**INTERNATIONAL ORGANISATION FOR STANDARDISATION**

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**ISO/IEC JTC1/SC29/WG11**

**CODING OF MOVING PICTURES AND AUDIO**

**ISO/IEC JTC1/SC29/WG11 MPEG2018/N17471**

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| --- | --- |
| **Source** | Video |
| **Status** | Approved |
| **Title** | Call for Test Materials for 3DoF+ Visual |
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# Input content

For the investigation on 3DoF+ visual compression [1], video/image material in the following format is requested: Multi-view 360° texture + depth with the following characteristics:

* Texture+depth 360° x 180° video/image from two or more simultaneously operating cameras in equirectangular format, with possibly different viewing positions.
* Video has to be delivered as a sequence of images
* The divergence of the multiple capture shall be enough in order to describe a 3DoF+ scene with at least 180° azimuth range.
* When a view has corresponding depth maps, then they should be provided as a raw monochrome stream with 16-bit values and at the full resolution. As the format is omnidirectional, the depth is here meant to be the radius from the optical center of the omnidirectional camera.
	+ Depth values, in case there are, shall be coded as the normalized disparity, as described in section 3.2 of approved document [2] and adapted for radius dimension instead of z-distance. This requires the definition for each content of Rnear and Rfar values mentioned herebelow in the metadata section. The content provider is free to put the value Rfar value to infinite, which simplifies the depth relation.
		- $Depth=vmax\*(\frac{1}{R}-\frac{1}{Rfar})/(\frac{1}{Rnear}-\frac{1}{Rfar})$
		- $with vmax=65535$
	+ A reserved null value of depth means non-available pixels, thus corresponding to a binary alpha mask channel.
* The video/image can have a reduced Field of View (FoV) below 360° x 180°, eg 180° x 180° provided that:
	+ Camera parameters are accurate (no further registration or rectification should be required),
	+ Depth maps are available,
* There are no “holes” meaning that all views together form a consistent set.
* A view shall always have a depth map, except when there is at least one other view with the exact same position that does have a depth map.
* Several videos may also be provided with the same viewing position.
* There is no limit in the number of videos. The number of cameras should define the 3DOF+ scene so that the operation of subjective tests is possible.
* All test material is progressively scanned and uses 4:2:0 colour sampling with 8 or 10 bits per sample per color component. It is possible to provide contents under a form of png or ppm / pgm or tiff, provided that they are convertible from RGB to YUV 4:2:0 exactly like the anchor, through a tool (like deriving from HDRTools) to be identified and made explicit by the content provider. In any case, the contents serving as references are those in YUV 4:2:0 only.
* Additional video characteristics:
	+ resolution shall be higher or equal to 4096x2024 and lower or equal to 8192×4096 (with exact 2:1 aspect ratio) for the full 360°x180° FoV. If the FoV is reduced, the resolution limits are adapted accordingly, so that angular resolution remains in the same range.
	+ fps shall be 30 or 60 or 90 fps.
* A desirable content duration for subjective test should be 10 seconds. Mandatory content duration is 1 frame, e.g just enough to apply objective metrics.
* Metadata shall be provided under the form of a JSON file that enlists in any order the following properties per video, the properties being the same for each frame:
	+ Position of the center of the camera as three values [x, y, z) in meters in OMAF referential, as explained in figures 5.3 & 5.4 of [3],
	+ Rotation of the related camera [yaw, pitch, roll] in degree in OMAF referential, as explained in figures 5.3 & 5.4 of [3],
	+ If the view has a depth map or not (Boolean 1:true, 0:false),
	+ If the view is background or not (Boolean 1:true, 0:false)
	+ If so, the *Rnear* and *Rfar* values in meters. The *Rfar* value is permitted to be infinite. When the *Rfar* value is meant to be infinite, it will be arbitrarily written as 0 value.
	+ Image/video resolution [width x height]
	+ Image/video horizontal and vertical range [Phimin ; Phimax] x [ Thetamin; Thetamax]. Full FoV is [-180; +180] x [-90;+90]
	+ General informations are added:
		- A general name linking this file to a given content
		- The fps of the content (30 / 60 / 90)
		- The number of frames
		- The center of the bounding box
		- Format of real numbers is eee.ffff where eee and ffff are respectively integer and fractional part of any length.
		- An optional informative part can be added related to general informations for clarity and not used by the 3DoF+ encoder.

An example of JSON file is given here below.

# Copyright notice

Content owners should provide a copyright notice along with the dataset to inform MPEG about copyright and usage restrictions.

# Informative annex: example of a JSON file

The following file is an example of JSON metadata file with 2 semi-omni cameras and 1 omni camera.

*{*

 *"content\_name": "street\_scene",*

 *“BoundingBox\_center”:[0.0,0.0,1.65],*

 *"fps": 30,*

 *"frame\_number": 300,*

 *"informative":*

 *{*

 *"BoundingBox\_size": 0.5*

 *},*

 *"cameras":*

 *[*

 *{*

 *"name":"camera\_1",*

 *"Position": [0.3, 0.4, 1.65]*

 *"Rotation": [60.00, 30.00, 0.00]*

 *"Depthmap": 1,*

 *"Background": 0,*

 *"Rmin": 0.0,*

 *"Rmax": 25.0,*

 *"Resolution":[2000,2000],*

 *"Hor\_range":[-90.0, +90.0],*

 *"Ver\_range":[-90.0, +90.0]*

 *},*

 *{*

 *"name":"camera\_2",*

 *"Position": [0.3, -0.4, 1.65]*

 *"Rotation": [60.00, -30.00, 0.00]*

 *"Depthmap": 1,*

 *"Background": 0,*

 *"Rmin": 0.0,*

 *"Rmax": 25.0,*

 *"Resolution":[2000,2000],*

 *"Hor\_range":[-90.0, +90.0],*

 *"Ver\_range":[-90.0, +90.0]*

 *},*

 *{*

 *"name":"camera\_3",*

 *"Position": [0.0, 0.0, 1.65]*

 *"Rotation": [0.0, 0.0, 0.0]*

 *"Depthmap": 0,*

 *"Background":10,*

 *"Rmin": 0.0,*

 *"Rmax": 25.0,*

 *"Resolution":[2000,2000],*

 *"Hor\_range":[-180.0, 180.0],*

 *"Ver\_range":[-90.0, +90.0]*

 *}*

 *]*

*}*

# References

[1] N17466 Investigation of 3DoF+ Video

[2] N16730 Depth map formats used within MPEG 3D technologies

[3] W17399 Revised text FDIS 23090-2 OMAF clean.doc Version 2.2;