Sports and esports demand efficiency, performance, and scalability.

SM BEST PRACTICES

Sport and Esport Strategies That Matter Most

AJA VIDEO SYSTEMS

VINDRAL

VOLUME 4, NO. 2 of a series of guides to streaming products and services

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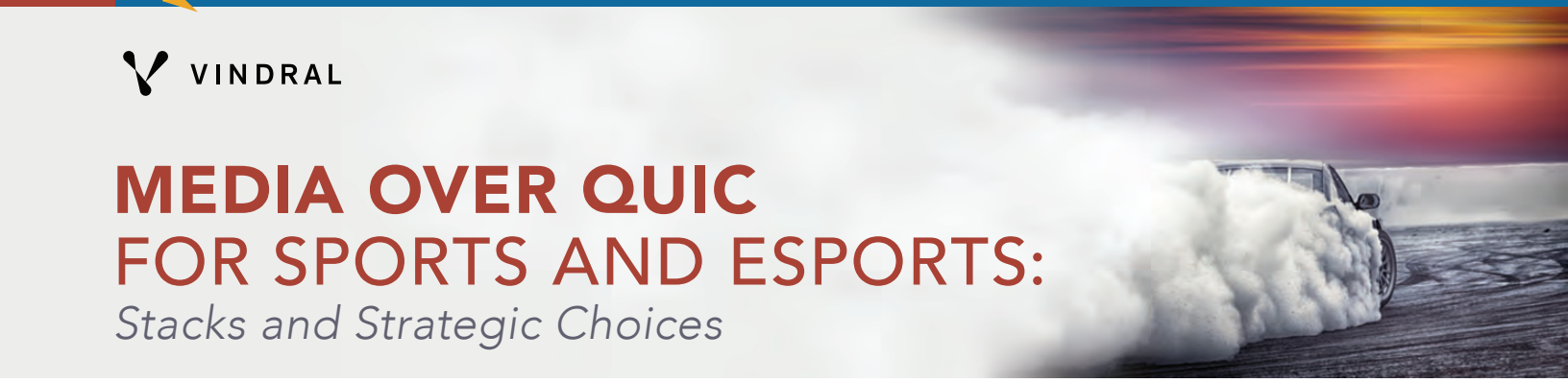

MEDIA OVER QUIC FOR SPORTS AND ESPORTS:

Stacks and Strategic Choices

The Current State of Low Latency Streaming

Latency has become a primary concern in live streaming, particularly for time-sensitive verticals like sports and esports. While broadcast workflows have achieved sub-second delay using proprietary means, internet-based delivery has always involved trade-offs between latency, quality, and scalability. Existing consumer-grade stacks, often based on HTTP and progressive chunking (HLS and DASH), struggle to provide predictable, real-time experiences at scale. They are often good enough to use, and the discussion over recent years has repeatedly come back to the same question: "If this works, why would we fix it?"

That's a valid question, but as with most technologies that evolve over time, live streaming is bound to improve. Today's audiences are more participatory than ever, with Esports services setting the precedent on how to consume content. From real-time chat and reactions, to consumption of the experience across devices, there are increasing expectations that the viewing experience is not just high-quality but also tightly synchronized and responsive. Many current delivery methods are neither deterministic nor configurable in latency behavior, and were not originally designed for one-to-many, low-latency live use cases.

Existing Technologies and Their Limitations

Most streaming stacks were optimized for stability and reach rather than real-time performance. HTTP-based approaches offer excellent compatibility and scaling via CDNs, but introduce delays and fragmentation. This has improved in recent years, as latency has been greatly reduced through LL-HLS. This is why Vindral Live has support for LL-HLS in use cases where absolute latency control and synchronization are not requirements.

WebRTC supports low latency but doesn't scale well for broadcast-style use cases without considerable operational complexity. In short, it was originally built for video conferencing and is doing a tremendous job in that niche. Meanwhile, bespoke systems offer tightly controlled latency but lack interoperability and vendor neutrality.

While efforts to incrementally improve these paradigms have improved metrics, fundamental limitations remain. This is where MoQ enters the picture.

Introducing MoQ: A Developing Standard

Media over QUIC (MoQ) is an emerging standard under development at the IETF, designed to deliver media over the QUIC protocol with greater control and efficiency. MoQ removes traditional HTTP layers and introduces a publish/subscribe model tailored to media delivery. This enables more predictable latency behavior and the potential for synchronized delivery of both video and metadata streams.

> *MoQ introduces a useful structure for combining latency, reliability, and bi-directional communications in a single transport. For Akamai it translates to an added layer of flexibility for our customers in optimizing their streaming applications and we are proud to be actively working towards industry interoperability in the space.*
>
> —Will Law, Akamai

> *Low latency experiences (such live streaming or low latency AI inference) are important for our platform, and MoQ is likely to have a big impact on those scenarios.*
>
> — Jordi Cenzano, Meta

> *MoQ is very similar to the architecture we've employed in our proprietary stack. The ability to provide deterministic latency is fundamental to our product and this emerging standard is 100% in line with how we think that live streaming should work. It's encouraging to see performance metrics represented in an emerging open standard.*
>
> — Per Mafrost, Vindral

MoQ is still under active development (Draft 13 as of the writing of this article). However, several influential companies are investing time and resources into its evolution.

MoQ is not just about streaming video; it is useful for any applications that require shared state, synchronized metadata, or bidirectional interaction. This broad potential is part of the reason companies are preparing for its eventual maturity.

Vindral Live: Production-Ready Determinism

While MoQ matures, Vindral offers a complete delivery stack purpose-built for low-latency streaming. Vindral Live is engineered for deterministic latency, full sync across viewers (maximum 100ms drift between users), and retention of high visual quality even under constrained network conditions. It exists both as a managed service and as a self-hosted engine, giving teams flexibility in deployment.

Key characteristics include:

- **Configurable latency** as low as 0.5 seconds (0.1 on internal networks), with consistency across sessions. This is what we call Deterministic Latency.
- **High-quality video** via modern codecs, adaptive bitrate streaming, and error resilience.
- **Full viewer synchronization**, enabling second-screen and betting scenarios, as well as a consistent experience in multi-angle scenarios.
- **Operational choice** between fully-managed and self-hosted modes.
- **Device reach** across web, mobile, and embedded platforms.
- **DRM support** using the Big 3: PlayReady, Widevine and FairPlay

Vindral Live features both a proprietary websocket playout method and Media over QUIC delivery. For clients looking to be ahead of the curve, Vindral Engine offers a foundation that is performance-proven and adaptable.

Choosing a Streaming Stack: Criteria That Matter

Switching delivery infrastructure is not trivial. It requires retooling pipelines, retraining staff, and investing in testing. Therefore, decision-makers should consider multiple criteria beyond cost or latency alone. Below are a few examples; the list could be made very long:

- **Scale:** Can the solution handle peak viewership globally?
- **Latency:** What is the configurable range, and is behavior consistent?
- **Cost:** Is the pricing transparent? Does it scale predictably? Am I willing to pay a premium?
- **Involvement:** Does it require internal operational lift, or is it plug-and-play?
- **Deployment model:** Is it self-service, managed, or hybrid?
- **API access and extensibility:** Can it integrate into existing workflows?
- **Viewer sync:** Is playback aligned across devices and regions?
- **Quality under load:** Does visual fidelity degrade gracefully?
- **Security & DRM:** Can streams be protected? If so, how?
- **Analytics:** What insight is provided into playback health and audience behavior?
- **Standard vs proprietary:** Is it interoperable? How broad is the adoption?

USE CASES ON THE RISE

Vindral Live has seen an uptick in new use cases, among other things powering live production workflows. Instead of using expensive and rigid hardware-based solutions to distribute streams within production crews, clients such as **SVT (Swedish Television)** have turned to Vindral Live. Using Vindral Engine they achieve an agile way of internal stream distribution at real-time latency, which can be reshaped and scaled extremely efficiently.

For sports specifically, several factors elevate in importance:

- Large screens necessitate high quality
- Diverse platforms increase compatibility demands
- Geographically dispersed audiences demand resilience
- Piracy risks drive a need for robust DRM
- Honorable mentions: Vindral Live features in-venue solutions for local streaming

Preparing for What's Next

While low latency continues to be a hot topic, with some arguing that it's a tight niche and others evangelizing about it being the One Right Way for all live streaming, the truth is most likely somewhere in between. It is doubtlessly evolving – rapidly in some areas of video. For sports and esports, it is becoming more common to see low-latency delivery, which in turn influences viewer expectations. While MoQ presents a promising path forward, most parts of the industry are still "working on it", as R&D. Vindral decided early on to move and is therefore already utilizing MoQ in production for reliable delivery with the performance characteristics that modern audiences expect.

The ability to maintain flexibility – operationally, technically, and in terms of standards adoption – will define success in the next phase of live media delivery. Now is the time to evaluate streaming stacks not only for what they deliver today, but how well they position organizations for tomorrow.

> *Live streaming requires a lot of active maneuvering as it's changing – as it has been for the past years. For us, the decision to offer both proprietary and standards-based delivery methods has shaped our ability to serve clients. It is currently right for Vindral Live to have both MoQ delivery, LL-HLS, and websockets as transport methods; potentially, this could consolidate into MoQ in the long run. We will continue on any path that allows our clients to choose. Also, the addition of standardized DRM has opened up the playing field within sports and esports – very exciting.*
>
> — *Daniel Alinder, Vindral Live*

Live Sports Streaming by the Numbers

A SNAPSHOT OF THE INDUSTRY, SUMMER 2025

As of summer 2025, live sports streaming continues to experience rapid global growth, driven by increased user engagement, technological improvements, and market expansion, and the value (or at least the spending) of sports media rights continues to skyrocket. While citing a few statistics from various sources can't paint the full picture, this grab bag of datapoints offers a glimpse of the state of the live sports streaming ecosystem, where the market is now, and where it's going:

Sports media rights value: The annual value of TV and streaming sports rights in the U.S., has grown from $14.6bn in 2015 to a projected $34.72bn in 2027—an 138% increase—though the market is projected to level off in 2026-27, with only a .22bn increase YoY. *(Source: Statista)*

Top 5 US sports media contracts by value in 2024: All of the top 5 sports media rights deals in the U.S. (TV and streaming) involve the NFL, with ESPN/ABC at $2.7bn, Fox at $2.3bn, NBC at $2.2bn, CBS at $2.1bn, and YouTube at $2bn. *(Source: Statista)*

Monthly subscription spending: The typical sports fan spends $88/month for TV/streaming subscriptions, compared to $64/month by viewers identifying as non-sports fans. *(Source: InterDigital)*

Sports fans watching on social: 40% of sports fans under 35 say they watch sports on social platforms, compared to 13% of fans in the 55+ age bracket. *(Source: InterDigital)*

Streaming-exclusive sports fans by gender: 49% of women say they watch their sports exclusively on streaming platforms, compared to 42% of men. *(Source: InterDigital)*

Fragmentation fallout: 30% of surveyed sports fans said they missed one or more games because they didn't subscribe to the streaming service carrying the game. *(Source: InterDigital)*

Trending toward streaming: By 2027, 127.4 million viewers will watch live sports on streaming platforms (a 21% increase from 84 million in 2024), with 75.4 million viewing on cable. *(Source: eMarketer)*

Appointment viewing: Sports fans 18–29 spend just 25% of their sports consumption time watching live matches (allocating the other 75% to highlights, social clips, and eSports); the numbers for live sports viewing climb to 28% for fans 30–39, 38% for fans 40–49, 46% for fans 50–59, and 60% for the 60+ crowd. *(Source: L.E.K Consulting)*

Live sports streaming in 2025 is a dynamic and complex landscape, with media rights spiking (for now) and consumption habits increasingly diverging by generation as the infusion of Gen Z fans continues.

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$34.72bn PROJECTED
2027

SPORTS MEDIA RIGHTS ANNUAL VALUE
(TV AND STREAMING)

$14.6bn
2015

138%

Streaming-exclusive sports fans by GENDER

49%

42%

Monthly Streaming SUBSCRIPTION SPENDING

SPORTS FANS
$88 per month

NON-SPORTS FANS
$64 per month

TOP 5 U.S. SPORTS MEDIA RIGHTS DEALS BY VALUE IN 2024
(TV AND STREAMING)

$2bn YouTube

$2.1bn CBS

$2.3bn FOX

NBC $2.2bn

ESPN on abc $2.7bn

LIVE STREAMING

2027 127.4 million viewers will watch live sports on streaming platforms

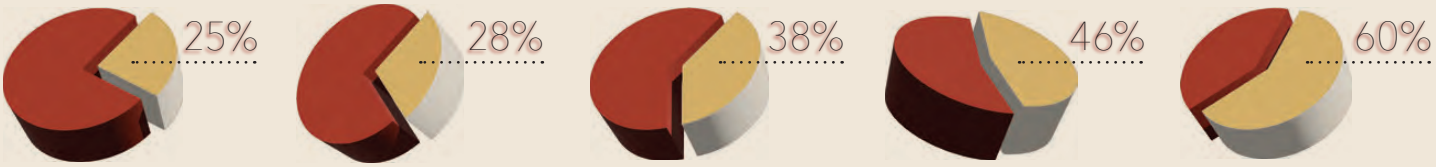
↑21%

2024 84 million viewers

30% missed one or more games because they didn't subscribe to the streaming service carrying the game.

40% fans under 35 VS. 13% fans 55+
WATCH SPORTS ON SOCIAL PLATFORMS

SPORTS VIEWING TIME — LIVE MATCHES — HIGHLIGHTS, SOCIAL CLIPS, ESPORTS



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