INDUSTRY FORUM

VRIF Guidelines 1.0
CES 2018 Master Class

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Agenda

- Guidelines Overview and organization
  - Production
  - Distribution
  - Security
- Architecture and Interoperability points

Generally

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Provide implementation guidance that covers the technical aspects and human factors pertaining to **content production**, **distribution** and **security**

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Organization

- Guidelines Organized by Vertical
- Currently, one Vertical:
  Download or Streaming of VR360 Content
- Per Vertical:
  - Use Case(s)
  - Technical Enablers (specifications)
  - Guidelines for Services Providers
  - Guidelines for Platform Developers
  - Guidelines for App Developers
- Next Vertical: Live content

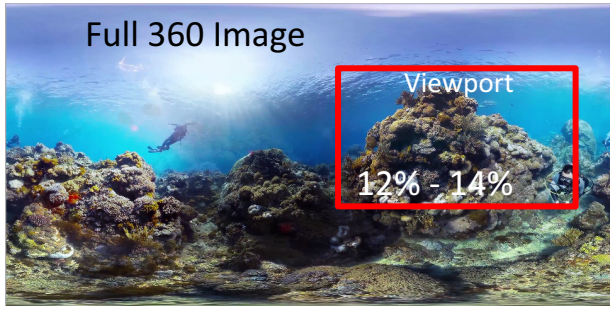
Content Production

- Content aspects relating to reduction of Physio-cognitive impacts while increasing Psycho-cognitive effect
  - Maximize enjoyment, minimize side-effects
  - Camera position & motion, Scene transitions, Limits to object positioning and speed
- Technical aspects of VR Media formats
  - Resolutions, Frame Rates, Color depths
- Content exchange metadata
  - 360° video master file format containing descriptive metadata
  - Spatial audio definitions for objects and scenes, described according to Audio Definition Model (ITU-R BS.2076-1)

Content Distribution

- Based on “OTT Download and Streaming” cases
- Guidance and recommendations to implement VR video and audio profiles from MPEG OMAF
  - Viewport Independent media profile
  - Viewport Dependent media profile
  - 3D Audio media profile
- Configuration of packing, projection and supporting metadata
- Use of Adaptation Sets for MPEG DASH based streaming

VR Technology based on MPEG OMAF



- View port Independent (VPI)
  - Deliver the entire 360 video to the VR Headset
  - Delivered as traditional video
  - Not cost effective
    - High resolution, high framerates →very high bitrates for a high quality VR experience
    - User normally sees 12-14% of the image

Viewport + extra

- View port Dependent + extra (VPD)
  - Deliver only a *portion* (View port + extra) of the 360 video
  - Reduced bandwidth requirements
  - Feedback to server (uplink connection is required) → Latency is important

VPI vs VPD deployment

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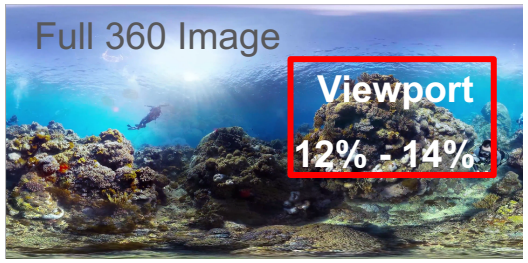
No optimization

Original video: 8K (or 12K, 22K)

Delivery network

8K → Storage & play-out server → 8K → 8K →

Decoding original video: 8K, High Bitrate



- -High Bitrate at NW edge
- - High decoding performance
- + High visual quality

VPI

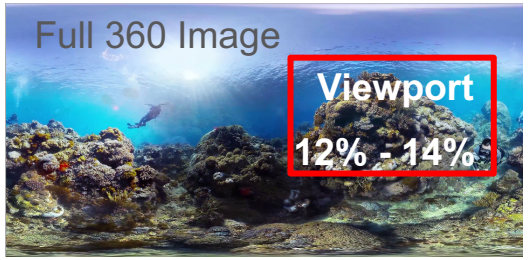
Original video: 8K (or 12K, 22K)

Delivery network

8K → Storage & play-out server → 4K → 4K →

Reducing quality @ playout

Decoding 4K (VP Independent)



- + Low Bitrate at NW edge
- + lower decoding performance
- - visual quality reduced

VPD

Original video: 8K (or 12K, 22K)

Delivery network

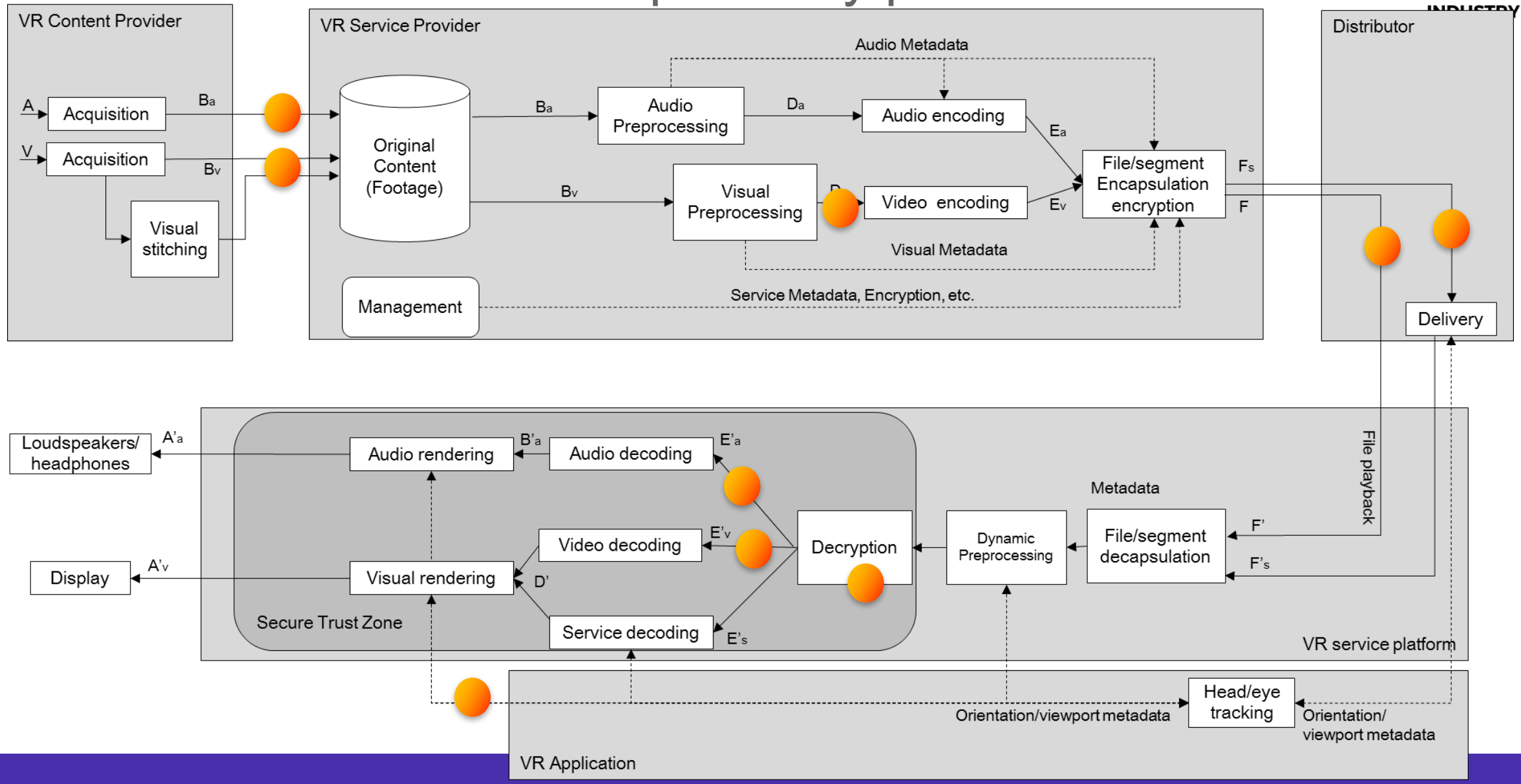
8K → Storage & play-out server → Viewport @ 4K → 4K →

Viewport selection feedback @ low delay

Decoding 4K (VP Dependent)

- + Low Bitrate at NW edge
- + Lower decoding performance and better device reach
- + High visual quality

Content Security

- Analysis of threat vectors associated with VR content and presentation; Proposals for threat mitigation techniques.
- Baseline of the MovieLabs ECP Guidelines but interpreted for 360 content.
- Security mechanisms such as encryption, secure media pipelines and secure platforms, are discussed in the VR context.
- Challenges:
  - Secure end-to-end pipeline in the device – (rendering!)
  - Interaction with viewport-adaptive streaming

Architecture and interoperability points