are ready and crosschecked (all three packing options), which includes the completed syntax signaling, parsing and MPI de-packing as described in semantics.

# Temporal interleaved packing

- Temporal interleaved packing may be preferable over the spatial packing for the capability to support the decoding of same MPI with lower decoder level requirements.

Level	Max luma sample rate MaxLumaSr (samples/sec)	Max luma picture size MaxLumaPs (samples)
5.1	534773760	8912896
5.2	1069547520	8912896
6	1069547520	35651584
6.1	2139095040	35651584
6.2	4278190080	35651584

(a) HEVC/VVC level constraints

SbS/TaB packing			
640x480	960x540	1280x720	1920x1080
Y	Y	Y	
Y	Y	Y	
Y	Y	Y	

(b) capability to support with SbS/TaB packing

temporal interleaved packing			
640x480	960x540	1280x720	1920x1080
Y	Y		
Y	Y		
Y	Y	Y	
Y	Y	Y	Y
Y	Y	Y	Y

(c) capability to support with temporal interleaved packing

# Conclusion

- MPEI SEI message provided the minimal set of metadata for distribution of single-view MPI content with single conventional 2D decoder
- We propose to adopt MPEI SEI into VSEI
  - Software is ready for VTM and crosschecked - Thanks Alibaba for crosschecking