



CUSTOM REPORT

Streaming Live Sports: Where Opportunity Meets Complexity

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Streaming Live Sports: Where Opportunity Meets Complexity

As live sports migrate from traditional broadcast to digital platforms, streaming is redefining how leagues, networks, and tech providers engage audiences and generate revenue. This transition brings both opportunity and complexity—from fragmented rights and shifting viewer expectations to significant technical demands around latency, scalability, and quality.

This research, written in partnership with **InterDigital**, explores the business and technology challenges of streaming live sports and outlines strategic insights for navigating this high-stakes, rapidly evolving landscape.

What You'll Learn

- How fragmented sports rights and evolving consumer habits are reshaping content strategy.
- The role of sports in driving SVOD acquisition and retention—and the risks of churn
- Key technical challenges in live sports streaming, including latency, buffering, and quality at scale.
- The future of sports streaming infrastructure, from advanced codecs to interactive, personalized experiences.



The Changing Sports Media Landscape

The sports media landscape is transforming, as sports programming transitions from traditional broadcast and cable networks to streaming. Sports fans now have more ways than ever to engage with their favorite teams or sports, watch live out-of-market games, watch on their mobile phone or tablet, gain access to niche sports not previously available, or engage in interactive activities, such as multicasts, live chats, or in-game betting.

- Forty-three percent of consumers in US internet households classify themselves as Sports Viewers (i.e., they personally watch live sports, and/or sports programs and highlights, from any source).
- Eighty-four percent of Sports Viewers watch at least one live game or match a week, making live sports the primary catalyst for viewing among Sports Viewers. In addition, 74% watch highlights and 47% watch analysis shows once a week or more.
- Among Sports Viewers, 40% watch sports ONLY via streaming services, including general SVOD services, sports-specific direct-to-consumer (D2C) services, streaming pay TV services, and social networks. An additional 30% watch sports content via both streaming and broadcast/antenna or traditional pay TV services.
- Eighty-nine percent of US internet households subscribe to a subscription-based streaming platform and 33% subscribe to a D2C sports-specific streaming service, such as NFL+, NBA League Pass, MLB TV, ESPN+, UFC Fight Pass, DAZN, Willow, and F1 TV.
- D2C sports service viewers are the heaviest spenders on streaming video services, spending an average of \$111 per month on all streaming subscriptions.

- Indian Premier League (IPL) streaming revenue (\$3.05 billion) exceeds that of broadcast revenue (\$3.02 billion).
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- Pure play streaming services such as Amazon and YouTube TV (Google) now account for 25% or more of both the NFL's and NBA's broadcast revenue, and this does not take into account hybrid deals such as Comcast-owned NBC/Peacock.
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- Free ad-supported services are beginning to air major sporting events. As part of FOX's distribution agreement with the NFL, Tubi, FOX's FAST service aired Super Bowl LIX (2025) live and for free. In addition, Tubi has the right to air NFL highlights.

This transition, however, is not without its challenges. From the fan's perspective, sports programming is becoming increasingly fragmented, making it more difficult to know where games are being broadcast and requiring multiple subscriptions to view games or events. While bundling of SVOD services helps it does not alleviate this issue altogether. If anything, fragmentation will accelerate as teams and leagues seek to maximize revenue by selling media rights to different streaming services, broadcast networks, and cable networks.

As games and events shift online, streaming services must navigate a complex web of technical challenges that can impact the viewing experience, many of which overlap. These include, but are not limited to, bandwidth limitations, latency, buffering, scalability, and device/platform compatibility.

At the core, however, lie two fundamental truths.

Video data is massive in size, requiring efficient compression technologies to limit bandwidth consumption when transmitting from the source to devices such as TVs, computers, tablets and smartphones.

Streaming must be adaptive in nature to accommodate differences in users' devices and internet capabilities.

Video codecs can have a significant impact on both buffering and latency, as they determine how efficiently video is compressed and streamed. More efficient codecs, like H.265 (HEVC) or next generation codecs like H.266 (VVC), reduce file size and corresponding bandwidth requirements, thereby improving bandwidth efficiency. Older or less efficient codecs can result in larger file sizes and higher bandwidth needs, potentially causing more frequent buffering and lag.

In addition, to more efficient compression, H.265 (HEVC) and H.266 (VVC) also natively support the 10-bit or higher bit depths required for High Dynamic Range (HDR), expanding the colors and contrasts in video without sacrificing quality.

Besides being well-suited to efficiently stream high-quality video content, such as 4K and 8K video, H.266 (VVC) can also enable higher quality broadcasting of ultra-high definition (UHD) content with reduced bandwidth usage. VVC also has multiple use cases, including video conferencing, VR and AR applications, 360-degree video, gaming and IoT.

This research examines the state of live sports streaming, how streaming is changing the economics of sports broadcasting, consumer pain points and the underlying technical issues, and solutions for overcoming these challenges.



Streaming is Transforming Sports Broadcasting

Whether it be live events, highlights or behind-the-scenes shows, sports programming has long been the domain of broadcast and cable networks. The market, however, is changing as streaming transforms the sports media landscape, fundamentally altering not just how fans follow their favorite teams and sports but the very relationship between the sports leagues and their broadcast partners.

Instead of relying solely on rights fees from broadcast and cable networks, sports teams and leagues are embracing subscription video-on-demand (SVOD) services, D2C subscription models, pay-per-view, and paywall systems. This shift affects the economics of sports broadcasting, changing how fans view games and events, pricing models, and how rights holders negotiate deals.

Long the exclusive home for live sporting events, traditional pay television is in decline. In Q1 2025, only 42% of US internet households paid for a traditional pay TV service (cable, satellite, or IPTV), down 20 points from 62% in Q1 2020.

This in turn is translating into a decline in viewership to pay television. In Q3 2023, US internet households watched an average of 3.5 hours of pay TV a week on their TV, accounting for 16% of their total average weekly video consumption. In Q3 2024, weekly pay TV video consumption fell to 2.9 hours, accounting for 11% of their total average weekly video consumption.

While pay viewership has been declining, consumption of streaming video (including SVOD, AVOD, TVOD, and social video) has been growing. In Q3 2024, streaming video accounted for the lion's share of video consumed on a TV (18.7 hours/week), with SVOD accounting for the largest portion of streaming video consumed (8.5 hours/week).

Consumers are engaging with video content across various business models, including subscription-based platforms, ad-supported services, transactional rentals, and free streaming options. This shift highlights the demand for flexibility and variety in how content is accessed and monetized, catering to a wide range of preferences and budgets.

Subscription TV

Traditional Pay TV

Includes cable, satellite, and IPTV (Telco Video), is a distribution model where viewers pay a monthly fee primarily to access a bundle of linear channels. Traditional pay TV is distributed over a managed network and requires proprietary equipment.

Streaming Pay TV

Otherwise known as vMVPD, streaming pay TV is a distribution model where viewers pay a monthly fee primarily to access a bundle of linear channels. Unlike Traditional pay TV, streaming pay TV is distributed over an unmanaged network (i.e., the internet) and does not require proprietary equipment.

Subscription Video-on-Demand (SVOD)

SVOD is a distribution model where viewers pay a monthly fee to access TV series and movies on-demand. SVOD is distributed over both managed and unmanaged (i.e., the internet) networks.



As a result, media companies are reconfiguring their holdings. Both Comcast and Warner Bros. Discovery (WBD) are spinning off substantial portions of their cable network portfolios. Comcast is spinning off USA, MSNBC, CNBC, Oxygen, E!, Syfy, and the Golf Channel, as well as digital assets Fandango and Rotten Tomatoes into a publicly traded company, which will be called Versant. Similar to Comcast, WBD is separating its cable networks division, which includes CNN, TNT, and Discovery, from its streaming and studio operations, which include HBO Max and Warner Bros. Pictures.

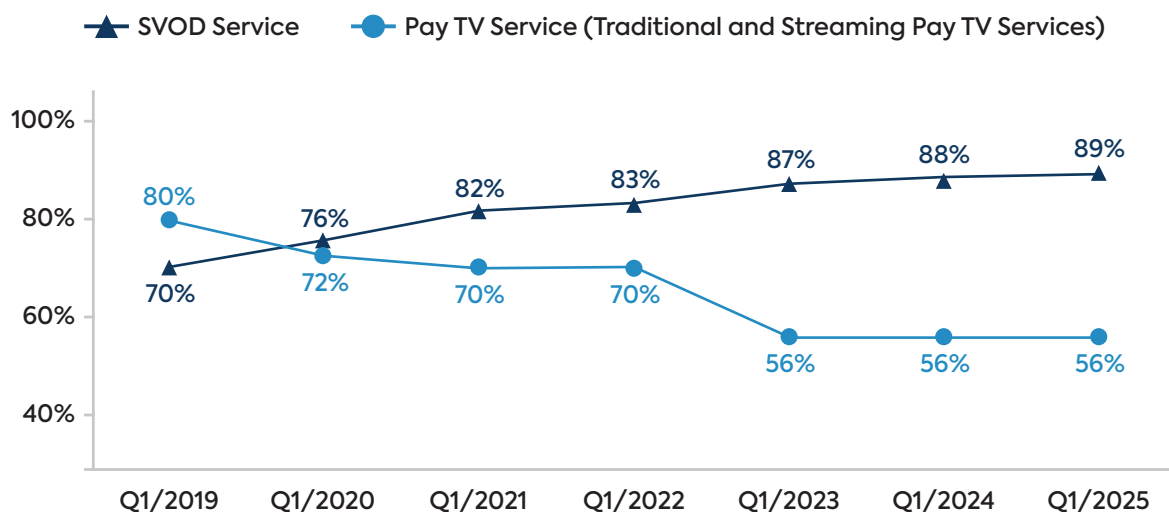
The move is driven by the changing media landscape, with a shift towards streaming and digital platforms, and aims to allow these companies to focus on other areas while still realizing value from their cable networks.

The one bright spot in the pay TV sector are streaming pay TV services, such as YouTube TV and Hulu+Live TV. While similar to traditional pay TV services in terms of pricing and packaging, these streaming pay TV services are distributed over unmanaged networks (i.e., the internet) vs. traditional pay TV services which are distributed over managed networks that are owned and operated by the services themselves. These streaming pay TV services, otherwise known as vMVPDs, are the one part of the pay TV sector that is generally growing, up 11 points, from 12% of US internet households in Q1 2020 to 23% in Q1 2025. With over 8 million subscribers, YouTube TV, which first launched in 2017, is already among the top 5 pay TV providers in the US.

While still declining overall, when we include streaming pay TV services in our pay TV definition the percentage of US internet households subscribing to a pay TV service (cable, satellite, IPTV, or streaming pay TV service) in Q1 2025 fell just 16 points, from 72% in Q1 2020 to 56% in Q1 2025.

Penetration of Pay TV & SVOD Services

(Among US Internet Households)

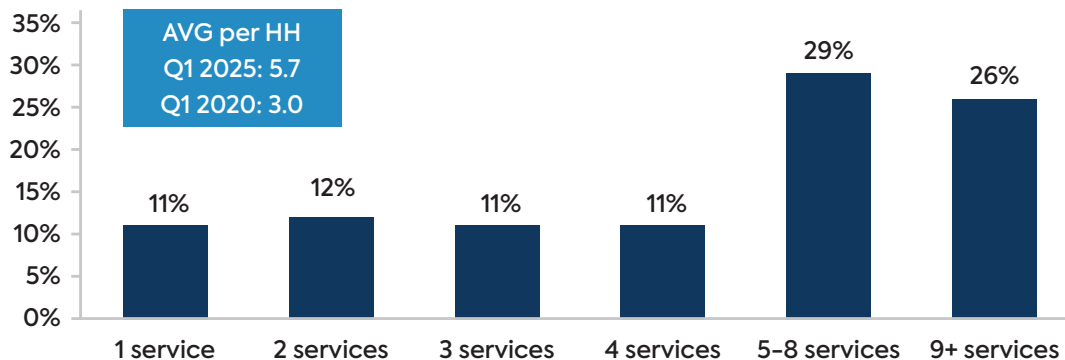


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Aside from offsetting declines in legacy pay subscriptions, streaming pay TV services also play an important role in streaming sports. YouTube TV acquired the rights to NFL Sunday Ticket for a reported \$2.0 to \$2.5 billion annually beginning with the 2023–24 football season and Disney acquired Fubo, a sports-centric streaming pay TV service, pending regulatory and shareholder approval, for an undisclosed amount in January 2025. Assuming the deal goes through, Disney will combine Hulu+Live TV and Fubo. With 6.2 million subscribers in North America, the combined company will be the 2nd largest streaming pay TV service in North America, trailing only YouTube TV. Disney also has plans to launch ESPN as a direct-to-consumer streaming service in the fall of 2025.

In comparison, Subscription Video-on-Demand (SVOD) services are becoming ubiquitous, with 89% of US internet households subscribing to one or more SVOD service in Q1 2025, up 13 points from 76% in Q1 2020. This is approaching pay TV's peak penetration before consumers began cutting-the-cord. Over half (55%) of SVOD households subscribe to 5 or more SVOD services with the average subscribing to 5.7 SVOD services.

Number of SVOD Subscriptions per SVOD Household



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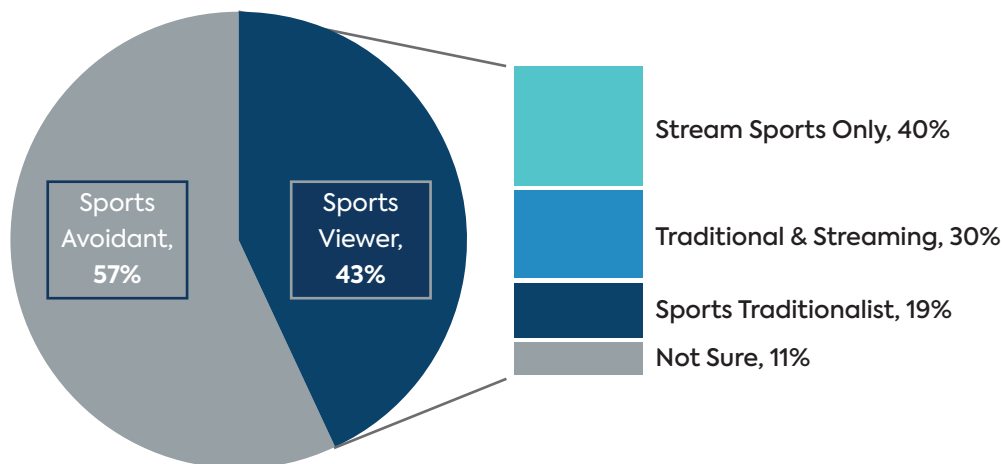
Sports have long played a pivotal role in helping traditional pay TV services maintain their subscriber base or at least slow cord-cutting, but as sports shifts to streaming services we can expect churn to accelerate. Once consumers cut the cord with traditional pay TV services, they seek alternatives to catch their favorite teams/sports. SVOD services and D2C sports apps from leagues and individual teams provide alternative methods for fans without access either because they cut the cord or live out-of-market.

As traditional pay TV services continue to shed subscribers, streaming changes the economics of sports broadcasting, creating new revenue opportunities for both sports leagues and streaming services, and new ways for fans to interact with their favorite team/sport. Streaming makes sports more accessible to fans worldwide, whether it's on a mobile device, smart TV, or laptop. With streaming services offering games both live and on-demand, fans can watch events on their own schedule or even while on the go, without being tied to a specific broadcast time.

Segmenting the Sports Viewer

The transformation of the subscription TV landscape demonstrates that one type of service (i.e., broadcast, pay TV, SVOD) cannot meet the needs of sports viewers today, due to fragmentation across multiple channels and services.

Forty-three percent of consumers in US internet households classify themselves as Sports Viewers (i.e., they personally watch live sports and/or sports programs and highlights, from any source). While not having quite the same broad appeal as Comedy and Drama, Sports, whether live or highlights, are a core part of the viewing experience, particularly for men and those ages 25–44.



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Among Sports Viewers, 40% watch sports ONLY via streaming services, including general SVOD services, sports-specific D2C services, vMVPDs, or social networks and do NOT view sports over broadcast/antenna or traditional pay TV. An additional 30% watch sports content via both streaming and broadcast/antenna or traditional pay TV services.

As games continue to migrate to streaming services, the Sports Traditionalist, those who ONLY watch via broadcast or pay TV, will continue to account for a smaller share of the sports viewing segment. In Q3 2024, 19% of Sports Viewers were Sports Traditionalists.

With 84% of Sports Viewers watching at least one live game or match a week, live sports is the primary catalyst for viewing among Sports Viewers. In comparison, 74% watch highlights and 47% watch analysis shows once a week or more. While behind-the-scenes shows like MAX's *Hard Knocks* gain a lot of publicity, they are far less popular than other sports programming with 27% of Sports Viewers watching behind-the-scenes/team content less than once a month and an additional 28% having never watched.

How Sports Viewers access sports content varies. Top tier streaming services, such as Netflix, Amazon, Apple TV+, and Peacock, are becoming critical distribution channels, with 45% of Sports Viewers using these services to watch live sports and highlights. With an estimated 121.5 million US households this translates to 23.5 million households using a general entertainment SVOD service to access sports-related content.

Sports Viewer Segments

Stream Sports Only

Only watches sports content via streaming (i.e., general SVOD services, sports-specific D2C services, vMVPDs, or social networks). Does not view sports via broadcast/antenna or traditional pay TV services.

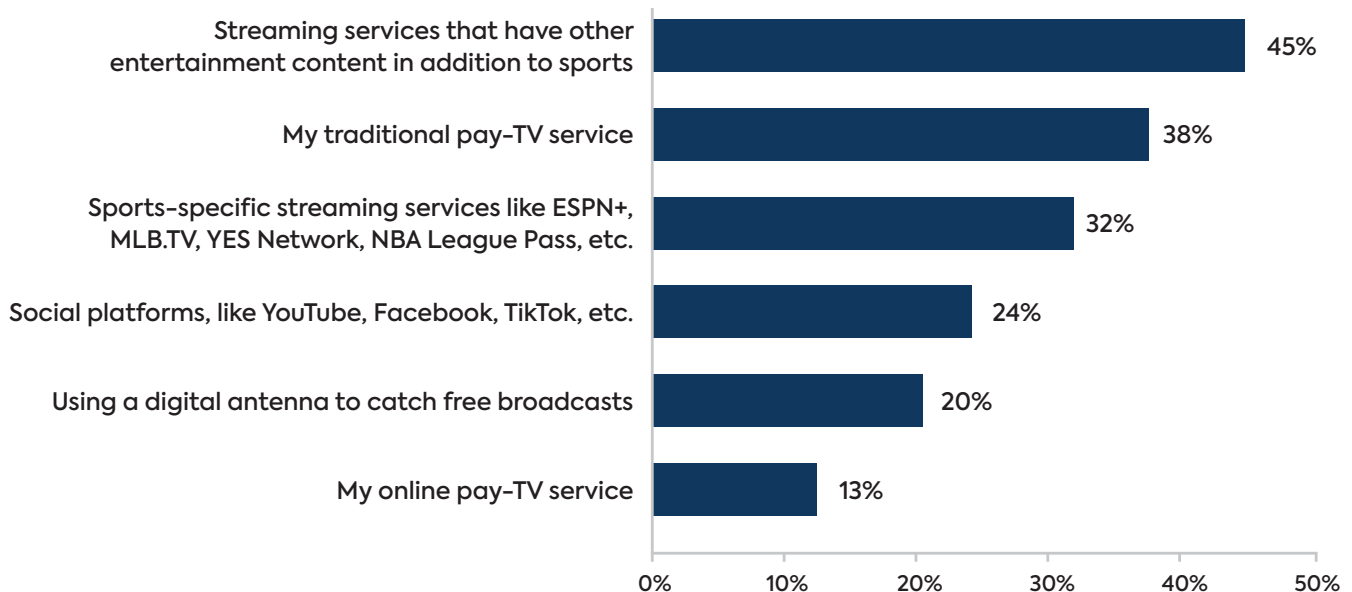
Traditional and Streaming

Watches sports via streaming sources or over broadcast/antenna or traditional pay TV services.

Sports Traditionalist

Only watches sports content over broadcast/antenna or traditional pay TV. Does not watch via streaming.

Platforms that Sports Viewers Use to Watch Live Sports/Highlights



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In comparison, 38% of Sports Viewers still use traditional pay TV services to access sports content and 32% (representing 16.7 million households) use sports-specific D2C streaming services like ESPN+, MLB.TV, NFL+, or NBA League Pass. While there has been some fluctuation, overall, the penetration of sports-specific streaming services has remained fairly consistent, despite the number of D2C sports services having grown significantly. Lastly, digital antennas are slowly coming back into vogue as consumers continue to cut the cord. In Q3 2024, 20% of Sports Viewers used a digital antenna to watch free broadcasts of live sports and highlights.

Sports fans are also among the most valuable viewers. On average, Sports Viewers tend to spend more on streaming video services than Sports Avoidants. In Q3 2024, Sports Viewers spent an average of \$88 per month on streaming services compared to \$64 per month for Sports Avoidants. Looking at average spend by sport viewing segment, we see that D2C sports service viewers are the heaviest spenders on streaming video services, spending an average of \$111 per month on all streaming subscriptions. This is followed by Traditional and Streaming Sports viewers (\$109 per month) and Streaming Sports Only viewers (\$97 per month).



Impact of Age and Gender on Sports Viewing

While sports holds universal appeal, how it is consumed, what is consumed, by whom, willingness to pay, and interest in interactivity all vary by age and gender. Younger sports fans show less interest in watching full games, preferring to watch highlights on social media to shorten viewing time. In comparison, live games tend to draw older viewers, while middle-aged viewers are prime targets for original content. And while men watch sporting events more often than women, women still comprise a significant portion of the sports viewing segment.

Age

Younger viewers represent the future of sports broadcasting; however, sports leagues are at risk of losing younger audiences and the valuable ad dollars they represent in the live stream. Younger viewers prefer to have more control over when they watch games. As such, they are more likely to watch replays of games and events that better align with their schedule. Also, interactive tools that mimic the mobile/social experience with chatting, polls, quizzes, and even sports betting may attract younger viewers into the live experience. Making the experience more engaging and immersive is critical to keeping those younger viewers engaged.

1. 70% of sports viewers 18–24 watch at least one live game or match a week compared to 87%+ of those ages 55+.
2. 40% of sports viewers under 35 watch sports on social media platforms compared with just 13% of those ages 55+.
3. Younger Sports Viewers (under age 35) are more likely to use sports-specific D2C streaming apps and social platforms to watch sports content.

While the quest for the ever elusive “younger viewer” continues, older viewers should not be ignored. As evidenced by the sheer number of pharmaceutical, travel, and high-end car commercials found on TV, not every advertiser is targeting the younger generation.

Another way for services to broaden their user base is to expand their coverage of niche sports, such as MMA/wrestling/boxing, tennis, surfing, rugby, and esports. ESPN is embracing this approach with its expanded coverage of pickleball, rugby, and surfing. While you won’t find these sports on ESPN’s primary channel or in primetime, they are making their way onto ESPN’s secondary channels and during the late fringe and overnight dayparts.

Gender

While men account for the majority of Sports Viewers (65%), women should not be ignored as they represent a significant portion of the Sports Viewing segment (35%) as well. One of the unique aspects of female Sports Viewers is that they are more reliant on streaming to access sports content. Nearly 49% of them watch streaming sports only (that is, do not watch via pay TV or antenna), compared with 42% of men. In comparison, 36% of male Sports Viewers use a combination of traditional and streaming services to watch sports compared to 29% of female Sports Viewers.

The most popular sports for female Sports Viewers to watch are combat sports, such as MMA/Boxing/wrestling (35%), auto racing (35%), the NFL (34%), and college football (31%).

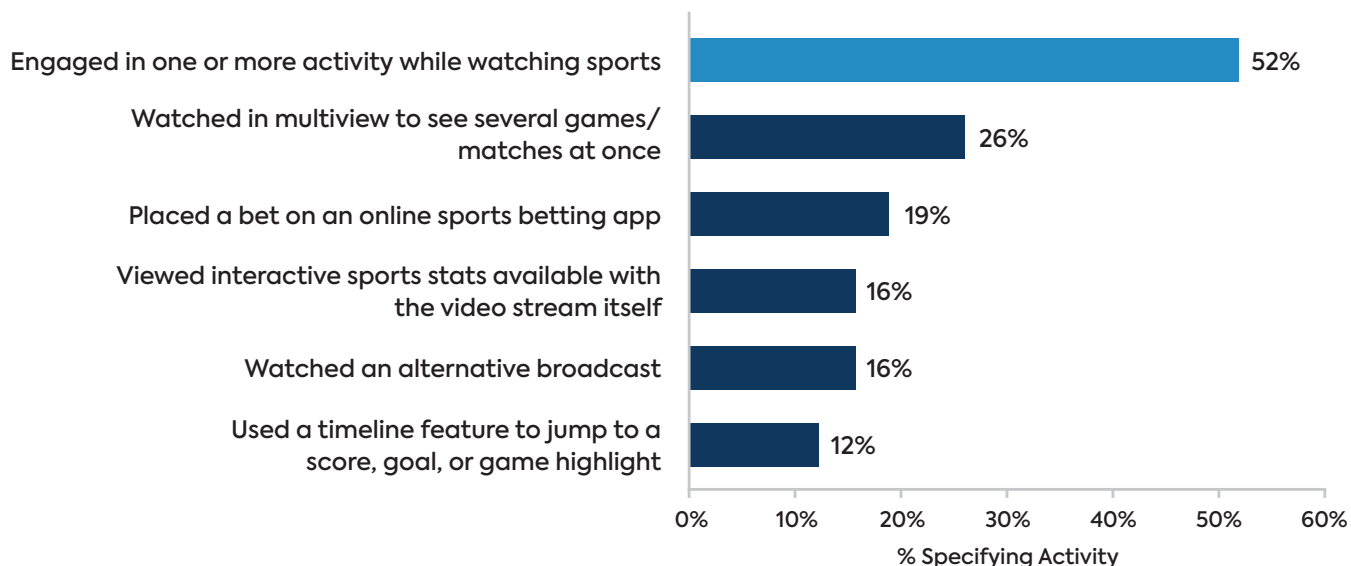
Regardless of age or gender, in the end, reaching sports fans requires an omnichannel presence.



Interactivity Changes the Game

From immersive experiences like augmented reality to in-game betting, live stats, and fan-driven content, sports is more than just a passive viewing experience—it is becoming an ongoing, participatory event that draws fans deeper into the action. And while interactivity tends to skew younger, just over half (52%) of Sports Viewers have used an interactive feature while watching sports. Additionally, this shift opens up major opportunities for data collection. As fans engage with content, sports leagues and brands can gather valuable insights on preferences, behaviors, and viewing patterns.

Engagement with Interactive Features While Watching Live Sports – US Sports Viewers



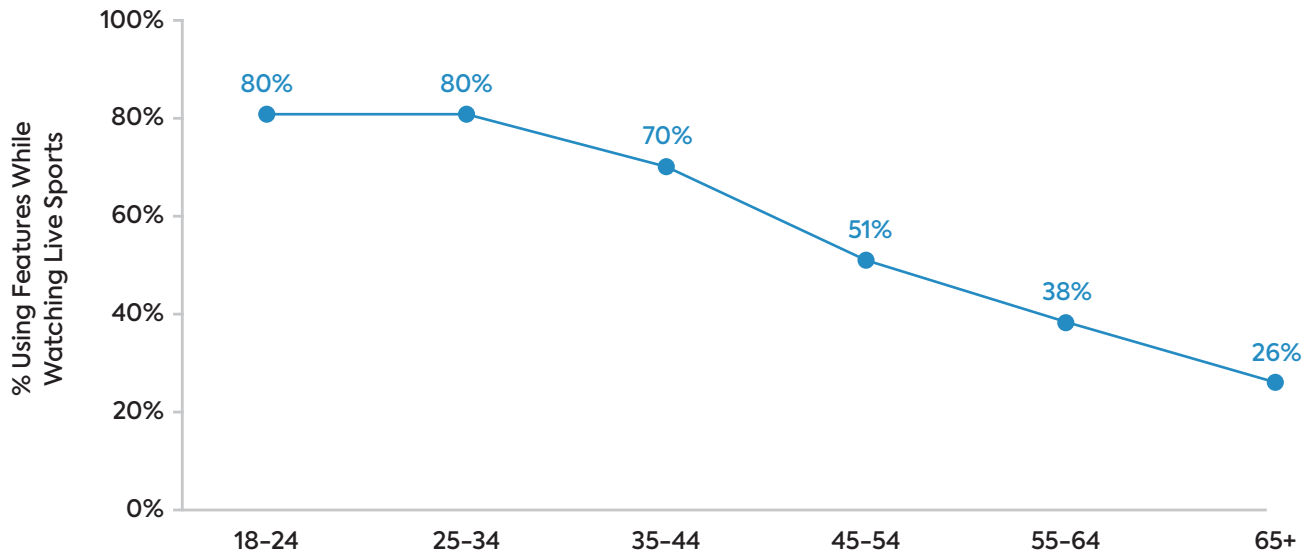
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Watching multiple games at once, such as NFL Red Zone, is the most popular interactive feature, with 26% of Sport Viewers citing it as an interactive feature they have used. This is followed by placing a bet through an online app (19%) and viewing sports stats integrated into the video stream (16%).

Engaging younger fans who watch highlights like other age segments but are less likely to watch games in real-time is critical to the long-term health of sports broadcasting. One way to engage this segment is through interactivity. Eighty percent of sports viewers under the age of 35 have engaged with interactive features while watching a live sporting event with the sweet spot for interactive activities being among sports viewers 18-44, who tend to be earlier adopters of technology.

While Sports Viewers are open to a variety of interactive features, the most appealing features are those offered by leading streaming sports apps and CTV platforms, such as multiple broadcasts, multi-view, and in-game stats. Achieving this engaging, interactive experience, however, is not easy, requiring a fair degree of technical sophistication.

Sports Viewers' Interactive Engagement While Watching Live Sports



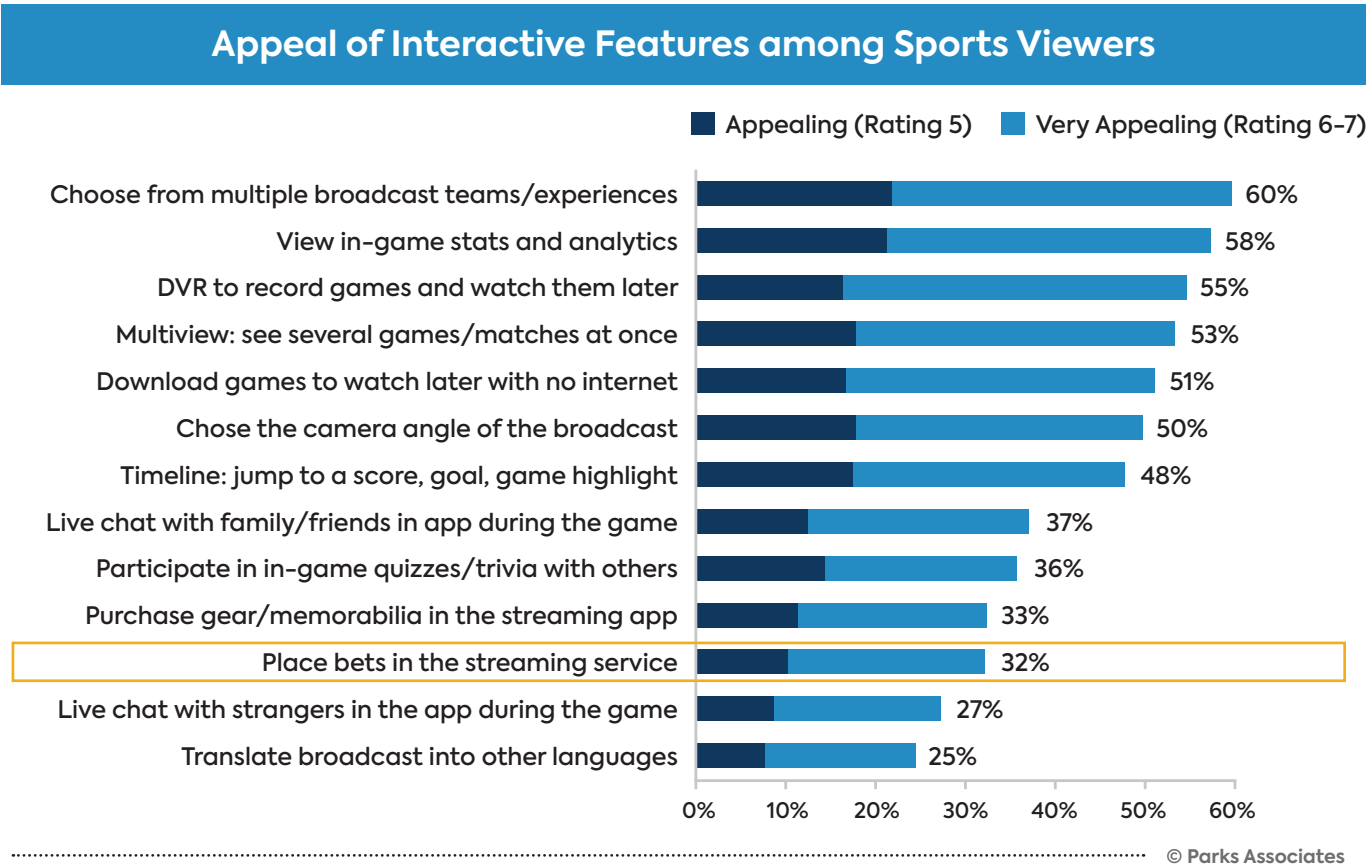
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While online sports betting has garnered a lot of attention over the past several years, it requires a high degree of technical sophistication, as things like latency and buffering can have a significant impact. Latency can cause bettors to miss out on valuable opportunities. In-game betting requires that bettors understand the true state of the game. If the play they are watching has already occurred, it can lead to high stakes errors.

With 35% of rugby viewers and 34% of MMA/wrestling/boxing viewers having placed an online bet while watching a game, fans of niche sports are the most likely to have engaged in live sports betting. The sheer scale of the NFL, NBA, MLB, and NHL fanbases, however, make those markets incredibly lucrative opportunities, even if fewer fans are placing bets during the game. In addition, sports betting appeals to younger sports viewers, with 31% of those 25-34 and 33% of those 35-44 having placed a bet during a game.

Overall, 32% of Sports Viewers find placing bets in a streaming service attractive, but this spikes to 57% of Sports Viewers ages 25-44. The heavily negative views towards sports betting among Sports Viewers ages 55+ strongly drags down the average.



Providers of interactive sports technology may prove out their use case and software through smaller sports leagues or sports app services first to gain confidence of the major sports leagues and sports streaming apps.

Streaming & the Economics of Sports Broadcasting

Streaming is changing how sports leagues make money. Instead of relying on rights fees from broadcasters and cable networks, sports teams and leagues are embracing D2C subscription models, pay-per-view, paywall systems, and even limited ad-supported free viewing through local over-the-air partnerships. This shift is fundamentally affecting the economics of sports broadcasting, changing how fans view games and events, pricing models, and how rights holders negotiate deals.

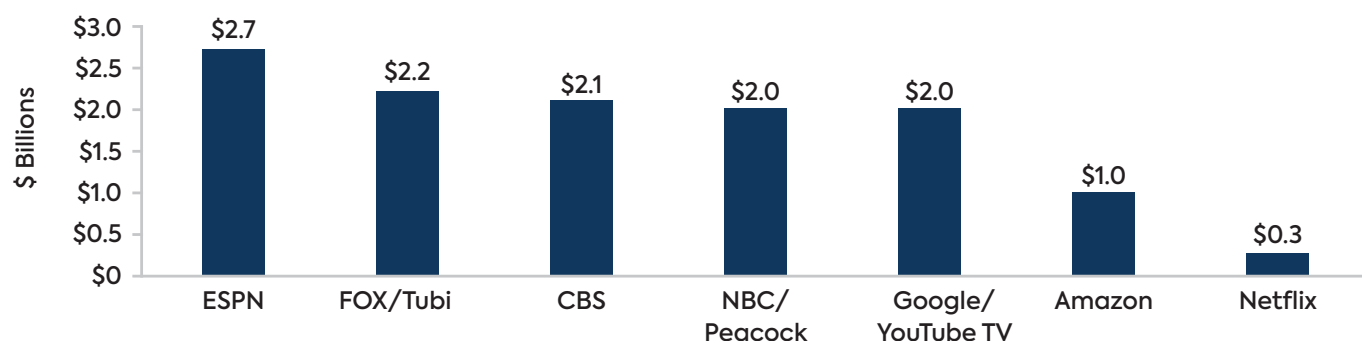


The NFL exemplifies how live sports streaming is fundamentally altering the economic model of sports teams and leagues. Long dominated by broadcast and cable networks, pure play streaming services such as Amazon and YouTube TV (Google) now account for nearly 25% of the NFL's broadcast revenue and this does not take into account hybrid deals such as Comcast/NBCU.

NBC broadcasts Sunday Night Football, the NFL Kickoff Game, the Pro Football Hall of Fame Game (preseason), and a primetime game on Thanksgiving Day. NBCU's Peacock streams a portion of the NFL season, including simulcasting Sunday Night Football games, two exclusive regular season games, and a Wild Card playoff game.

The NFL also is beginning to include free ad-supported TV (FAST) services in its distribution agreements. As part of FOX's distribution agreement with the NFL, Tubi, FOX's FAST service aired Super Bowl LIX (2025) live and for free. In addition, Tubi has the right to air NFL highlights.

NFL Media Rights



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Like the NFL, the NBA is also seeing revenue from its TV rights explode, largely due to the growth of streaming sports. Buoyed by streaming revenue, the NBA recently signed an 11-year, \$76 billion media rights deal, beginning with the 2025–26 season, with Disney (ABC/ESPN), Comcast/NBCUniversal (NBC/Peacock), and Amazon Prime Video. In this new rights deal, Amazon will account for 26% of the NBA's TV revenue. This deal dwarfs the NBA's previous 9-year, \$24 billion agreement with Warner Bros. Discovery (WBD), which included TNT Sports.

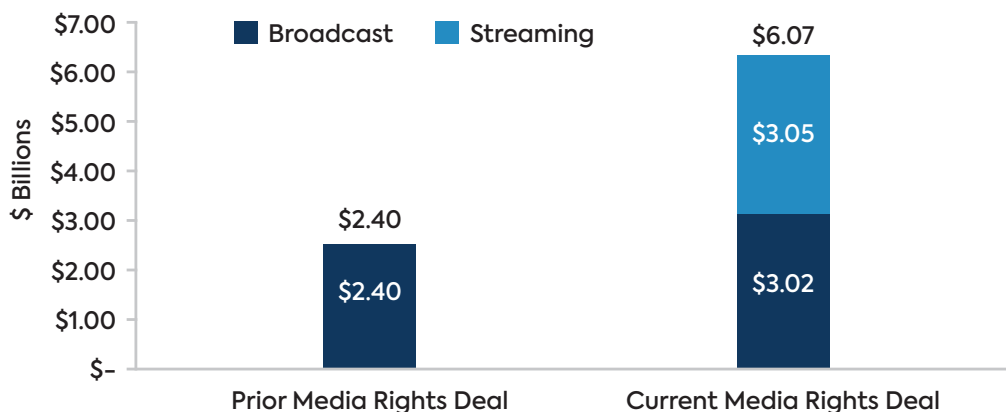


The US Women's National Soccer Team (USWNT) streaming rights are part of a larger media rights deal with Turner Sports. This deal, reportedly worth between \$25 million and \$27 million per year, gives TNT, TBS, and HBO Max the exclusive English-language rights to stream more than 20 US Soccer national team matches annually. HBO Max streams all the matches covered in the contract, while TNT and TBS televise about half, which are also simulcast on HBO Max. The remaining matches are exclusive to the streaming platform.



But it is not just US sports leagues that are seeing their broadcast revenue grow as a result of streaming. The Indian Premier League (cricket) saw its broadcast revenue more than double in its most recent TV rights deal as a result of streaming revenue. The IPL signed a 4-year (2023–27), \$6.07 billion media rights deal with DisneyStar (broadcast) and JioHotstar (streaming). What makes this deal even more unique is that streaming revenue (\$3.05 billion) exceeds that of broadcast revenue (\$3.02 billion). A large part of the rationale for this is that a significant portion of the cricket audience in India watches on their mobile phone.

Indian Premier League (IPL) Media Rights

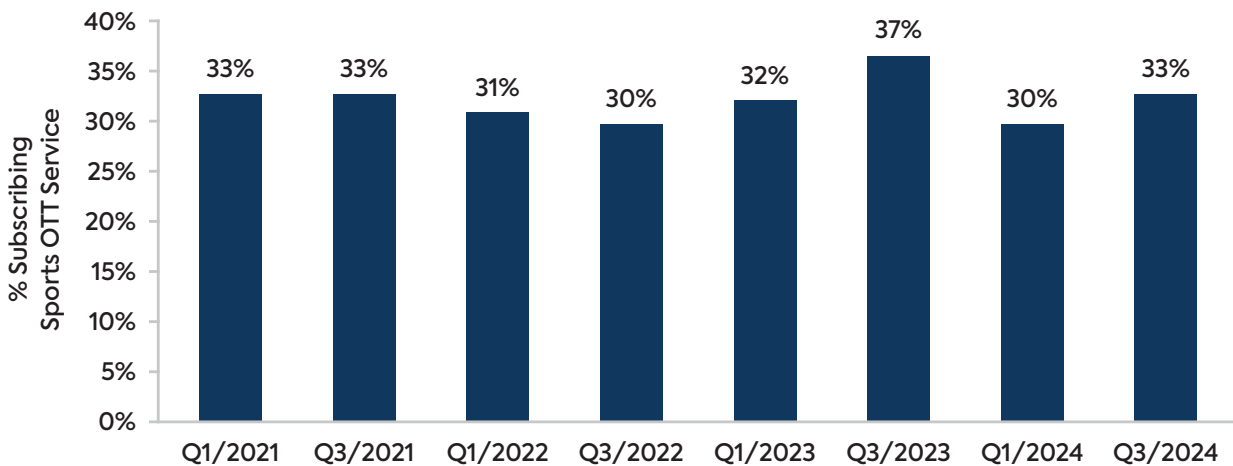


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Media rights are not just shifting to SVOD services like Netflix, Amazon, Peacock, and JioHotstar. With 33% of US internet households subscribing to at least one D2C sports-specific streaming service, such as NFL+, NBA League Pass, MLB TV, ESPN+, UFC Fight Pass, DAZN, Willow, and F1 TV, these services have a role in altering the sports broadcast landscape as well.

% Subscription to Sports-Specific D2C Service

(Among US Internet Households)



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The English Premier League (EPL) is a good example of a league focused on developing sports-specific D2C services. While the current EPL broadcast package does not have a pure-play streaming provider, unlike its previous two broadcast rights deals, the EPL has not forgotten about streaming.

Rather, they seem to be setting the stage to launch their own streaming platform. While EPL has traditionally outsourced media production to IMG, it was recently announced that they will move all international media content production and distribution in-house beginning with the 2026/2027 season. This sets the stage for the EPL to potentially launch a D2C platform serving overseas markets in 2029, while earmarking the domestic broadcasting rights for traditional channels such as Sky Sports and TNT Sports. Given the global popularity of the EPL, EPL games are broadcast in 189 markets, if this comes to fruition this could bring a revenue windfall to the EPL.



Individual clubs are also taking advantage of the opportunities streaming presents. Spanish football club FC Barcelona recently launched a D2C streaming service, Barça One, netting 400K subscribers in its first four weeks post launch. Barça One offers news and info on the club, documentaries, reruns of old matches, and pre- and post-game analysis. In addition, it airs live broadcasts of youth team matches, press conferences, and live streams of the redevelopment work at Spotify Camp Nou.

FAST services are also stepping into sports broadcasting. In September 2024, streaming platform Free Live Sports launched with a selection of 100+ live FAST sports channels as well as rights to thousands of sports movies, docs, series, and highlights. Sports channels offered include the Big 12 Network, Willow Sports, Glory Kickboxing, Boxing TV, Mike Tyson TV, Motorsport.tv, Tennis Channel, Court Sports Network, Powder, Surfer, Billiard TV, Cornhole TV, ChessTV, and Wired2Fish. While none of these niche FAST channels have audiences approaching the size of the tier 1 sports, they help advertisers reach niche demographic and ethnic groups that mainstream sports do not.

FAST sports channels are not just for smaller players. Mainstream networks like NBC, CBS, and FOX are also getting involved. NBCUniversal recently rebranded the NBC Sports FAST Channel to NBC Sports NOW, with free video content for consumers through various platforms. FOX-owned Tubi has partnered with U.K. sports streaming platform DAZN to launch live sport FAST channels in the U.S. and Canada. Lastly, CBS Sports launched Champions League, a 24-hour streaming channel with goals and highlights from the UEFA Champions League soccer games out of Europe and CBS Sports Golazo Network, a free soccer streaming network.

Connected TV platforms are also rolling out FAST sports channels. In August 2024, Roku launched the Roku Sports Channel, a curated, free ad-supported channel that brings all of Roku's top-tier, premium sports content into a dedicated, one-click experience for sports fans.

While all of these emerging distribution channels provide new and unique ways for fans to view and interact with their favorite teams and sports, they also create headaches that fans did not have to deal with when only broadcast and cable networks owned these rights.





Addressing Sports Viewer Pain Points

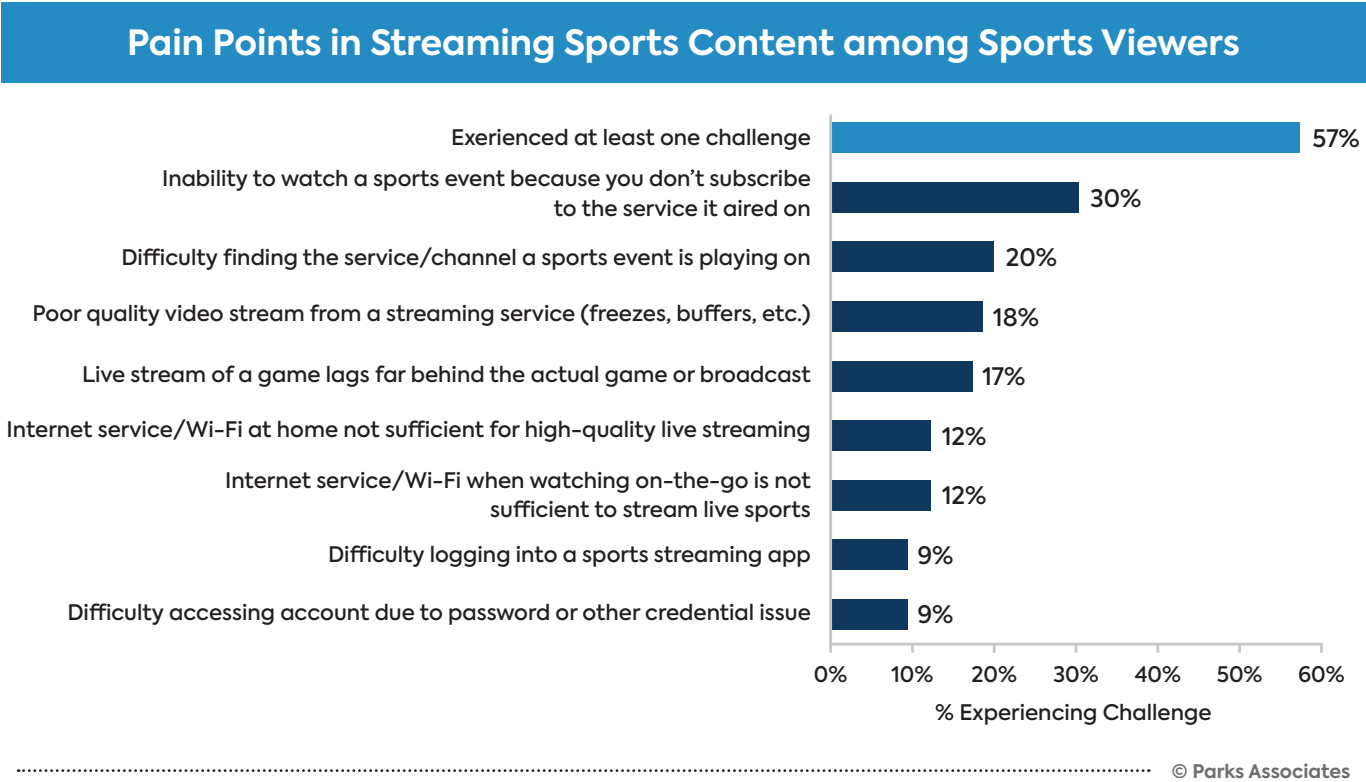
Streaming major events, be they live sporting events or high-profile movies or TV series, is not without challenges. Consumers continue to have issues with accessing content, technical issues, and quality concerns. A short list of recent technical failures includes the following:

- Viewers looking to stream the [Kansas City Chiefs vs. Tampa Bay Buccaneers in Super Bowl LV \(2021\)](#) via CBS All Access (now Paramount+), experienced technical difficulties and app crashes right around kickoff time, while others were unable to access the live stream or saw error messages indicating technical difficulties. The timing of these issues was particularly unfortunate, as CBS All Access was using the Super Bowl to promote its upcoming rebrand to Paramount+.
- During the [Jake Paul vs. Mike Tyson fight on Netflix](#), tens of thousands of Netflix users reported that the livestream was either failing to load or freezing. According to the website Down Detector, which tracks website outages and user issues, on the night of the fight, some 85,000 viewers reported issues with the fight.
- On what will be one of the most watched days of the 2025 season, [Opening Day, Major League Baseball's \(MLB\)](#) national streaming package, MLB.TV experienced a widespread outage, causing many fans to see "Network Error" messages and be unable to stream games. Only the MLB. TV's whip-around show, *Big Inning*, was available, with fans unable to tune into any one of the 10 concurrent games. The outage lasted for nearly two hours.

Streaming major events, be they live games, events, or the premier of a high-profile TV series, has similar demand challenges. The challenges associated with movies and TV series, however, can be avoided or minimized by edge caching, but this is not possible with live sports or events.

The challenge with streaming live sports and events is that services are trying to deliver content over the internet in a way it wasn't designed to support. The internet is designed for point-to-point communication, while broadcast channels are designed for multipoint communication. TV broadcasters, for example, transmit one signal via one shared channel to all TVs in their coverage area. Streaming services, in contrast, require a dedicated channel every time someone connects online to play an episode of a show, movie or live sports event.

Fifty-seven percent of Sports Viewers have faced at least one challenge in trying to watch streamed sports, with the most common challenge being that they don't subscribe to the service airing a particular sporting event (30%). Even more frustrating is when a streaming service experiences technical difficulties delivering an event.



While the inability to watch a sports event because you don't subscribe to the service is a pain point felt commonly across all age groups, technical issues tend to be felt more commonly by younger more technically sophisticated sports viewers. Thirty-one percent of sports viewers ages 18–24 cite poor video quality (freezing, buffering, etc.), insufficient bandwidth for high-quality streaming (25%), and lag (20%) as common problems.

Regardless of the viewing segment they fall into, consumers are becoming frustrated with the fragmentation of games across multiple services. Needing multiple subscriptions to watch games and finding what service/channel those games are airing on are two key frustrations. In addition, sports viewers in the D2C Sports Subscribers and Streaming Sports Only segments are more likely to report technical issues, such as poor video quality and lag.

One other frustration sports enthusiasts have with the migration of sporting events to SVOD services is the inability to flip or change channels. While the SVOD services and leagues are happy viewers cannot easily change the channel when commercials air or easily drop in and out of games, this lacking feature makes the streaming sports viewing experience less viewer-friendly than traditional methods.



Overcoming Technical Challenges

Underlying these consumer pain points is a complex web of technical challenges that content providers must navigate, many of which overlap. From bandwidth limitations to content delivery issues, live streaming faces numerous obstacles that can impact the viewing experience. At the core, however, lie two fundamental truths.

Video data is massive in size, requiring efficient compression technologies to limit bandwidth consumption when transmitting from the source to devices such as TVs, computers, tablets, and smartphones.

Streaming must be adaptive in nature to accommodate differences in users' devices and internet capabilities.

Some of the leading issues streamers face in delivering live video include buffering, latency, scalability, and device/platform compatibility.

Buffering

Video buffering is the process of preloading a portion of a video file into a temporary storage area (the buffer) before playback begins to ensure a smooth and uninterrupted viewing experience by compensating for variations in network speed or other potential interruptions during streaming.

Buffering becomes noticeable when data isn't loading fast enough to keep up with playback speed, causing the video to pause while more data is downloaded. This delay is often referred to as "buffering."

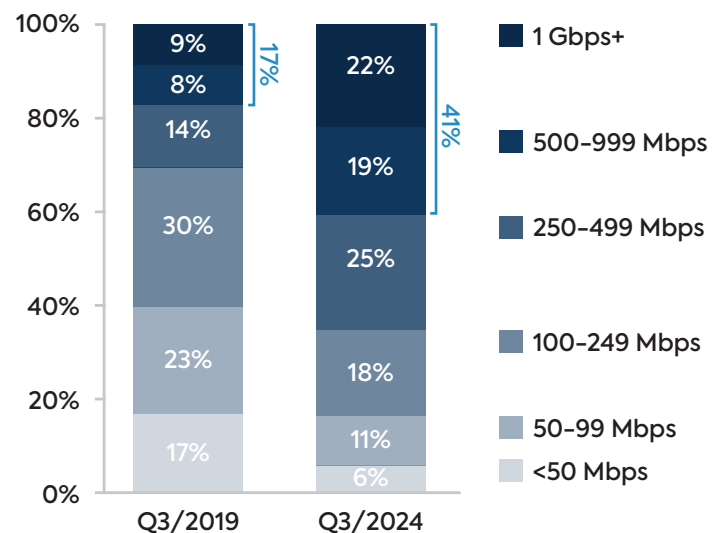
While a number of factors can cause buffering, two of the more common are file size and bandwidth limitations. Streaming higher resolution video requires more data (i.e., bigger files), which can strain bandwidth and lead to buffering, particularly among users that do not have access to fast, stable connections. This is further compounded by streaming high-definition (HD) or Ultra HD (4K) video as these require more bandwidth than lower resolutions.

In the US, internet speed packages have been improving, with 41% of households paying for a package of 500 Mbps or greater in 2024, compared with just 17% of households in 2019. Still, more than a third of households have speeds of less than 250 Mbps.

Plus, bandwidth can vary greatly from region to region and country to country. According to Ookla Research's Speed Test Index, fixed broadband users in countries like the US and China benefit from above average median internet speeds while those in Germany, Mexico, and India are below average.

Users with limited bandwidth can face poor video quality and interrupted viewing experiences. Furthermore, these are median fixed broadband download speeds by country. So, some users will have faster connections and others slower. All this affects the quality of their live streaming experience.

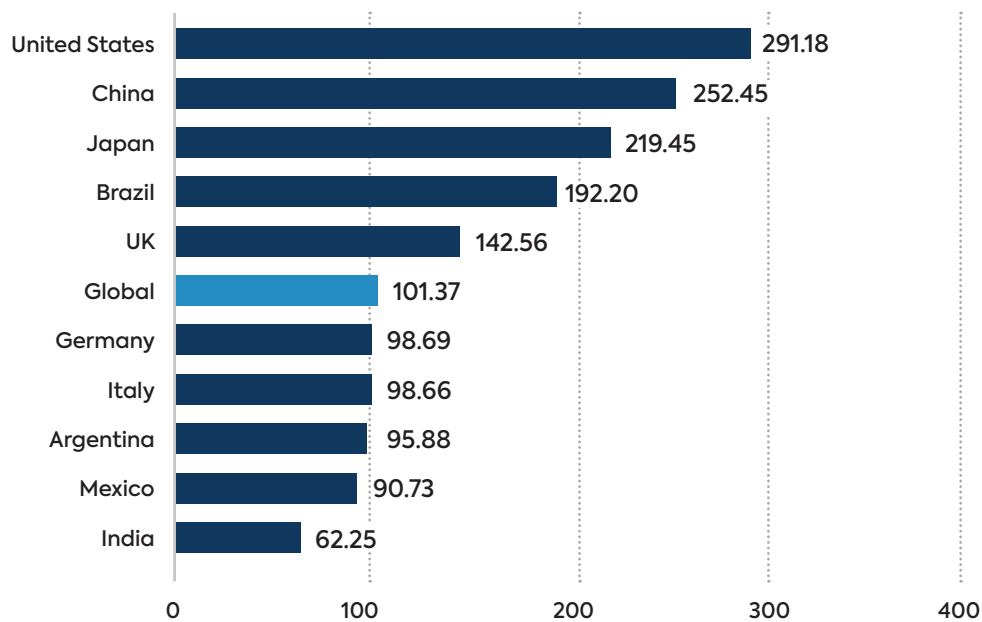
Download Speed of Home Broadband Services (Self-Reported)



© Parks Associates



Median Download Speed by Country (Mbps)



Source: Ookla Research Speedtest Global Index

Also, users watching on handheld devices via mobile networks tend to experience slower speeds. For example, while the median fixed broadband speed in the US is 291.18 Mbps, according to Ookla Research, the median mobile download speed is 175.65 Mbps.

Even those users with sufficient bandwidth can experience issues due to unstable connections causing interruptions in the stream. This can lead to buffering as the stream tries to catch up.

Lastly, buffering can be a result of network congestion. Network congestion can be due to multiple devices within a home using the internet simultaneously thereby overloading the Wi-Fi network. Though outside the content services provider's realm of influence, consumers may still blame the service provider. Service / content providers may also fail to strategically increase resources and capabilities to handle demand. This most commonly occurs with large-scale live events like the Super Bowl or Oscars.



Latency

Video latency (otherwise known as lag) is the delay between when a video is captured and when it is displayed on a viewer's screen (i.e., the time it takes for a video signal to travel from the source to the display, like a TV or mobile phone). This delay can range from milliseconds to seconds and is a crucial factor in various applications, especially those requiring real-time interaction, like streaming live sporting events where low latency is desired to minimize the delay between the action on the field and viewers seeing it.

There are a number of factors that can cause latency.

- **Internet connection.** Faster internet connections, like those with higher bandwidth and fiber optic infrastructure, generally result in lower latency, leading to quicker response times and a smoother online experience. Conversely, slower connections, those with high congestion, or those using older technologies like copper wiring tend to have higher latency.

While bandwidth (the amount of data that can be transmitted) and latency are two distinct issues, higher bandwidth can help reduce latency by minimizing network congestion. When a network is congested, data packets must wait longer to be processed, increasing latency.

- **Encoding and decoding.** Encoding is the process of converting raw video data into a compressed format for transmission while decoding is the process of decompressing the encoded video data on the viewer's device. Latency results from the complexity of the encoder structure (e.g., the size of the Group of Pictures (GOP), the lookahead, use of buffers to smooth bitrate fluctuations, etc.). You can reduce latency by selecting a low latency operating mode, such as limiting GOP size, but this will also limit the compression efficiency.

- **Streaming protocols.** Different streaming protocols contribute to various levels of latency. Low latency streaming protocols aim to reduce the time between when a video is captured and when it is displayed on the viewer's device. Traditional streaming protocols, like some implementations of HLS, can have latencies of 30 seconds or more. Low latency streaming protocols aim to achieve delays of just a few seconds, or even under a second, making the experience feel much closer to a real-time interaction.

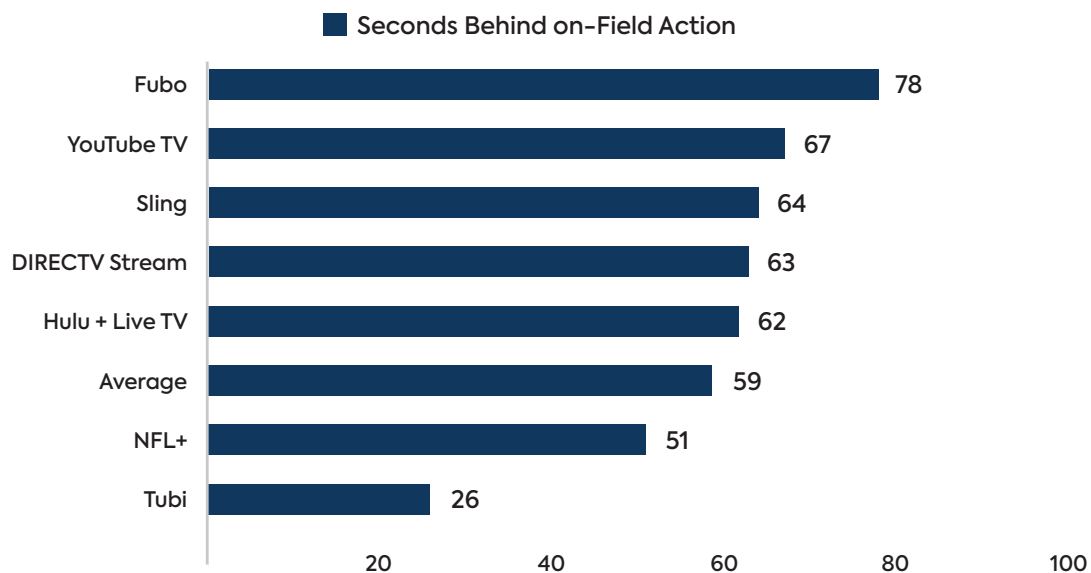
Key protocols include WebRTC, SRT, and certain configurations of HTTP-based protocols like Low-Latency HLS (LL-HLS) and Low-Latency CMAF for DASH (LL-CMAF for DASH). Low latency streaming protocols are crucial for applications like live sports streaming.

- **Content delivery network (CDN).** CDNs can impact latency in several ways. By caching content at the edge CDNs can minimize the distance data needs to travel, thereby reducing the time it takes for content to reach the user. CDNs can also distribute content across multiple servers, reducing the load on the origin server, leading to lower bandwidth consumption. Lastly, CDNs can implement front-end optimization techniques like minification, compression, and image optimization, further enhancing page load times and reducing latency.

Unlike traditional television broadcasts, where all viewers watch the same content simultaneously, streaming services often struggle to deliver content with minimal latency, especially when catering to a large number of concurrent viewers.

Lag also can vary by service. According to a study by Phenix Real Time Solutions, a streaming tech platform that streams real-time synchronous video to broadcast-sized audiences, all of the major US streaming platforms, which broadcast the 2025 Super Bowl between the Kansas City Chiefs and Philadelphia Eagles, experienced significant delays broadcasting the game. Fubo experienced the greatest lag, 78 seconds behind the live action, while Tubi had the least at 26 seconds.

Super Bowl 2025 – Measured Lag Behind Real Time



Source: Phenix Real Time Solutions

The trade-off between compression, quality, and latency is a fundamental consideration. By reducing the file size, compression reduces the amount of data that needs to be transmitted or stored. This leads to faster transmission times and reduced latency for the network, especially in environments with limited bandwidth. Essentially, smaller data packets travel faster through the network. This can be particularly beneficial for live sports streaming.

The goal is to find the optimal balance between these three factors based on the specific needs of the application or system. For example, live sports broadcasts might prioritize low latency, even if it means slightly compromising visual quality. This issue is further compounded as you move to higher quality video (i.e., Ultra HD (4K) or 8K) and its corresponding larger file sizes.

Scalability

Scalability refers to a platform's ability to handle greater workloads and adapt to growing user demand without compromising performance or quality. This includes the ability to accommodate more concurrent viewers, manage higher bandwidth requirements, and maintain a smooth viewing experience even during peak times.

Streaming large-scale live events which quickly attract large audiences, such as a playoff game, the Super Bowl, or the Oscars, frequently have issues with scaling. This issue, however, is not unique to live events. Static events such as the season premiere of a heavily anticipated TV series, like the launch of season 4 of *Game of Thrones* or the final episode of *Breaking Bad*, can overwhelm a content provider if it has not properly planned for it.

The rapid evolution of video streaming, particularly live streaming, demands efficient scalable delivery methods to ensure smooth playback, high-quality delivery, and a positive user experience even during peak demand or when the user base rapidly expands. A scalable infrastructure can provide a flexible experience to viewers, resulting in a reduction in the bitrate/storage needs for applications that require multiple instances of the same video.

Scalability involves having the necessary infrastructure and resources, such as servers, storage, and processing power, to accommodate a large number of concurrent viewers, ensuring that the streaming experience remains consistent for all users, regardless of the number of participants. In addition, by efficiently managing resources and avoiding over-provisioning, scalable solutions can help reduce operational costs.

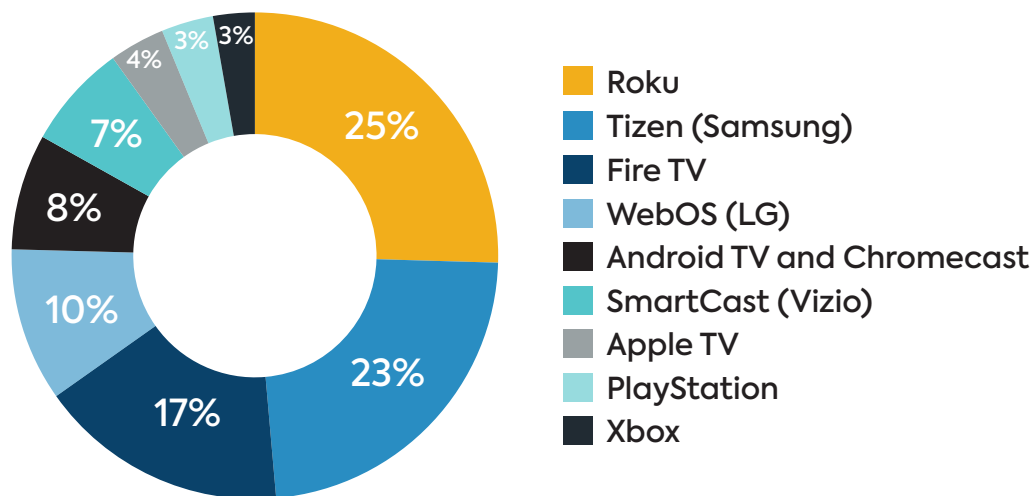


Device and Platform Compatibility

Device and platform compatibility significantly impact the success and user experience of video streaming services, and the streaming device landscape is growing ever more diverse in users' homes. Consumers can stream directly to their TVs, phones, tablets, and computers, and also use streaming media players, smartphones, set-top boxes, gaming consoles, and laptops to stream to a TV for a connected TV experience. The connected TV platform market is itself fragmented with the top 9 CTV platforms including a mixture of 1st party and 3rd party TV operating systems.

Primary Connected TV Platform

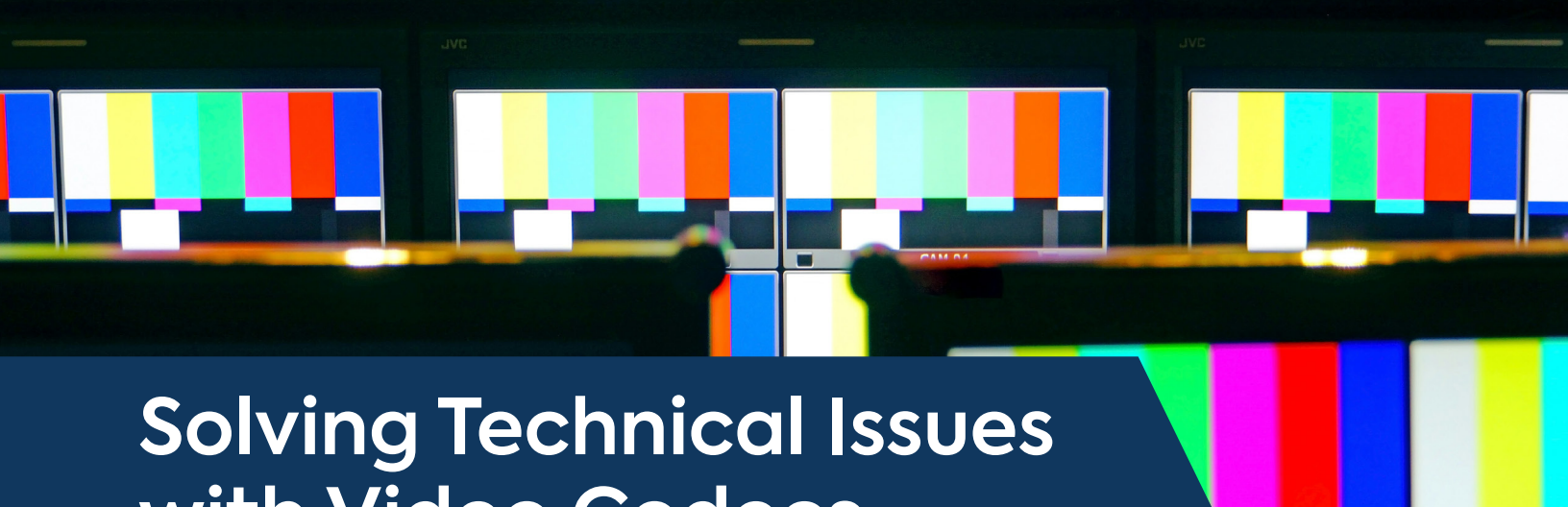
Among Owners of Leading CTV Platforms



© Parks Associates

To ensure device compatibility, video streaming services need to utilize techniques like adaptive bitrate streaming (ABR), which adjusts video quality based on the device's capabilities and network conditions. This ensures that users on devices with lower processing power or slower internet connections still receive a watchable video stream.

Additionally, understanding different streaming protocols and their compatibility across devices is essential. HLS is widely supported across various devices and platforms, WebRTC is designed for low-latency streaming, making it suitable for interactive applications, while MPEG-DASH supports robust digital rights management and ensures high-quality content delivery. Selecting the appropriate streaming protocol allows services to reach a wider audience and provide a consistent viewing experience across various devices and platforms. Issues with compatibility can lead to poor viewing quality, buffering, and limited access to content for users on different devices.



Solving Technical Issues with Video Codecs

While there is no single solution that will address all the challenges associated with delivering live video streams, video codecs, which compress video data by removing redundant information, can significantly reduce buffering and latency, improving the overall user experience.

Video codecs can have a significant impact on both buffering and latency, as they determine how efficiently video is compressed and streamed. More efficient codecs like H.265 (HEVC) or next-generation codecs like H.266 (VVC) reduce file size and corresponding bandwidth requirements, thereby improving bandwidth efficiency. Whereas, older or less efficient codecs can result in larger file sizes and higher bandwidth needs, potentially causing more frequent buffering and lag.

Some of the more commonly used video codecs include the following.

H.264 (AVC)

H.264 was first introduced in 2003 and can be considered a legacy codec. It is a widely supported, relatively efficient codec often used for streaming, especially in lower-bandwidth situations. H.264, however, does have some drawbacks, especially when used in high motion scenes commonly found when streaming live sporting events.

Like other codecs utilized for distribution, H.264 uses lossy compression, which means some information is discarded during encoding, potentially leading to blurry text, artifacts, or reduced clarity, especially in high-motion scenes. New codecs, like HEVC and VVC, however, achieve better compression efficiency, allowing for smaller file sizes while maintaining the same quality as H.264, or the same file size with higher quality.

Another drawback to H.264 is that while it theoretically can support High Dynamic Range (HDR) it is far from the ideal choice. HDR expands the range of colors and contrasts in video, requiring a more efficient codec to compress and deliver the data without sacrificing quality. This allows for the same or better quality at lower bitrates, making it easier to stream HDR content without buffering or quality degradation. H.264 is primarily used for 8-bit content and doesn't natively support the 10-bit or higher depths required for HDR, leading to a loss of HDR information and a more SDR-like appearance.

H.265 (HEVC)

HEVC was introduced in 2013 but did not see widespread adoption until mid-2017 when Apple began supporting HEVC in iOS 11, tvOS 11, and macOS High Sierra. HEVC is an improvement over H.264 for video compression, especially when dealing with high-resolution content.

- HEVC offers more efficient compression, achieving up to 50% better compression than H.264, meaning smaller file sizes for the same video quality or higher quality at the same file size.
- HEVC has a native 10-bit profile that is suited to handling HDR content.
- HEVC can maintain higher image quality at lower bitrates compared to H.264, resulting in sharper, more detailed images with fewer artifacts.
- HEVC is well-suited for high-resolution formats like 4K, where its improved compression efficiency helps reduce file sizes and bandwidth usage.
- HEVC is designed to handle the increased data demands of HDR video.
- HEVC is a more future-proof format than H.264, as it is designed to be more efficient in the face of increasing demands for high-quality video.
- Device and software support for HEVC is fairly ubiquitous with iOS 11 or later and Android 5.0 or later, offering native support. In addition, web browsers like Google Chrome and Safari also support HEVC.

HEVC is widely used by streaming platforms like Netflix, Amazon Prime Video, and others, enabling them to deliver high-quality HDR content to consumers.

HEVC does have some drawbacks. With some older devices and software not supporting it, HEVC is not as universally compatible as H.264, requiring users to install additional codecs or switch to different players. In addition, compared to H.264, HEVC demands more processing power due to its complex compression techniques for both encoding and decoding. This can result in slower encoding times, increased CPU load during playback, and potential compatibility issues with older hardware.



H.266 (VVC)

The VVC codec standard was published in September 2020 and is designed to be the successor to HEVC. Compared to HEVC, VVC offers higher compression efficiency, improved video quality, and support for ultra-high resolutions. This allows for smaller file sizes, reduced bandwidth usage, and lower storage costs, making it ideal for applications like streaming high-resolution content over mobile networks and broadcasting in ultra-high definition.

- In tests VVC has achieved up to 50% better compression than HEVC, meaning it can achieve the same video quality with half the data.
- VVC can deliver better video quality, particularly at lower bitrates, meaning it can achieve higher quality at the same data rate or maintain the same quality with smaller file sizes.
- Improved compression efficiency leads to lower bandwidth requirements, making it suitable for streaming over slower connections or for applications where bandwidth is limited.
- VVC is designed for ultra-high resolutions like 4K, 8K, and beyond, including HDR and 360-degree VR/AR video.
 - In addition to being well-suited to efficiently stream high-quality video content, such as 4K and 8K video, VVC can also enable higher quality broadcasting of ultra-high definition (UHD) content with reduced bandwidth usage.
 - VVC can improve the quality and efficiency of video conferencing applications, enabling clearer and more natural interactions.
 - VVC can compress the large amount of video data required for VR and AR applications, providing a smoother and more immersive experience.
 - VVC supports 360-degree video, allowing for more efficient streaming and storage of this type of content.
 - VVC can be configured for gaming and IoT.
- Smaller file sizes and reduced bandwidth requirements lead to reduced costs for storage and transmission.
- Reduced bandwidth requirements can lead to fewer interruptions and buffering issues during video streaming.
- While VVC is more complex than its predecessors', decoding complexity has been controlled so that it can be used on a wider range of devices.

Though VVC takes longer to encode and requires more processing power, it is expected that as encoders are optimized to work with VVC these requirements will decline over time. While it is unlikely that processing requirements will be the same or lower than HEVC net gains in compression efficiency, video quality, file size, bandwidth requirements, and storage will offset greater processing requirements.

One of the biggest challenges VVC must overcome is addressability. While support for HEVC is pretty much ubiquitous, VVC is really just getting started in terms of wide-scale adoption. VVC, however, is off to a good start with nearly all the major chip manufacturers, including MediaTek, Realtek, Samsung, Broadcom, ARM, and Intel supporting VVC in their chipsets.

What VVC needs next is a trigger event that sparks wider consumer adoption of devices and platforms that support VVC, similar to Apple's integration of HEVC into its device portfolio in 2017. Three events that have occurred to help spur adoption of VVC include the following:

- Adoption of VVC into the ATSC 3.0 standard.
- Brazil has adopted ATSC 3.0 as its next-generation digital broadcasting standard (TV 3.0), with VVC as the main codec for the video base layer in TV 3.0. Other codecs, H.264 and HEVC, will be supported for alternative content distribution.
- Tencent, via TencentCloud and Tencent Media Lab, actively supports VVC and has developed a VVC encoder and decoder, helping VVC gain traction in China. TencentCloud was the first cloud service provider to globally support VVC. Tencent's O266 software decoder was optimized for Qualcomm's Snapdragon 8 Gen 2 mobile processor, achieving performance gains of over 30%. This optimized decoder enables real-time 4K 10-bit 60fps VVC playback on mobile devices.

In isolation, none of these events is sufficient to trigger widespread adoption of VVC but taken in totality they indicate a positive trend in this direction. In particular, Brazil's adopting of VVC into TV 3.0 will help grow adoption of VVC with the men's World Cup taking place in 2026. This represents a period of peak TV and mobile phone sales as consumers upgrade their devices in preparation for this event. Given that Brazil is the largest TV market in South America, as VVC-enabled TVs become available in Brazil so too will they become available in other South American markets, and as the number of VVC addressable devices grows support among content services will follow suit.

	AVC	HEVC	VVC
Introduction	2003	2013	2020
Advantages	• Widely supported • Efficient in low-bandwidth use cases • Good video quality at low bit rates • Enhanced resilience to errors and packet loss	• Widely supported • 25-30% better compression than AVC • Supports higher resolutions, wider color ranges, and High Dynamic Range (HDR) content • High image quality at low bitrate	• Up to 50% better compression than HVEC • Designed for 4K, 8K, HDR support • Supports 360° video • Lower bandwidth requirements means less lag during live streaming
Disadvantages	• Lossy compression results in reduced clarity in high-motion activity • Efficiency and effectiveness decline when handling high-res video • Doesn't support parallel processing • Limited HDR support	• Higher processing power demands compared with AVC • HVEC videos can take longer to encode than AVC • Can have playback issues with some older devices and software	• More complex, increases encoding time • Requires greater processing power • Optimized encoders for VVC need to be developed • Limited, but growing, uptake in end-user devices
Implications for Sports Streaming	• Universal support ensures broad audience reach • Established infrastructure make it a practical and effective option for live sports streaming	• Significantly reducing bandwidth requirements and file sizes, while maintaining or improving video quality compared to AVC	• Ideal for streaming high-res content over mobile networks and broadcasting in high-definition • Better quality even in low-bandwidth environments



Video Encoding and the Future of Sports Streaming

Despite challenges, the future of live sports streaming is bright with viewership growing, new revenue streams for teams and leagues, and the opportunity for new interactive and personalized experiences. And this is just the beginning. With advancements in personalization and AR experiences, along with new revenue models like advertising-supported streaming and exclusive content we are just at the precipice of what streaming live sports can achieve.

To bring this vision to reality though, **the entire streaming sports ecosystem, including leagues, content service providers, chip manufacturers, TV OEMs, and tech companies, must all work together to maximize the consumer experience while minimizing their pain points.**

While technology cannot alleviate all of consumers' pain points, particularly fragmentation and the need for multiple subscriptions, it can address many of them, particularly those associated with lag, buffering, and scalability.

Through the use of video codecs like HEVC and VVC to compress and decompress media, content providers can improve compression efficiency, thereby improving video quality while reducing file sizes and corresponding bandwidth and storage requirements, improving transmission speeds, limiting broadband interruptions, and ensuring smooth playback across various devices. As the live sports streaming experience improves for consumers this will lead to growing viewership, massive revenue growth, and new revenue opportunities.

METHODOLOGY

Data referenced throughout this research is from Parks Associates library of data including studies:

- *Interactive TV: Social, Commerce, Sports*
- *Streaming Sports: The Fan Experience*
- *The Viewer Journey Navigating Streaming Options*
- *Ad-Based Streaming – Consumer Demand & Engagement*
- *Streaming Video Tracker*
- *Video Services Dashboard*

Survey Methodology:

- The surveys referenced throughout captured 8,004 heads-of-internet households in the United States.
- This sample was split to show special topic questions to smaller groups. Some questions related to interactive TV asked of a ~4,000 sub-segment of the full sample. Sample sizes are noted on each chart.
- The survey is demographically representative of internet households for the full 8,004 survey results as well as for each ~4,000-sample sub-group.
- Demographic quotas are set for age, gender, household income, and education to be demographically representative of US households with internet access.
- These surveys were fielded between 09/26/2024 and 10/04/2024, and 03/12/2025 and 03/27/2025.

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Michael Goodman is a Senior Contributing Analyst at Parks Associates and the founder and principal analyst at Nexus Media Research. Goodman is an accomplished media and entertainment analyst with a strong history of providing clients with market intelligence and strategic insight into the evolution of the TV industry. Key areas of research include streaming TV platforms and devices, OTT video, connected TV advertising, video games, and cloud gaming. Prior to founding Nexus Media Research, Goodman was Director, Connected TV Strategies at TechInsights and before that Goodman was Director, TV & Media Strategies at Strategy Analytics. Over the course of his career, Goodman has contributed to and been quoted by leading publications and spoken at numerous industry events such as CES, NAB, and the StreamTV Show. Goodman is a graduate of Boston University.

ATTRIBUTION

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