
AWS
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MNE204

End-to-end UHD live streaming

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Agenda

Why stream in UHD?

Challenges in contributing live UHD content to the cloud

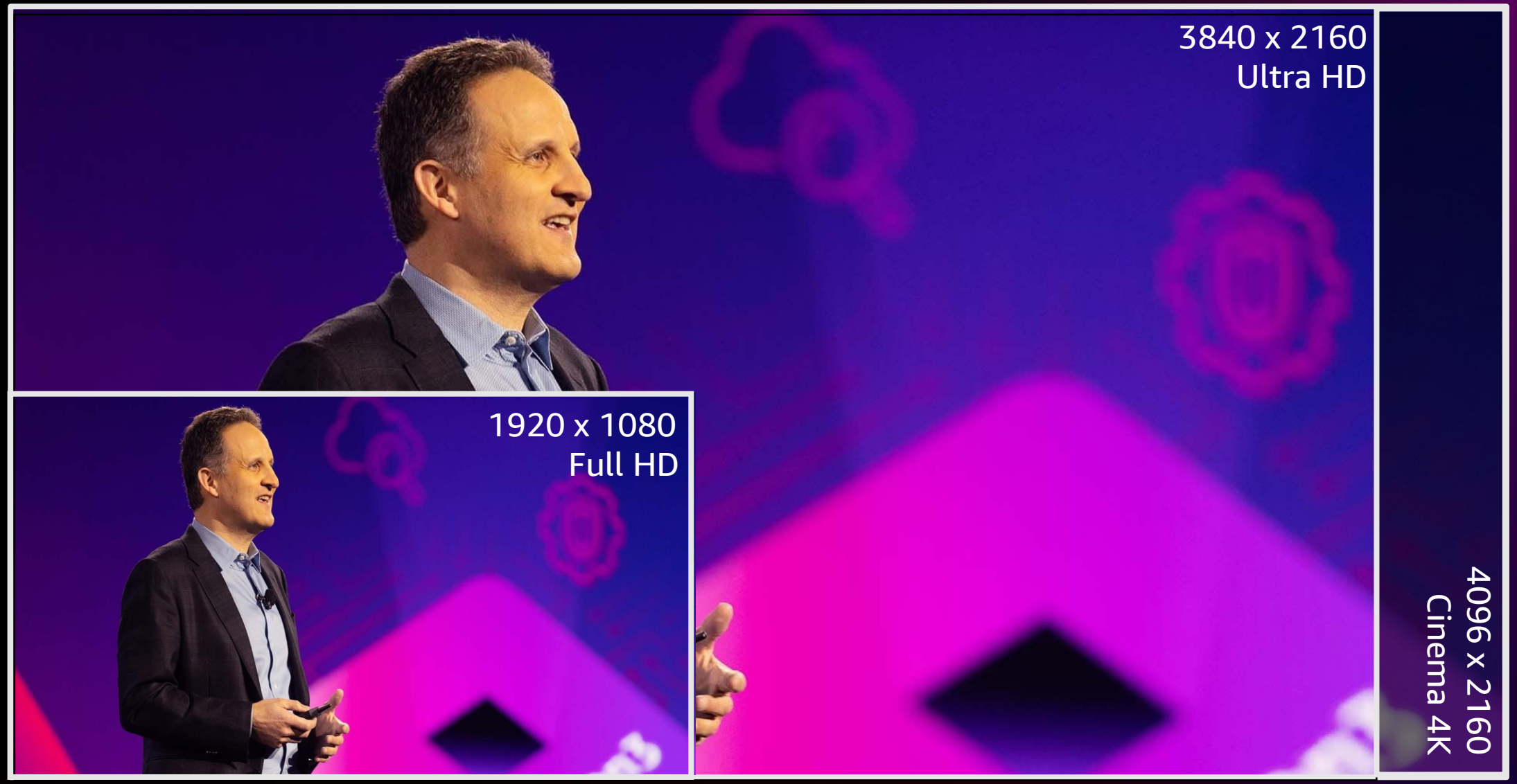
IOIO’s approach

Challenges in creating a live UHD encoding/distribution pipeline

STAN’s solution

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What is UHD?



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Why live stream in UHD?

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Why live stream in UHD?

UHD is becoming synonymous with **high-quality** streaming













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Why live stream in UHD?

Most live sports content is premium content

In 2021…

95 of the top 100 rated shows in the US were **live sports** programming

Source: https://bit.ly/livesports95

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Why live stream in UHD?

UHD production–capable trucks/facilities are growing

“With Launch of Vista, Dome Productions Boasts Trifecta of 4K-Capable Trucks”

The SDI-based truck is also capable of HDR production

from SportsVideo.org

“NEP UK presents four new UHD outside broadcast trucks”

from 4rfv.co.uk

“HighEnd TV debuts 4K HDR production truck”

Production coordinator Adam Mills talks about the value of going all the way with 4K HDR and some of the challenges in building a full 4K, HDR truck

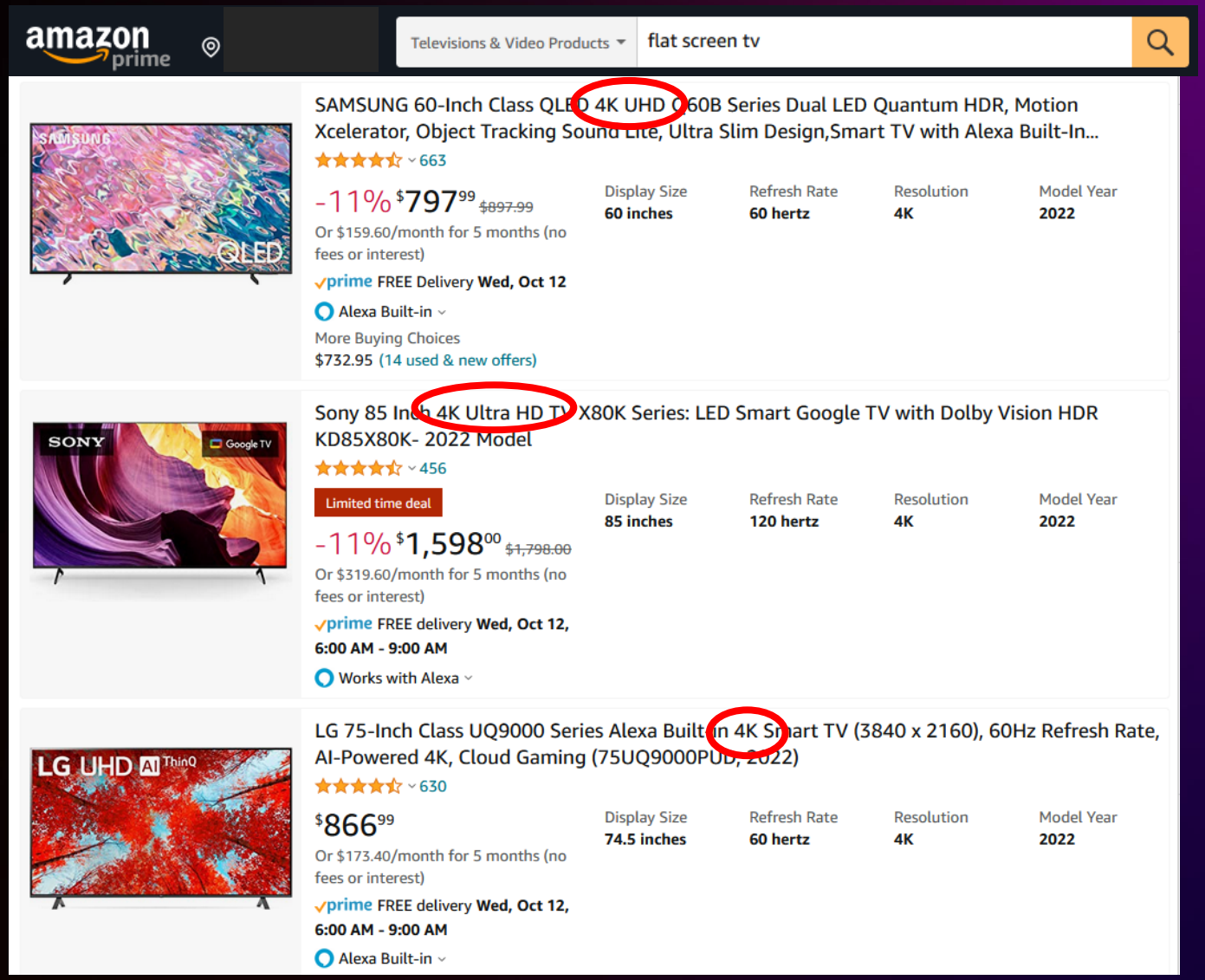
from tvtechnology.com

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Why live stream in UHD?

UHD matches the capabilities of today's displays

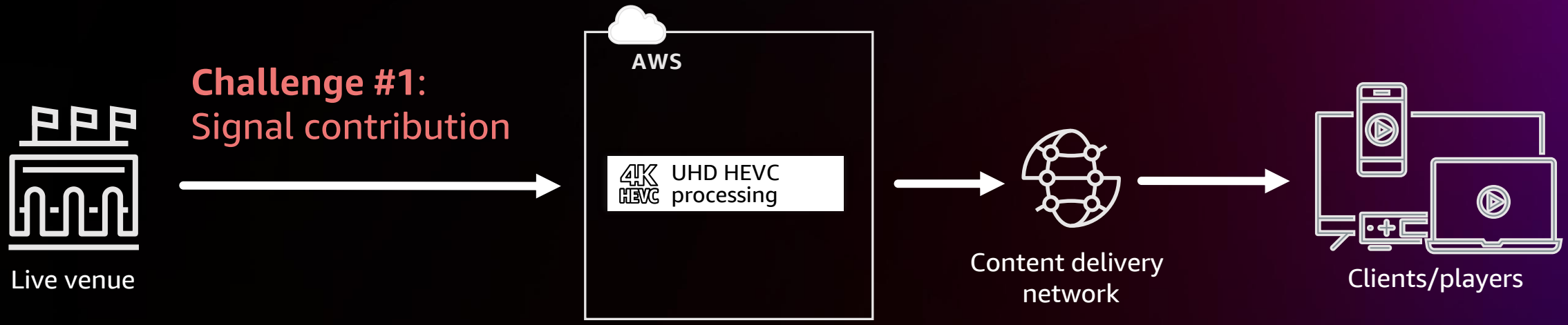


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Challenges for end-to-end live streaming

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Challenges for end-to-end live streaming



Challenge #2: UHD-capable OTT processing/distribution pipeline

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Challenges in contributing live UHD to the cloud

- UHD is 4x the data rate of HD 1080p
- Some protocols don’t support UHD well (RTMP)
- Some live venues only have internet connectivity
- Like HD, contribution of important signals need:
  - Resiliency
  - Content encryption
  - Reliability

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Select Technology Partner



IOIO’s solution for UHD contribution

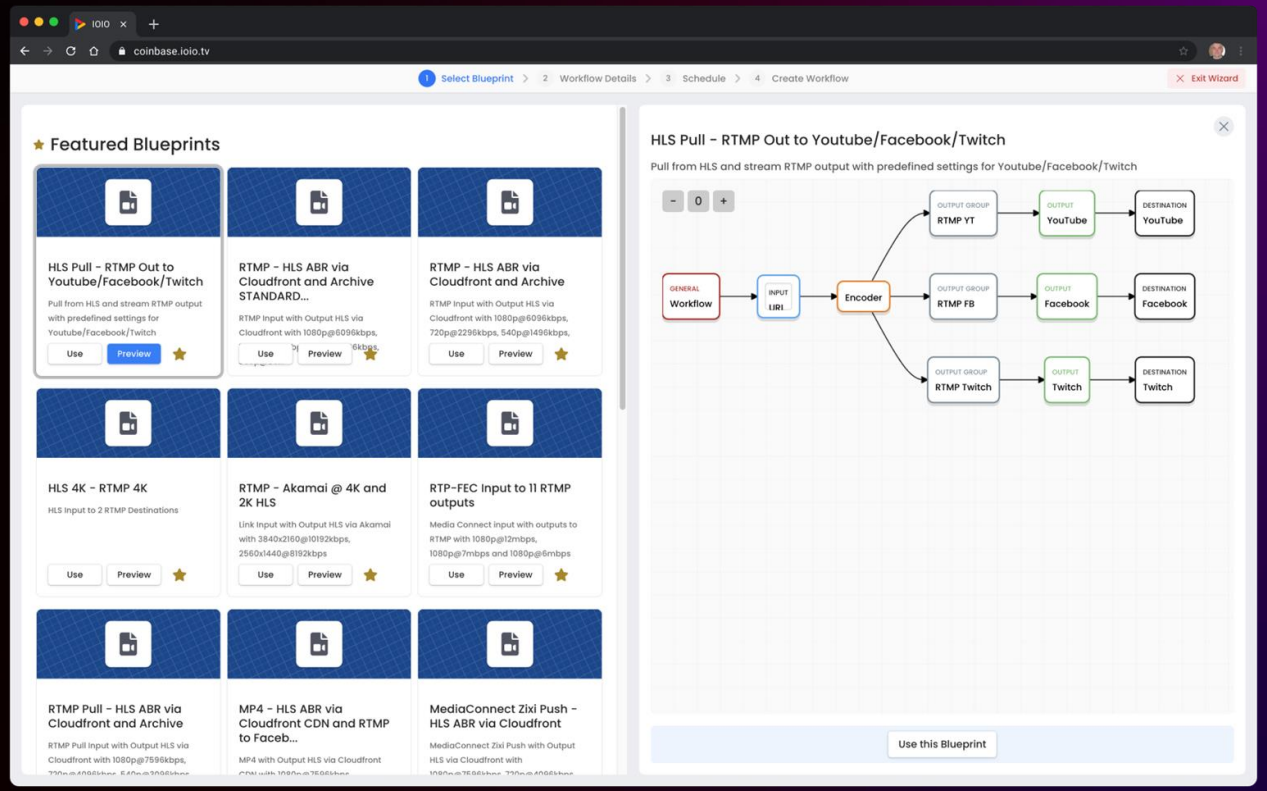
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Who is IOIO?

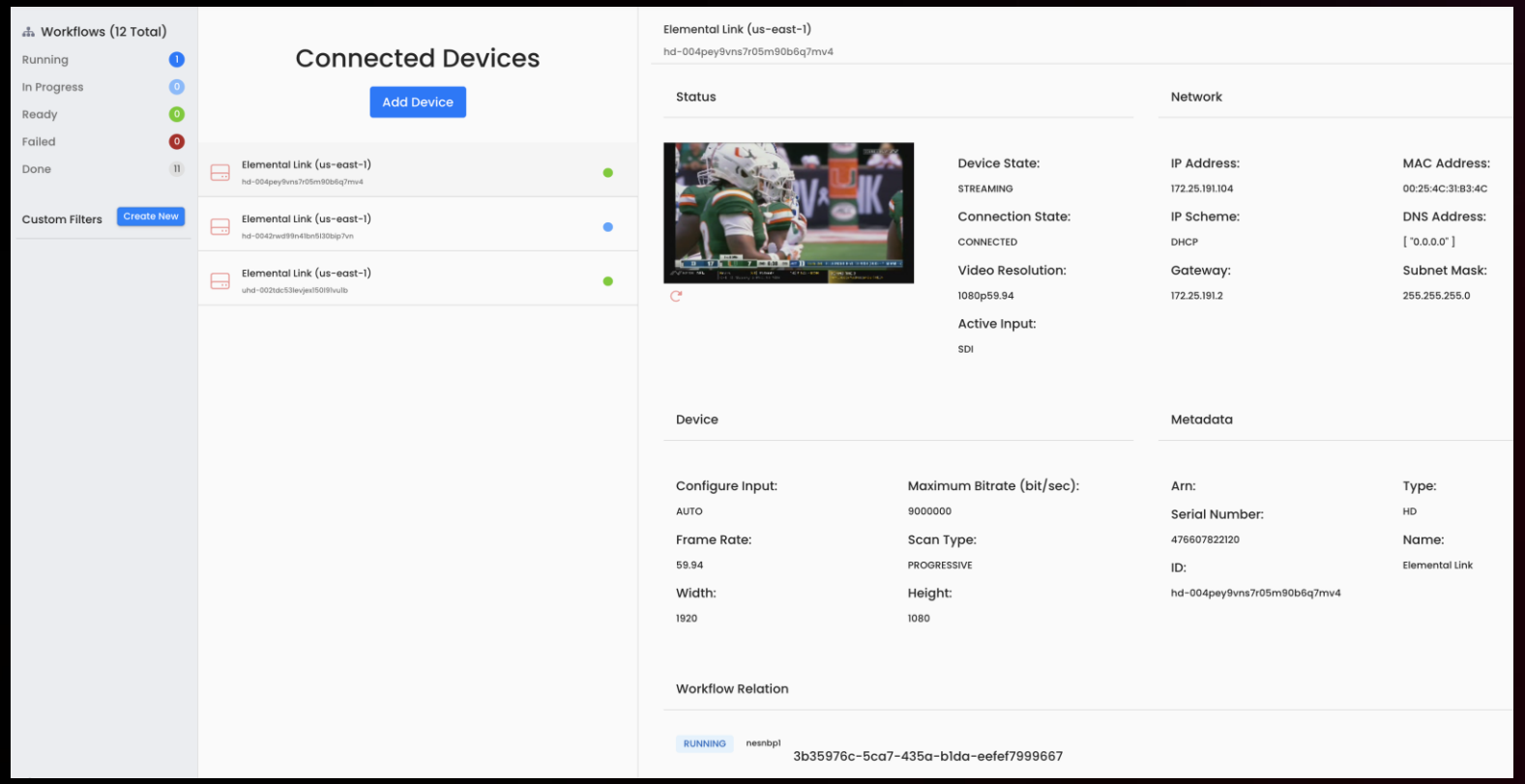
IOIO designs and develops an enterprise communication platform to create, collaborate, and distribute content

- Launch/capture/distribute video streams with a few clicks
- Live or scheduled – or a mix of the two
- One-click to archive for VOD re-use



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IOIO's solution





- Tightly integrated with AWS Elemental Link for contribution of HD and UHD sources into workflow
- Built-in Link device management and monitoring

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Challenges in building live UHD OTT pipelines

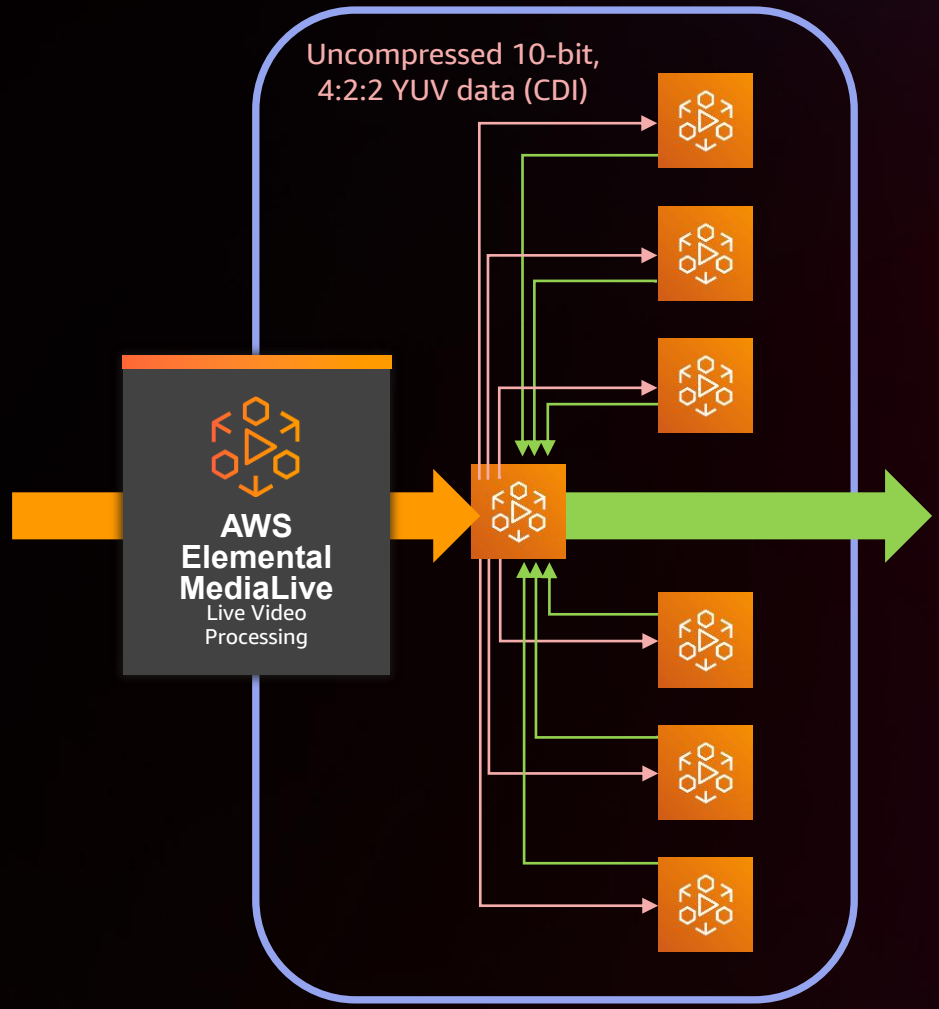
- ABR encoding ladders can’t be created with a single encoder running on one Amazon Elastic Compute Cloud (Amazon EC2) instance – even the largest ones
  - Requires managing multiple encoders in parallel, locking the outputs
- Complex to deploy and manage
- Difficult to troubleshoot (multiple failure points)

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MediaLive XL ABR encoding

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MediaLive XL ABR encoding



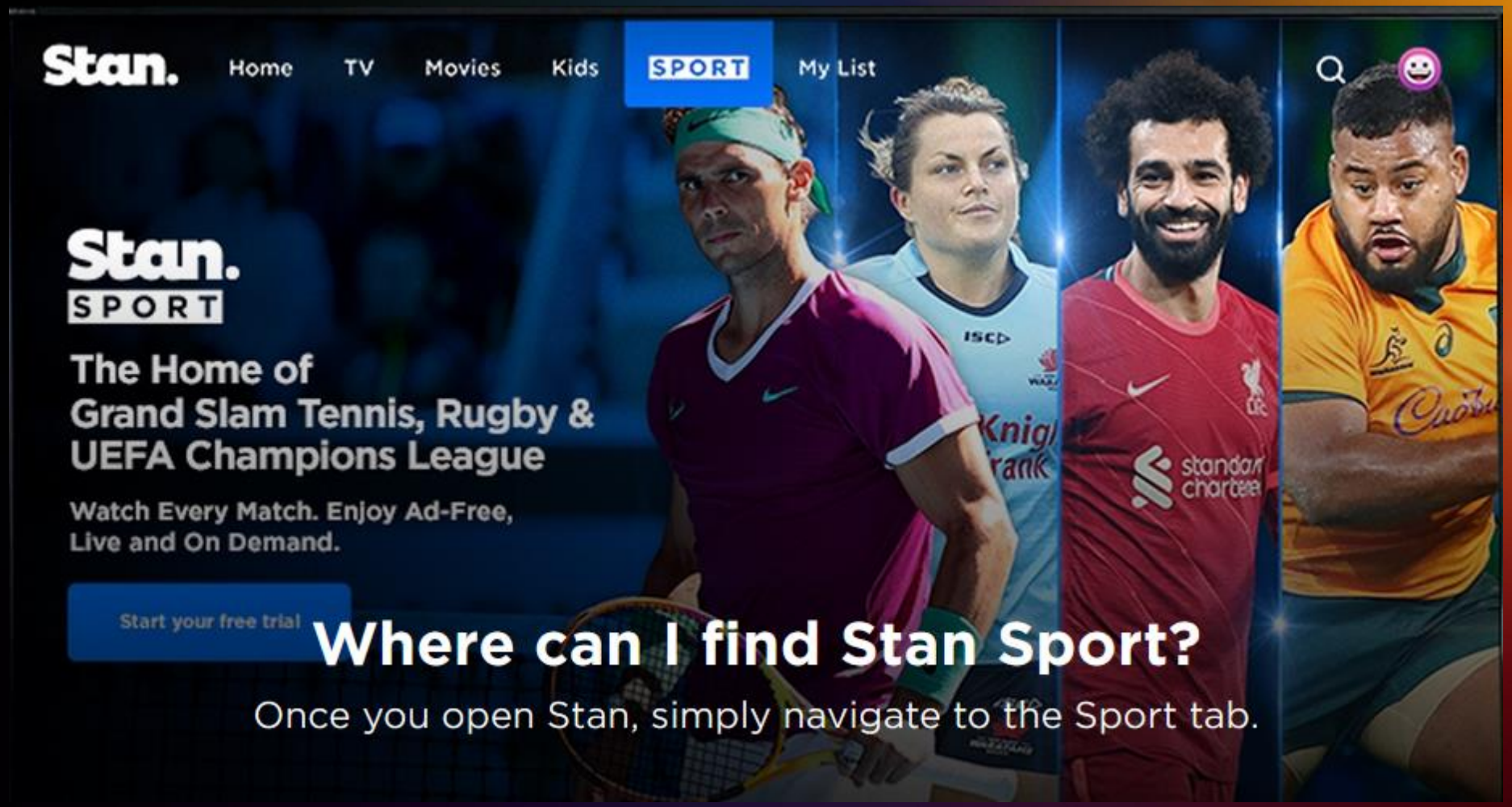
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Stan’s solution for UHD encoding and distribution

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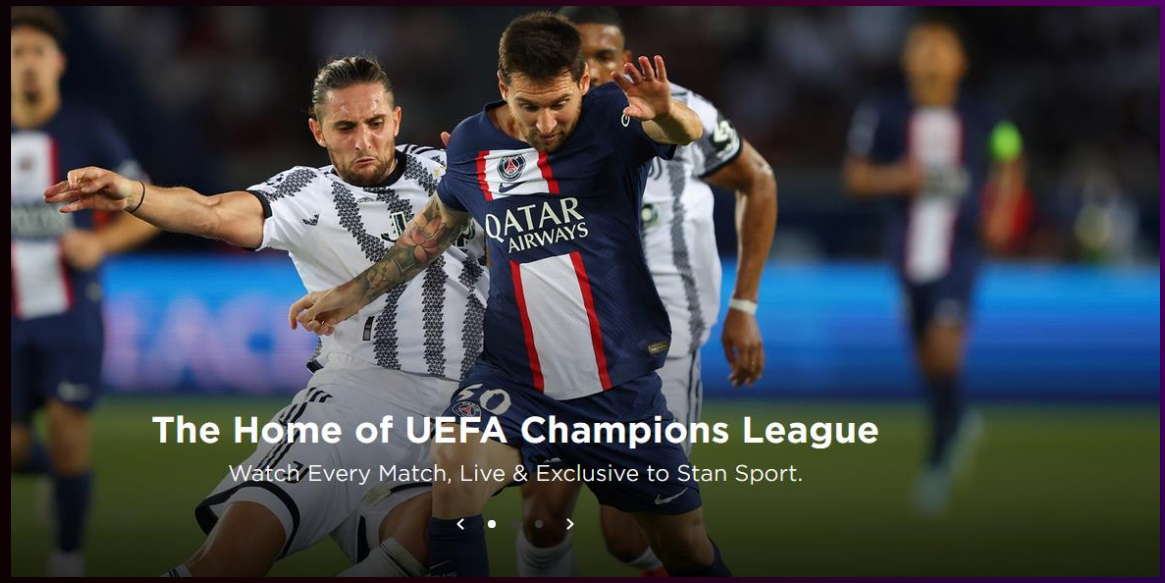
Who is Stan?



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Why UHD is important to Stan

- Increasing amounts of live UHD content
- Importance of delivering quality experiences to customers
- UHD-sourced content delivers a better quality signal for HD viewers as well



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Results: Time from project start to operational



Built 99% of Stan Sport in 3 months

- Great team
- Great platform
- Great partners

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Results: Able to rapidly scale to new events



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STAN's UHD ABR ladder

… in a single AWS Elemental MediaLive Channel

Inputs

UHD HEVC (50Mbps) — Primary input

UHD HEVC (50Mbps) — Secondary input



Single channel with 14 outputs:
3 UHD HEVC outputs
2 HD HEVC outputs
3 HD AVC outputs
3 SD HEVC outputs
3 SD AVC outputs

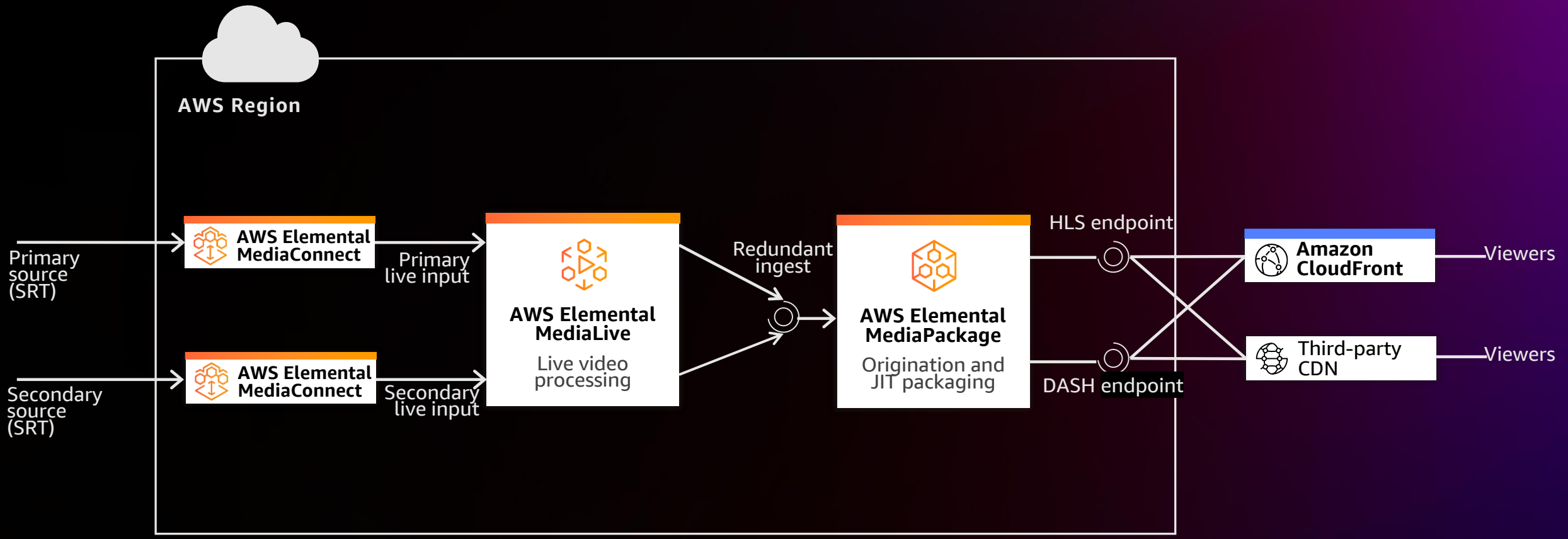
Output ABR Ladder
(All outputs at 50fps)

3840x2160 25 Mbps HEVC
3840x2160 18 Mbps HEVC
2560x1440 12 Mbps HEVC
1920x1080 8 Mbps HEVC
1280x720 4 Mbps HEVC
1024x576 2 Mbps HEVC
640x360 1 Mbps HEVC
640x360 0.5 Mbps HEVC

1920x1080 8 Mbps AVC
1280x720 6 Mbps AVC
1280x720 4 Mbps AVC
1024x576 2 Mbps AVC
640x360 1.5 Mbps AVC
640x360 0.8 Mbps AVC

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Stan’s OTT pipeline



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Conclusion

End-to-end UHD streaming of live content is both possible and practical

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