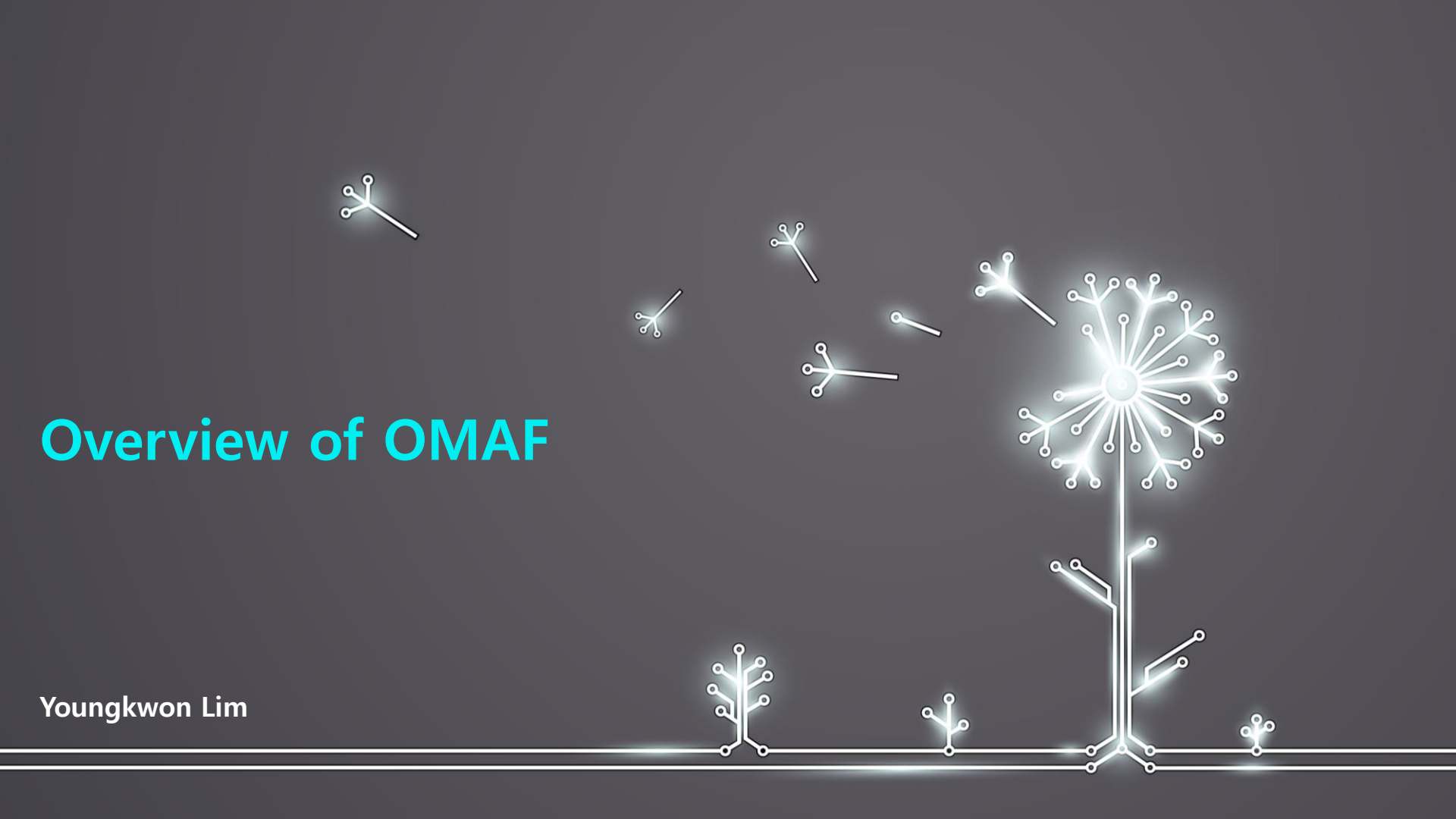
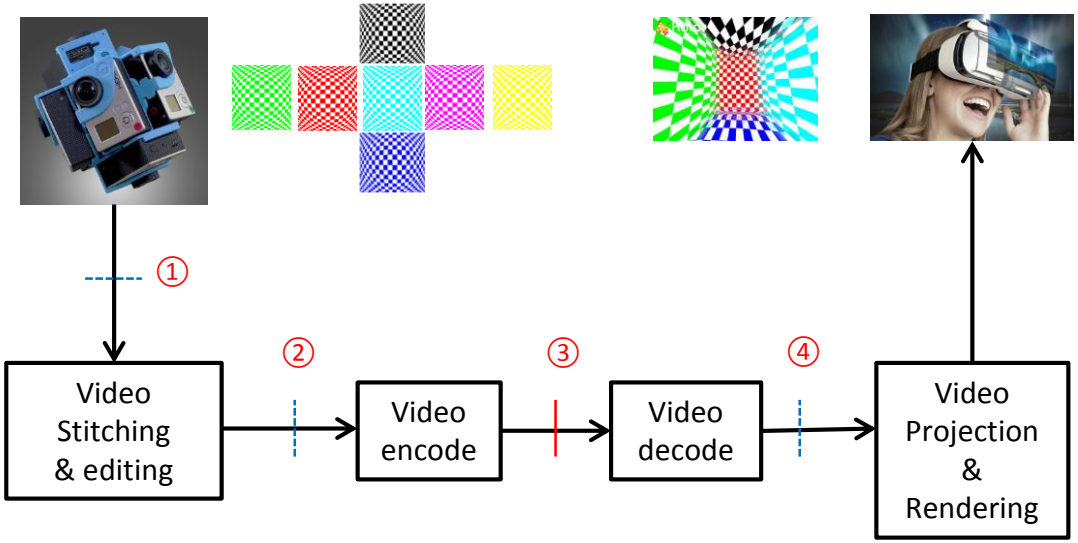


Overview of OMAF

Youngkwon Lim

I. Background

VR Ecosystem and Interfaces



1	Multiple videos, Capture Metadata	
2	Single Video, Projection Metadata, Interactivity Data	
3	Storage & Delivery Format	OMAF
4	Single Video, Projection Metadata, Interactivity Data	

Challenges in VR Industries (I)

Quality of video on HMDs

Challenges in VR Industry (II)

Interoperability of formats

- Projection formats
- Stereoscopic arrangement
- Coverage Range

Streaming Standards Support

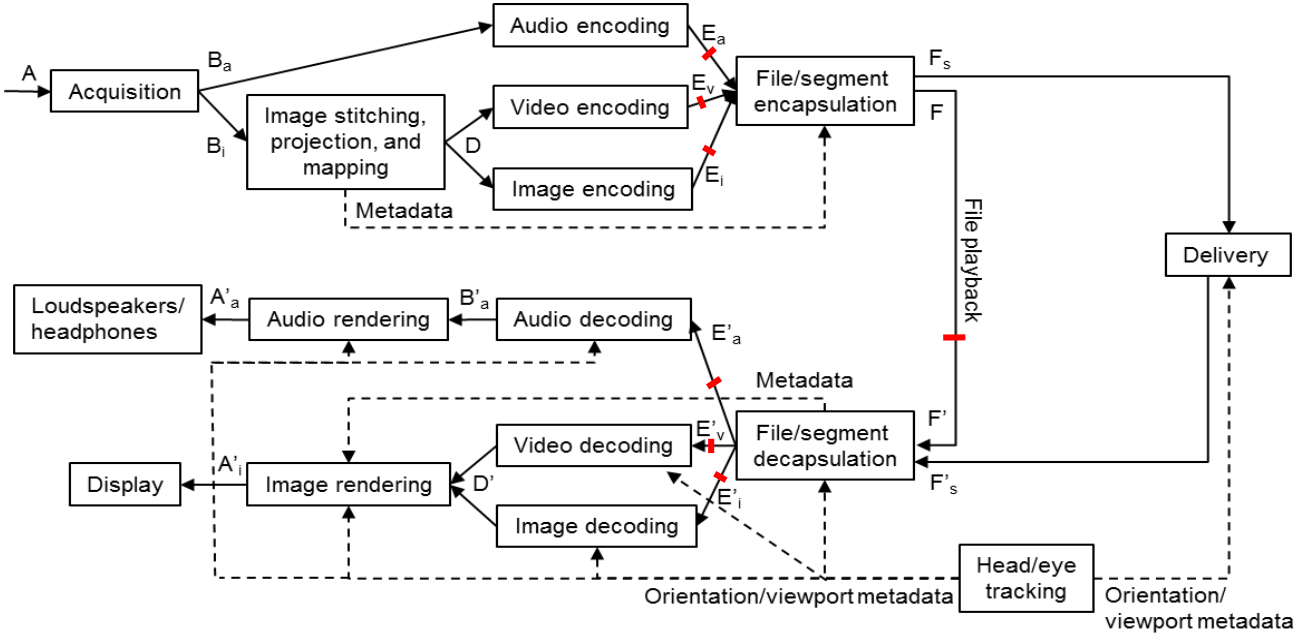
- MMT
- DASH

Video Type Combinations	Code
2D video	"_2dp"
3D top bottom video	"_3dpv"
3D side by side video	"_3dph"
Monoscopic 180	"180x180"
Monoscopic 180 16:9	"180x101"
Monoscopic 360	"_mono360"
Top bottom stereoscopic 360	"3dv" or "_tb"
Left right stereoscopic 360	"3dh" or "_lr"
Top bottom stereoscopic 3D 180	"180x180_3dv"
Left right stereoscopic 3D 180	"180x180_3dh"
LR stereo 3D 180 squished	"180x180_squished_3dh"
Top bottom stereoscopic 3D 180x160	"180x160_3dv"
Two monoscopic 180 hemispheres	"180hemispheres"
TB 3D cylinder 2.25:1	"cylinder_slice_2x25_3dv"
TB 3D cylinder 16:9	"cylinder_slice_16x9_3dv"
TB 3D 360 no bottom	"sib3d"
180 planetarium full dome	"_planetarium" or "_fulldome"
V360 camera	"_v360"
RTXP 360 cylindrical	"_rtxp"
Icosahedron	"_icosahedron"
Octahedron	"_octahedron"

https://samsungmilkvr.com/portal/content/faq#video-types

II. OMAF Solutions

Architecture (Content Flow Process)

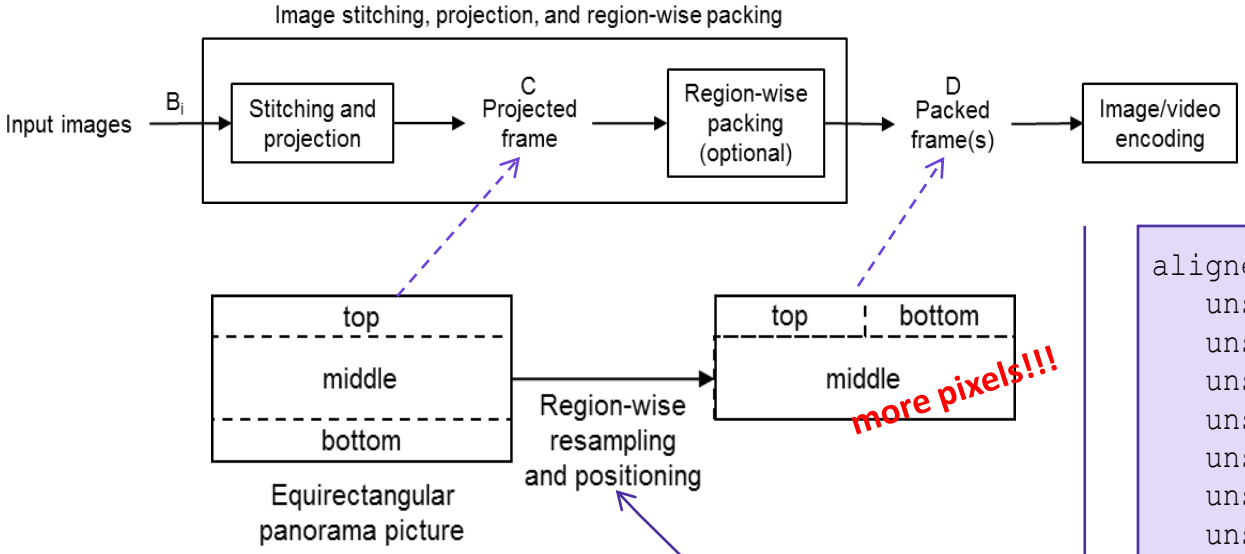


- Ea/E'a, Ev/E'v, Ei/E'i: audio bitstream, video bitstream, coded image(s)
- F/F': media file, including projection and region-wise packing metadata
- delivery related interfaces for DASH delivery & MMT delivery.

Concepts & Definitions

projected frame, packed frame and region-wise packing

- projected frame : frame that has a representation format specified by a 360 video projection format
- packed frame : frame that results from *region-wise packing* of a *projected frame*




```
aligned(8) class RectRegionPacking(i) {
   unsigned int(32) proj_reg_width[i];
   unsigned int(32) proj_reg_height[i];
   unsigned int(32) proj_reg_top[i];
   unsigned int(32) proj_reg_left[i];
   unsigned int(8)  transform_type[i];
   unsigned int(32) packed_reg_width[i];
   unsigned int(32) packed_reg_height[i];
   unsigned int(32) packed_reg_top[i];
   unsigned int(32) packed_reg_left[i];
}
```

Syntax & Semantics

Static Metadata

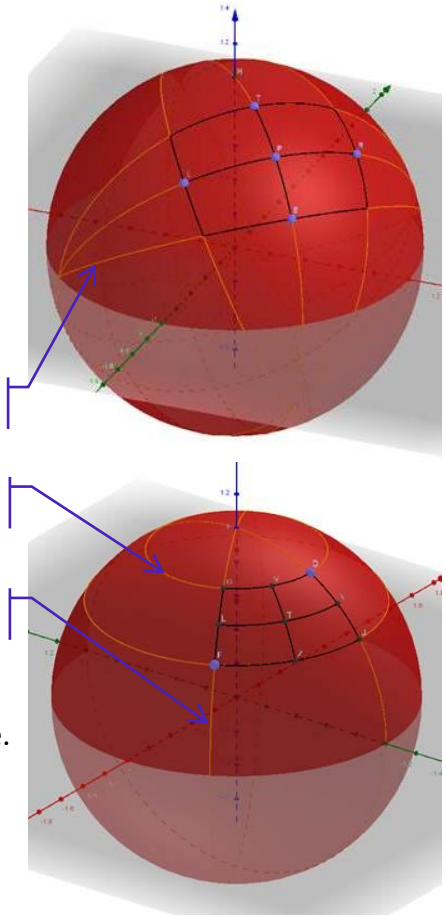
- Projected omnidirectional video box
  - the projection format
  - the orientation of the projection structure relative to the global coordinate system
  - the spherical coverage of the projected omnidirectional video (i.e., the area on the spherical surface that is represented by the projected frame).
- Fisheye omnidirectional video box

Timed metadata

- Regions on Sphere
- Initial viewpoint
- Recommended viewport

great circle, pitch circle and yaw circle

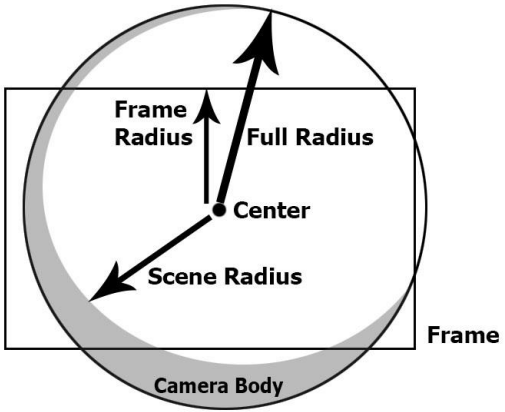
- **great circle**: intersection of the sphere and a plane that passes through the center point of the sphere.
- **azimuth circle**: circle on the sphere connecting all points with the same azimuth value
- **elevation circle**: circle on the sphere connecting all points with the same elevation value

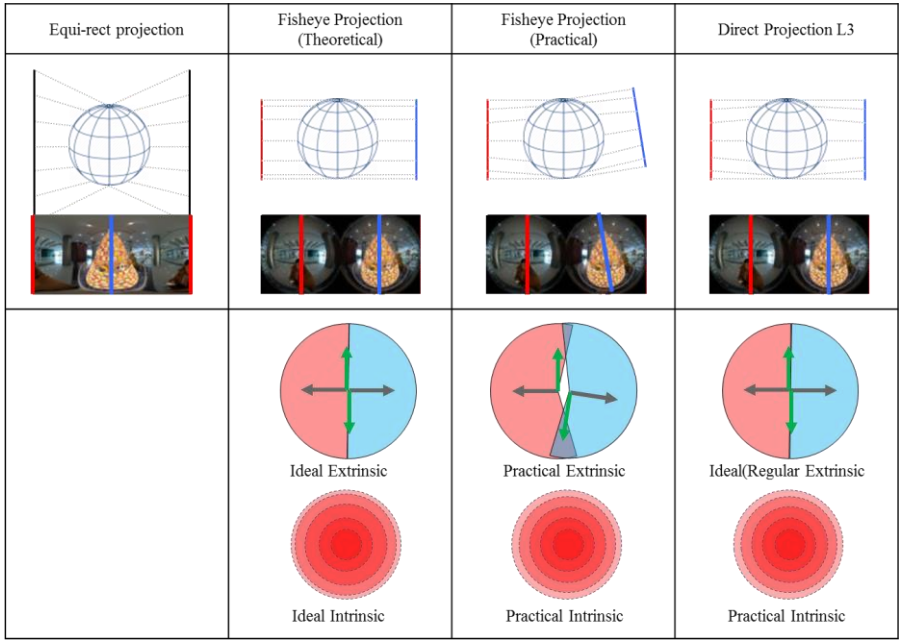


Fisheye video

No projection & region-wise packing process Parameters

- Lens distortion correction (LDC) parameters with local variation of FOV
- Lens shading compensation (LSC) parameters with RGB gains
- Displayed field of view information
- Camera extrinsic parameters





II. Next Steps

Potential Items

3DoF+

Interactivities

OMAF Developers' Day

When : 2018. 1. 24 (121st MPEG meeting)

Where : Gwangju, Korea

More Information will be available soon

https://mpeg.chiariglione.org/

Thank You