

# Delivering UHD to HbbTV devices using IP streaming

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# DELIVERING UHD TO HBBTV DEVICES USING IP STREAMING

- **Proposition**
- **The content**
- **The application**
- **Live architecture**
- **On-demand architecture**
- **Learnings**

## DELIVERING UHD TO HBBTV DEVICES USING IP STREAMING

# PROPOSITION

- **UHD versions of premium content delivered through BBC iPlayer**
- **On-demand – dramas and documentaries**
- **Live events – football, tennis**
- **Delivered to UHD capable TV devices only**



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## **CONTENT SPECIFICATION – LIVE AND ON-DEMAND**

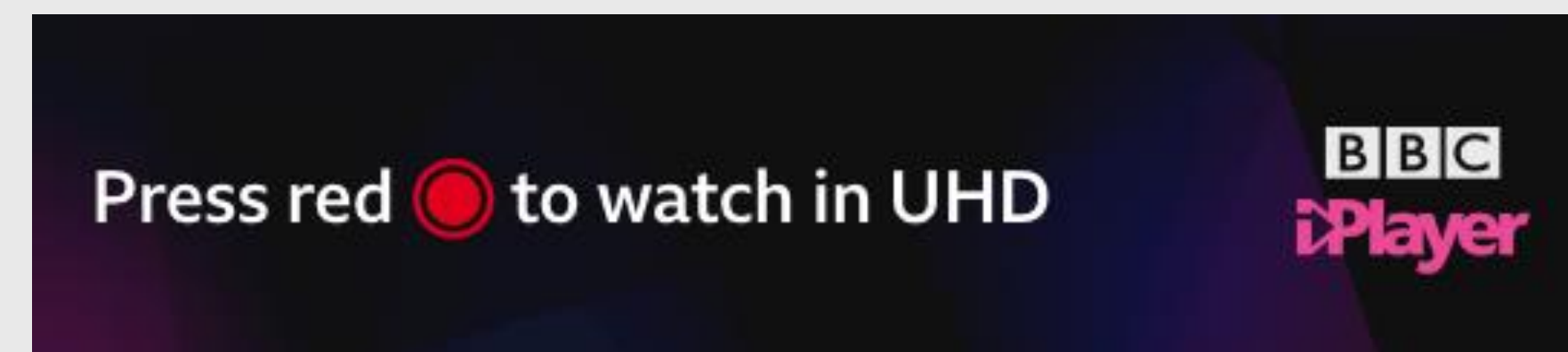
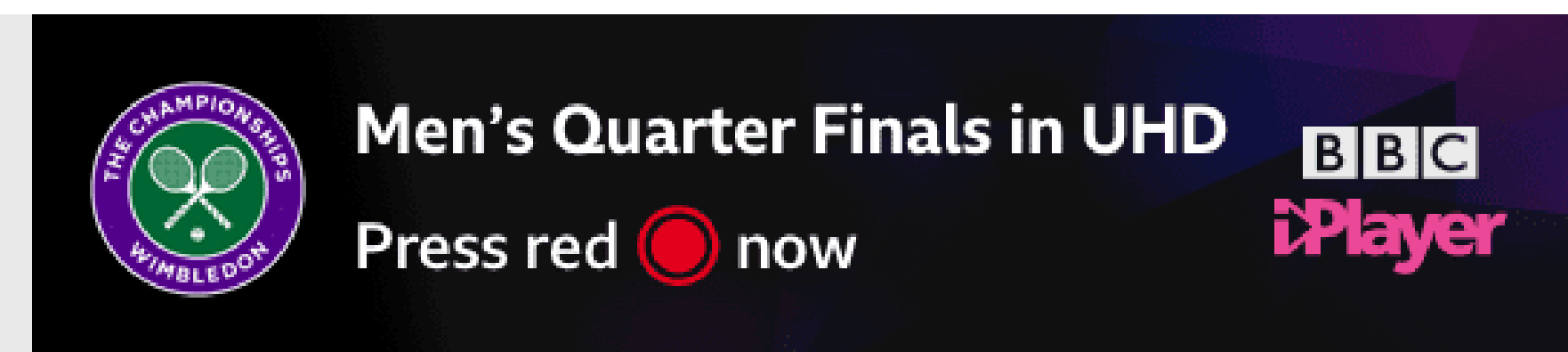
- Ultra High Definition 3840x2160**
- High Dynamic Range using BT2100 HLG**
- Wide Colour Gamut BT2020 colour space**
- Video encoded with HEVC Main 10 profile**
- 50Hz / 25Hz frame rate**
- Audio encoded with AAC-LC**
- CMAF compliant packaging**
- DASH distribution using DVB DASH profile**



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## APPLICATION

- **Auto-launch HbbTV application runs on our broadcast (HD and SD) channels**
- **UHD targeted only at certain devices**
  - Passed testing
  - Connected to suitable displays (found using HbbTV video\_display\_format capability for example)
- **On screen call to action to targeted devices**
  - **Live** – prompt at the start and after tuning
  - **On-demand** – prompt when the programme airs live
- **Playback** – Native player or Media Source Extensions (MSE) with Javascript player



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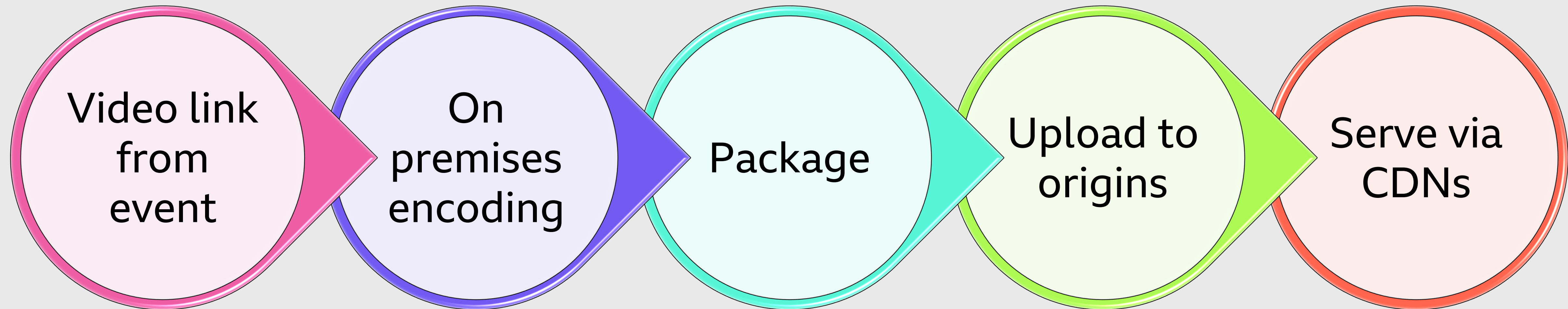
## DVB DASH SPECIFICS

- **2014 profile MPD with iso-ext-live**
- **Inband parameter sets (hev1 sample entry)**
- **Fixed segment duration**
- **One audio adaptation set and one video**
  - Not mixing UHD with HD content
  - Nor mixing codecs
- **Video goes up to Main 10 profile Level 5.1**
- **Audio has a single representation of AAC-LC**

<MPD profiles=  
"urn:dvb:dash:profile:dvb-dash:2014,  
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## LIVE MEDIA PRODUCTION ARCHITECTURE

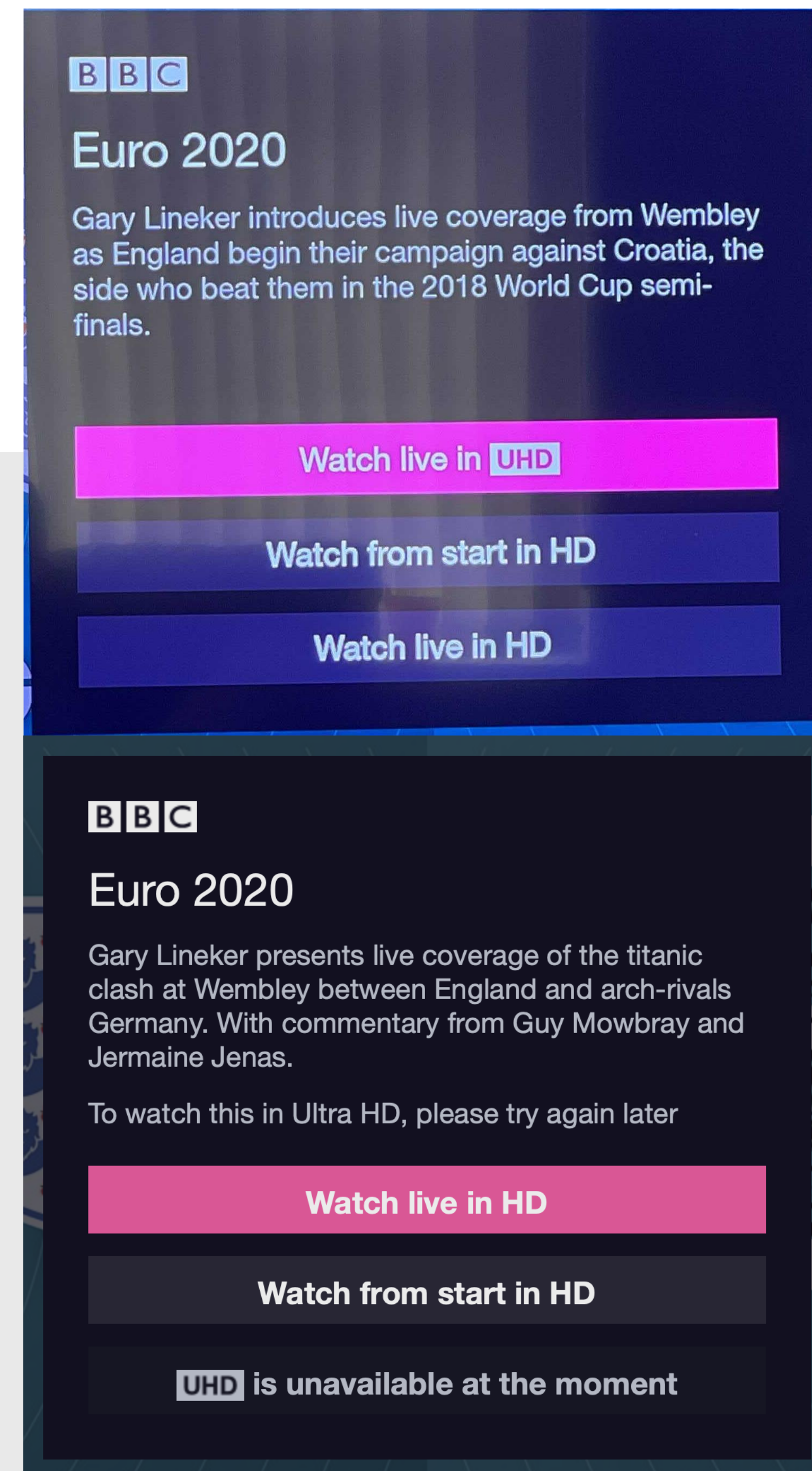




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# LIVE SERVICES

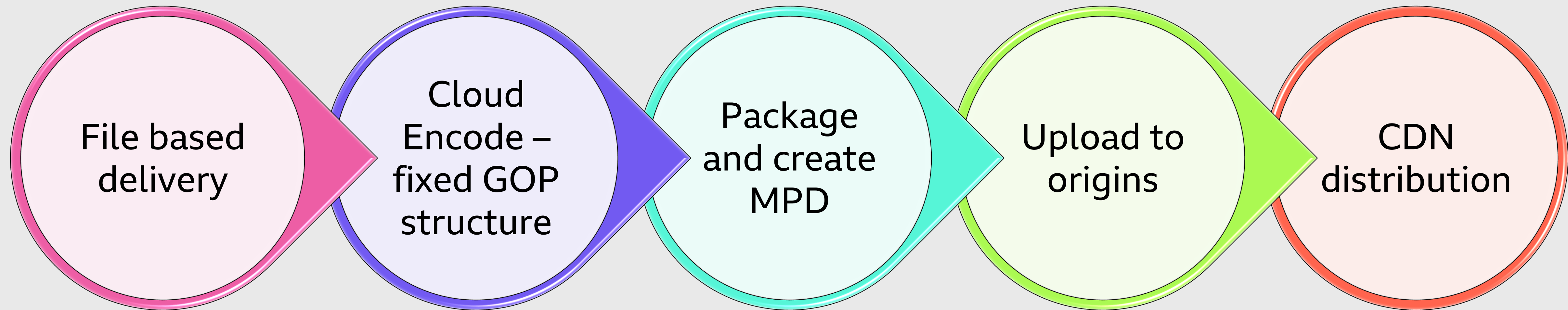
- Live encoding constraints
  - Small ladder at the top end only
  - 4s segment duration – would prefer to keep audio segment duration constant
- Limit on number of simultaneous viewers to control CDN capacity.
- User choice to select HD or UHD when available





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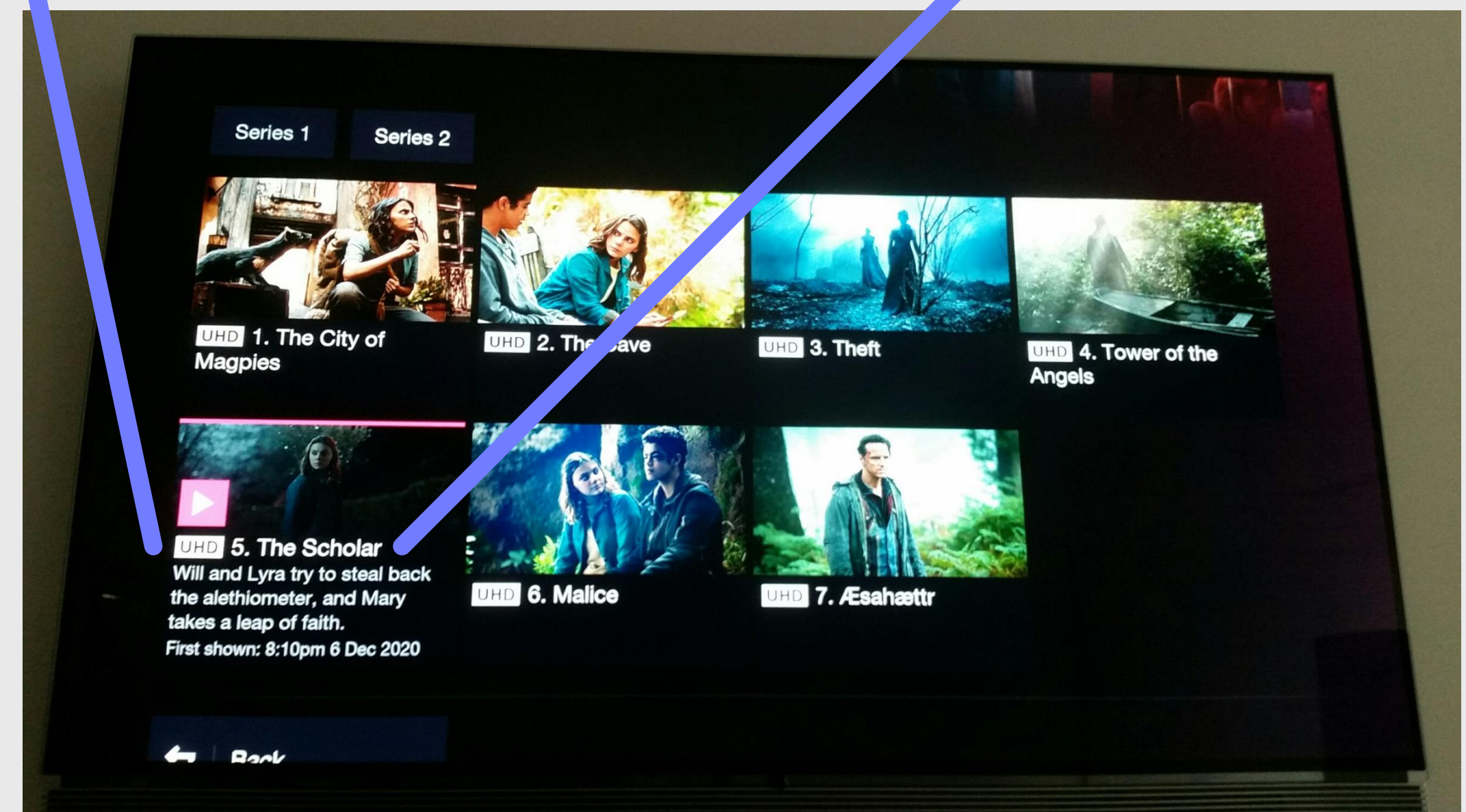
## ON-DEMAND MEDIA PRODUCTION ARCHITECTURE



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# ON-DEMAND SERVICES

- 3.84s segment duration
- Wide bitrate ladder
- UHD content replaces HD content on suitable devices when it is available





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# SOME NUMBERS

- **In the UK most new TVs are UHD capable**
  - By now around 40% of main TVs installed are UHD
- **Approximately 60% of UHD VOD playbacks from HbbTV devices** (based on analysis of a VOD series in 2019)
- **80-100k viewers** opened iPlayer and chose the Live UHD streams in the group stages of Euro 2020 (presented in 2021)

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# LEARNINGS

- **Feedback indicates our audience like it**
- **Some device issues appeared during the trials**
  - HEVC decode issues (surprisingly) – largely resolved with firmware updates
  - Apparent memory management issues native players
- **End to end tests are important – particularly when the chain is significantly different from normal broadcast channels**



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**THANK YOU**

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