Service provider requirements for adaptive streaming

Florence Agboma
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VQEG

Premier League
sky SPORTS

Agenda

- Who we are

- Purpose
  - Follow up from the last face-to-face meeting on adaptive streaming standards
  - Industry landscape
  - In Scope

- A typical end-to-end VoD workflow

- Service provider requirements for VoD content delivery

- Final thoughts

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Europe's leading entertainment and communications business

Our locations

Headquarters
London, Munich and Milan

32
sites including contact centres, technology hubs and broadcast centres

Operating across Europe
UK, Ireland, Germany, Austria and Italy

Offering world-leading entertainment

80,000+
hours of live sports coverage

6.5m+
average audience of Game of Thrones Season 6

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Purpose

- Follow up from the last face-to-face meeting in London

- Adaptive streaming standards that can be used to **predict** the overall quality of adaptive streaming as perceived by the ordinary viewer in the presence of re-buffering, start up times and audiovisual quality degradations

- Provide a typical service provider requirements to support the efforts of the ongoing standards

Industry landscape
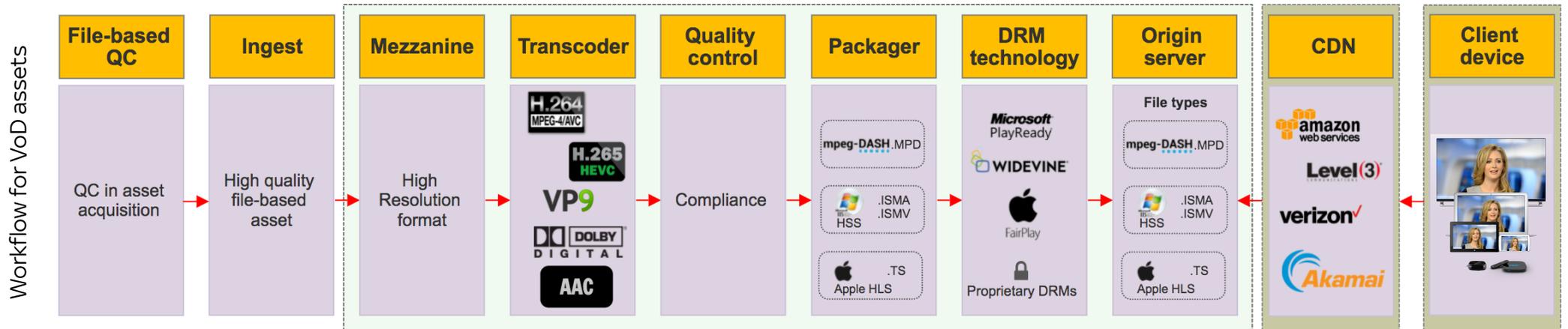
- Streaming analytics tools

In Scope

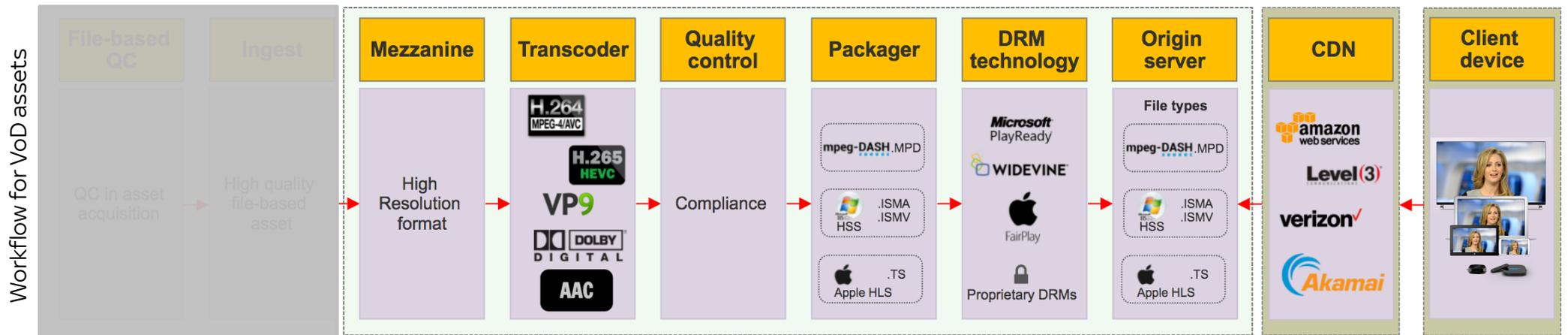- The requirements are based on VoD delivery

Components of a typical VoD workflow[1]

Workflow for VoD assets

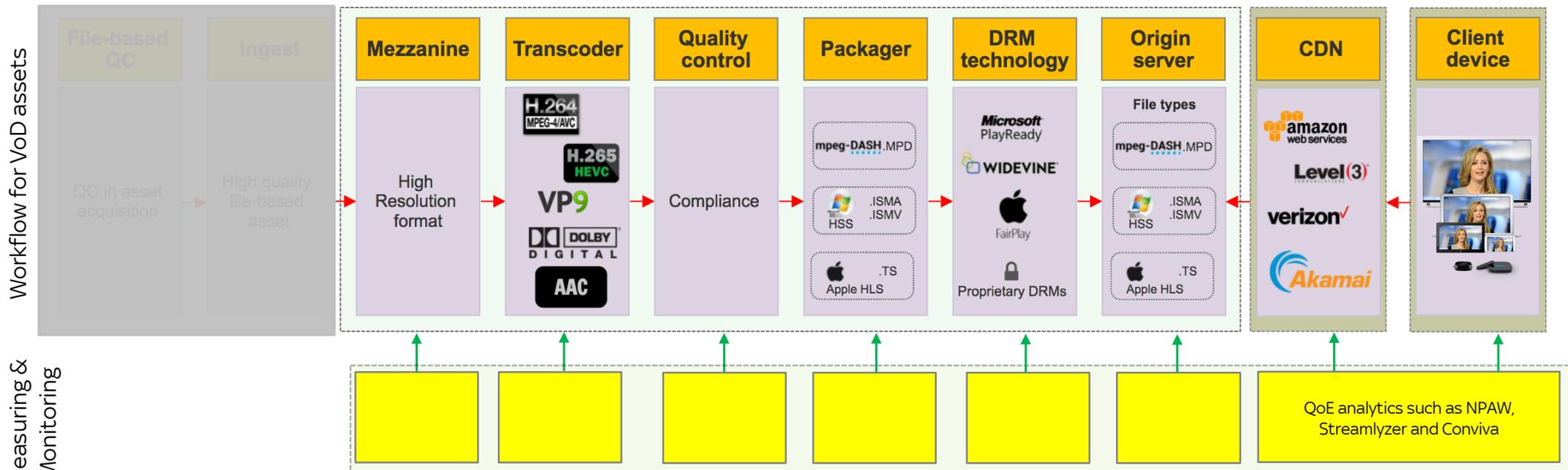| File-based QC	Ingest	Mezzanine	Transcoder	Quality control	Packager	DRM technology	Origin server	CDN	Client device
QC in asset acquisition	High quality file-based asset	High Resolution format	H.264 MPEG-4/AVC, H.265 HEVC, VP9, DOLBY DIGITAL, AAC	Compliance	mpeg-DASH .MPD, .ISMA .ISMV HSS, .TS Apple HLS	Microsoft PlayReady, WIDEVINE, FairPlay, Proprietary DRMs	File types: mpeg-DASH .MPD, .ISMA .ISMV HSS, .TS Apple HLS	amazon web services, Level(3), verizon, Akamai	

[1] Here is a conceptual workflow for VoD. The actual end-to-end workflow might vary among service providers where two or more components could be merged as a single unit.

Components of a typical VoD workflow

Components of a typical VoD workflow

Workflow for VoD assets (left axis)

- File-based QC → Ingest → QC in asset acquisition → High quality file-based asset
- Mezzanine — High Resolution format
- Transcoder — H.264 MPEG-4/AVC, H.265 HEVC, VP9, DOLBY DIGITAL, AAC
- Quality control — Compliance
- Packager — mpeg-DASH .MPD, HSS .ISMA .ISMV, Apple HLS .TS
- DRM technology — Microsoft PlayReady, WIDEVINE, FairPlay, Proprietary DRMs
- Origin server — File types: mpeg-DASH .MPD, HSS .ISMA .ISMV, Apple HLS .TS
- CDN — amazon web services, Level (3), verizon, Akamai
- Client device

Measuring & Monitoring (left axis)

QoE analytics such as NPAW, Streamlyzer and Conviva

It is worth noting that some tools already exist to measure and monitor quality checks at some of these components. The yellow boxes were added here to illustrate the components along the workflow in which a typical service provider might want to measure and monitor for end-to-end QoE

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Service provider requirements for VoD adaptive streaming standards

MUST HAVE[2]

1. At each component (i.e. after mezzanine etc) as shown in the previous workflow diagram, a typical service provider must be able to measure and monitor quality checks at the appropriate components.

2. Regardless of geographical locations, a service provider must be able to view all the appropriate components in one interface window

3. Must have no dependency on video codec types such as AVC and HEVC

4. Must have no dependency on audio codec types such as AAC-LC (and its extensions) and AC-3

5. Must be able to differentiate between the number of channels in an audio stream such as 5.1 and stereo

6. Must support DRM-encrypted contents such that the overall MOS of a streaming session can be calculated regardless of any specific DRM

7. Must support HTTP delivery formats such as HLS, SmoothStream and DASH

[2]This is by no means an exhaustive list, and some of these requirements are in the ToR document.

Service provider requirements for VoD adaptive streaming standards

MUST HAVE cont'd

7. Must support video outputs from mobile resolutions up to UHD

8. Must support HD and UHD video input sources

9. Must support frame rates including 25, 30, 50 and 60 fps

10. Must be able to accurately report MOS for different network types such as cellular and WiFi

11. Must support continuous monitoring of client-side quality of experience such as hour-by-hour and minute-by-minute.

12. The streaming metrics such as startup time, buffering, and bitrates of the adaptive streaming session must be reported in one interface window.

13. The overall quality of the adaptive streaming session as experienced across all users must be reported in one interface window.

14. Must support integration to all devices and browsers

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Service provider requirements for VoD adaptive streaming standards

SHOULD HAVE[3]

1. Should be able to report the MOS quality of each media segment.

2. Should include other player heuristics such as the number of ABR jumps, etc.

3. Should have the ability to monitor the performance of private and third party CDNs.

4. Should be able to report on audio quality irregularities on the device. For example, when a device is playing out mono instead of stereo or playing out stereo instead of 5.1

5. Should be able to report on video quality irregularities on the device. For example, when a device is playing out interlaced instead of progressive video.

6. Should be able to differentiate between private and third party CDNs when reporting performance

7. Should be highly scalable to monitor thousands of simultaneous users without having to use lots of resources. For example, without the need to install a storage farm.

[3]This is by no means an exhaustive list, and some of these requirements are in the ToR document.

Final thoughts!

Linear delivery is not so far apart ...

- Scenario

Game of Thrones Season 6 Episode 4		
	Linear	**VoD**
Source (i.e. pre-recoded files)	Same	Same
Source quality	Mezzanine	Mezzanine
Encoding configs	Same	Same
Packaging & DRM	Same	Same
CDN	Different (Data is short leaved)	Different (cacheable)
Client behavior	Different (manifest refresh)	Different (static)

Thank you