

WHITE PAPER

The Shifting Landscape for Content Streamers

Why streaming platforms need a new kind of CDN built for live streaming, scale, and economics.



THE SHIFTING LANDSCAPE FOR CONTENT STREAMERS

Overview

On January 16, 2007 the world changed in an epochal way. Netflix launched its online streaming service. Although “the future” took longer to arrive than most had anticipated back in those heady days, it’s finally here.

In May, 2025, according to research from Nielsen, streaming over-the-top (OTT) video in the United States eclipsed cable and broadcast TV combined. And while it has taken almost two decades to arrive at this point, it’s not difficult to envision the day when virtually all video is streamed as unicast IP sessions over broadband or cellular connections. But clouds are on the horizon.

The vast majority of streaming video to date has been of the on-demand variety. Arguably, video on demand (VOD), while representing a massive increase in traffic for all aspects of the internet infrastructure, is a relatively straight forward use case. Basically, large files transferred to playback apps that can buffer a few seconds of content locally to minimize underruns. Even 4k is just (a lot) more bytes. The clouds on the horizon represent a streaming use case that is relatively newer and much more challenging: the streaming of live content, especially sports.

Live sports streaming is an entirely different use case than VOD, even though it may be offered by the same streaming platforms, delivered using the same content delivery networks (CDNs), and watched using the same apps (see nearby sidebar for a comparison).

At the same time live sports streaming is increasing in popularity, the underlying infrastructure most streaming platforms use to deliver content to their subscribers is not as economically strong as it should be.

Over the past few years there have been a number of well-publicized exits from the CDN market, some due to bankruptcy and others due to thoughtful business decisions. In either case, roughly half a petabit per second of capacity has simply gone away. This should be alarming because for most streaming platforms, i.e., those employing “multi-CDN” strategies, CDNs are strategic suppliers that are vital to their long-term business interests.

These two herculean challenges—massive traffic spikes associated with live sports and a financially weakened underlying delivery infrastructure—mean that *streaming platforms need to rethink their relationships with CDNs.*

Live Streaming versus VOD

Live streaming imposes tight latency budgets, concurrency spikes, real-time encoding, fragile error tolerance, and synchronous ad insertion, making it an end-to-end systems optimization problem. VOD workflows benefit from asynchronous processing, higher compression efficiency, better caching economics, and more forgiving QoE thresholds.

CATEGORY	LIVE STREAMING	VOD
Latency	Low-latency (<5-10s); short segments (1-2s); constrained playback buffers	Latency irrelevant; longer segments (6-10s); large buffers possible
Scalability & concurrency	Flash crowd surges; simultaneous manifest requests; stresses CDNs and origins	Time-shifted viewing; caches warm gradually; load spread across time
Encoding & packaging	Real-time single-pass encoding; on-the-fly ABR ladders; CMAF packaging	Multi-pass encoding; optimized bitrate ladders; pre-packaged and cached
Error recovery & reliability	Lost chunks unrecoverable; requires FEC, SRT/RIST; small buffer reduces tolerance	Segments can be re-requested; larger client buffers (20-60s); more resilient
Advertising & monetization	SSAI must be frame-accurate; ad decisioning in milliseconds; high ad server load	Ads can be pre-stitched or dynamic; relaxed timing constraints; less stress
Quality of experience (QoE)	Minimal stall tolerance (<1%); startup delay <3s; device sync across viewers critical	Higher stall tolerance; startup delay flexible; no synchronization required

Multi-CDN streamers

Multi-CDN selection is a strategy used by streaming video platforms to improve performance, reliability, and cost-efficiency by routing traffic across multiple CDNs in real time. Instead of relying on a single CDN, platforms integrate several providers and dynamically choose the best one for each viewer’s request. The process starts with CDN integration at the application or player level. The video platform’s delivery system is connected to two or more CDNs through APIs, DNS-based routing, or client-side logic. When a viewer requests content, a decision engine evaluates multiple factors before selecting a CDN.

Key selection criteria include:

Performance metrics:	Real-time measurements of latency, throughput, and error rates from analytics probes or third-party monitoring tools (e.g., Cedexis, NSI).
Geographic coverage:	Matching viewers with CDNs that have optimal PoPs (points of presence) close to their location.
Availability and failover:	Detecting outages or degraded performance and rerouting traffic to a healthier CDN.
Cost considerations:	Using contractual rates or load-balancing logic to minimize delivery costs while meeting performance targets.
Capacity management:	Preventing overload on any single CDN by distributing traffic proportionally.

Two main approaches exist:

DNS-based selection:	The viewer’s DNS request is directed to an authoritative server that chooses the CDN based on monitoring data. This approach is transparent but operates at the DNS resolution layer, so changes mid-stream are harder.
Client-side (player) selection:	The video player receives multiple CDN endpoints and can switch mid-session based on live telemetry. This allows more granular control, especially for adaptive bitrate streaming.

By using multi-CDN selection, streaming platforms can consistently deliver high-quality video, reduce buffering, and improve uptime, all while maintaining flexibility to adapt to changing conditions in real time.

The dawn of a new CDN

For too long, streaming platforms have been stuck using general purpose CDNs to deliver their content to subscribers. The underlying assumption has been that CDNs adept at security or e-commerce, for example, can also handle live and on-demand streaming video with equal dexterity. Unfortunately this is simply no longer the case and multi-CDN streamers are increasingly demanding CDNs built specifically to handle what is most important to them. For proof look no further than Netflix, which utilizes an in-house CDN tailored to meet their streaming video needs and nothing more. If the top streaming brand in the world uses a CDN specializing in streaming video, shouldn’t its multi-CDN competitors look to do the same?

Many streaming platforms have now come to exactly that conclusion. Going forward, there are three key areas they should expect their CDNs to excel in:

Quality of experience (QoE)

Ultimately, viewers care about three things when it comes to the streaming video platform they subscribe to and, hopefully, don't churn away from.

The first and most overriding is clearly content availability but this is a subject completely outside the realm of CDNs. The second is price. Here it might be argued that CDNs play a role since their fees bubble up into subscriber costs but, for most streaming platforms, the vast majority of their costs lie in content development, acquisition, and promotion, which are also beyond the control of CDNs. The one subscriber concern that CDNs are absolutely central to is quality of experience.

Despite the fact that many streaming platforms are experimenting with "just good enough" average bit rates, this is simply an effort to control distribution costs in the face of ever-rising content demand. Along the same lines, some streaming platforms are resisting the move to 4K for live events, which is understandable given the very significant costs, but with over two-thirds of US households owning 4K televisions, consumer demand will make this transition inevitable. It's simply a question of when.

Further, while average bit rate (ABR) is a key QoE metric, it is only one of many that are typically tracked by major streaming platforms (see nearby sidebar for a more comprehensive outline).



Quality of experience (QOE)

Major streaming video platforms (Netflix, YouTube, Disney+, Amazon Prime Video, etc.) track Quality of Experience (QoE) metrics to ensure that viewers perceive high-quality playback with minimal disruption. These metrics combine network-level performance with user-perceived quality signals. Here are the key QoE metrics used:

Startup & Load Performance

- **Video Startup Time (VST):**
Time from when a user clicks play until video starts.
- **Join Latency:**
Often used in live streaming; measures delay between request and playback start.
- **Time to First Frame (TTFF):**
How long it takes for the first video frame to render.

Playback Continuity

- **Rebuffering Ratio / Stall Rate:**
Percentage of playback time spent buffering.
- **Rebuffering Events (per hour/session):**
Frequency of interruptions.
- **Mean Stall Duration:**
Average length of buffering events.
- **Exit Before Video Start (EBVS):**
Users who abandon before playback begins (linked to startup delay).

Video Quality

- **Average Bitrate / Delivered Bitrate:**
Reflects effective resolution and clarity.
- **Resolution Metrics:**
Percentage of playback time spent in HD, UHD/4K, or downgraded to SD.
- **Adaptive Bitrate (ABR) Switching Frequency:**
How often the system changes quality; excessive switching degrades QoE.
- **Initial Video Quality:**
Resolution at playback start (often lower, then ramps up).

Latency (Live Streaming Specific)

- **Glass-to-Glass Latency:**
Delay between live event capture and playback on the viewer's device.
- **End-to-End Latency:**
Network + encoding + delivery + device buffer delays.
- **Sync Drift:**
Audio/video synchronization and (in multi-stream experiences) sync across users.

Engagement & User Behavior

- **Completion Rate:**
Percentage of content watched.
- **Session Abandonment Rate:**
Drop-offs tied to quality issues.
- **Rewatch Rate / Seek Behavior:**
May reflect buffering or navigation frustration.
- **Churn Correlation:**
Long-term retention impact of poor QoE.

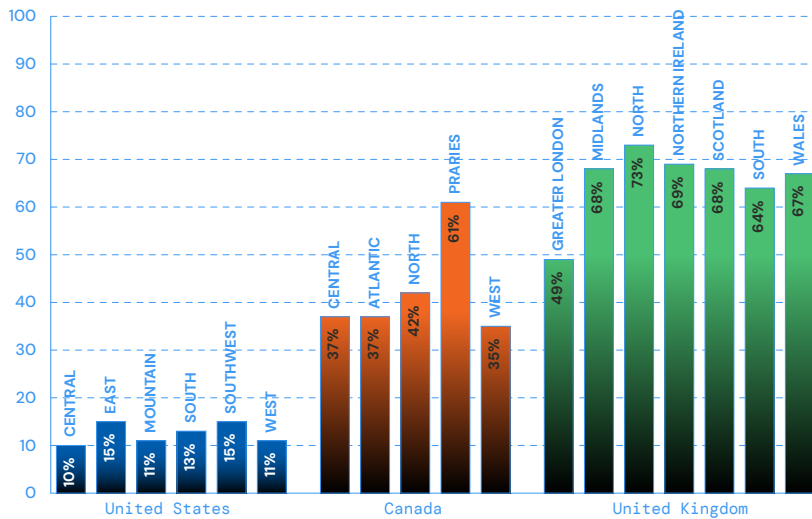
Device & Network Context

- **Playback Failure Rate:**
Errors preventing playback (DRM, CDN issues, codec mismatch).
- **CDN Performance Metrics:**
Throughput, round-trip time (RTT), error rates.
- **Device-Specific Failures:**
QoE breakdown by device class (TV, mobile, console).

01

% Improvement (reduction) in TTFF

Based on actual streaming provider data



While CDNs have been part of the internet landscape for decades, most have been general purpose workhorses intended to improve efficiency delivering a myriad of traffic types across the decidedly inefficient internet. Quality of experience, beyond simply how long it takes a browser to paint a page, was not a huge concern. But as streaming

For streaming platforms, their choice of CDNs should be driven primarily by the ability of the CDN to reliably deliver the only traffic type that matters to them—streaming live and on-demand video—with maximum QoE.

Netskrt is unique among CDNs in that the sole focus is delivery of streaming video and other large, high-value payloads.

Global breadth, local depth

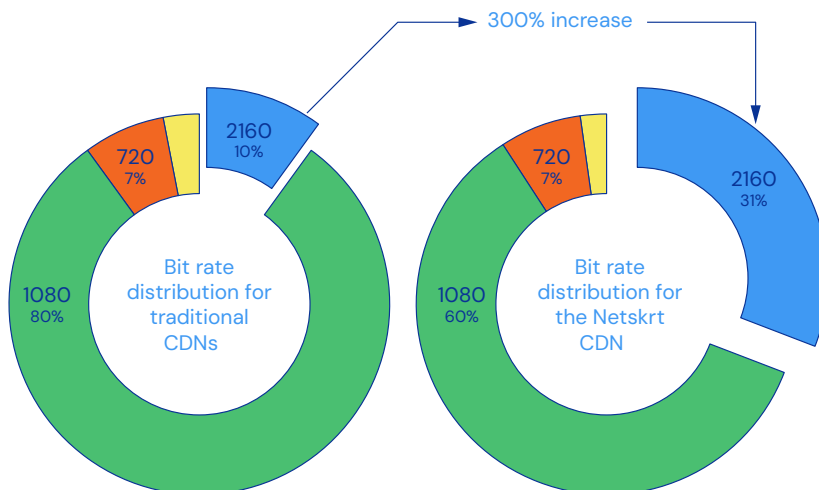
Steaming platforms face somewhat conflicting requirements from a capacity standpoint. To varying degrees and depending on specific events, they require capacity on a broad scale. However, they also need to know available capacity and real-time QoE down to the serving ASN. This is necessary not only to achieve their quality goals but also to ensure accurate and reliable delivery of their live and on-demand streams.

There are over 120,000 ASNs globally and more than 12,000 “eyeball” ASNs (i.e., ASNs operated primarily by residential ISPs) in the US alone. For streaming platforms, understanding capacity available down to the serving ASN is exceedingly difficult and requires information not typically provided by conventional CDNs. Traditional CDN POPs are normally located several layer three hops “north” of the serving ASN. The CDNs themselves only know that an ASN is reachable through one or more routes; they do not understand the real-time capacity, topology, or QoE characteristics (latency, error rate, etc.) between themselves and the serving ASN. This is problematic for streaming platforms—once they hand off traffic to a CDN, all they really know is that the traffic is likely to be successfully delivered, not that it will meet the quality expectations of the streaming platform or its subscribers. Multi-CDN selection mechanisms do allow the streaming platform to take corrective action some time after the fact but by then the damage has been done. Better for all involved if capacity and QoE characteristics could be known ahead of time.

02

Playback rate ladder distribution

Based on actual streaming provider data

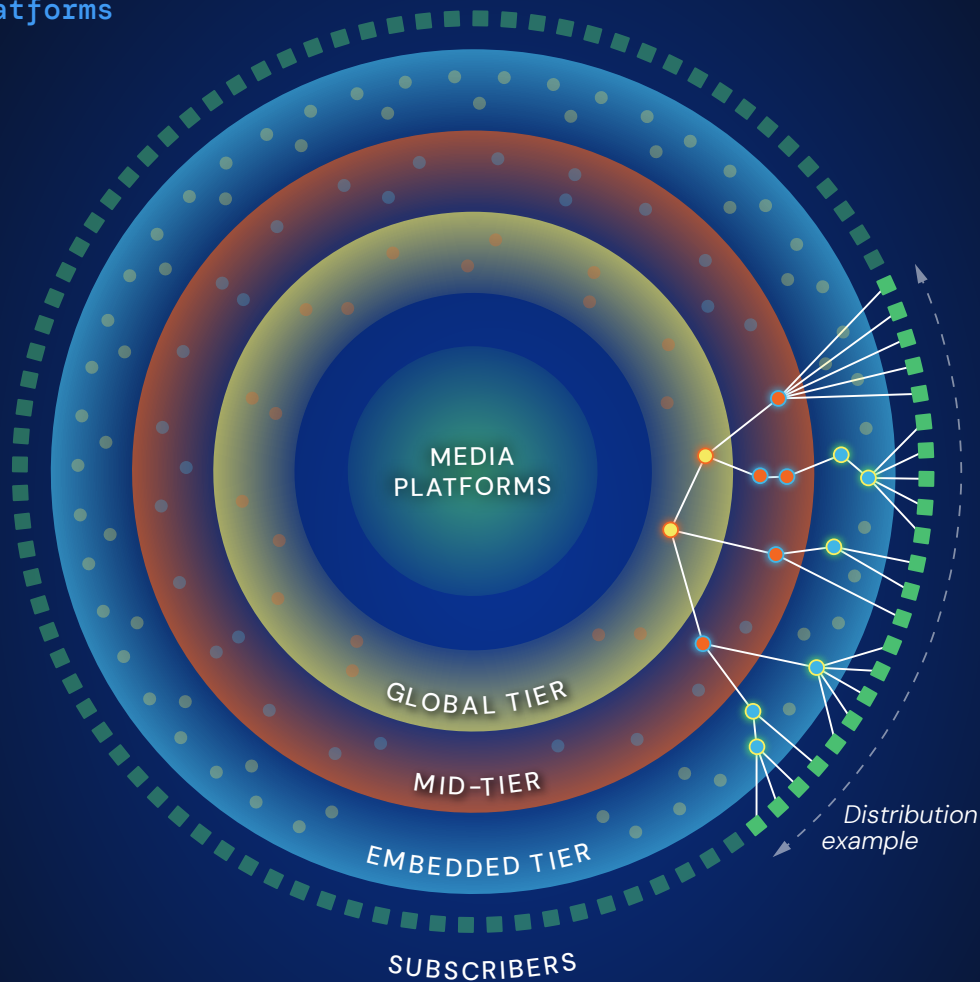


platforms look to completely supplant cable, satellite, IPTV, and even over-the-air broadcast for the delivery of all video entertainment into consumer households, quality becomes paramount.

Netskrt employs a three-tier CDN footprint consisting of a global tier, a mid-tier, and an embedded tier. The global tier, built in partnership with large-scale network providers such as Lumen, delivers high capacity and global reach. The mid-tier, composed primarily of deployments within Internet Exchanges (IXs) and tier-one service providers, enables visibility into serving ASNs and operates as a fallback and a repositioning point for VOD traffic during large-scale live events. The embedded tier is made up of selective deployments within tier two and tier three ISPs around the world. Importantly, the embedded tier is typically located directly adjacent to the subscriber broadband connection and no more than one router hop away.

This tiered architecture gives streaming partners the reach and scale economics of tier one global CDNs coupled with the local awareness into the most important network in the overall internet: the last-mile subscriber connection.

03 Media Platforms





Disruptive Economics

The capital intensive nature associated with building and operating CDN infrastructure on a global scale within a market that has experienced declining unit costs for delivery has been shown to be economically challenging. As has been well documented, several CDNs have exited the market over the past few years for precisely this reason. Given that streaming platforms, as has been described above, can be expected to place ever increasing demand on CDNs, something clearly needs to change. If CDNs continue with a “build and they will come” infrastructure deployment model there is risk that they will follow the path of earlier market participants that are no longer present. At a minimum, it will make it increasingly difficult for CDNs to innovate in a manner that materially benefits streaming platforms.

The CDN market is ripe for disruption. Practically speaking this means more flexible, adaptive, and dynamic technologies that yield commercial models allowing the CDN market to thrive and continue operating as reliable partners to streaming platforms. This disruption is made up of three distinct characteristics:

01 • Dynamic capacity instantiation. Central to achieving lower compute costs has been the movement of workloads to the cloud. This has allowed compute capacity to be allocated only when and where it is required. Applying the same principle to CDN capacity yields the same overall cost savings and results in an infrastructure that more closely matches the capacity requirements of its content users. Through innovative technology and strategic partnerships, the Netskrt CDN fundamentally

alters the conventional build-and-sell capacity into a more cloud-like, fully adaptable service.

02 • Embedded ISP POPs. Achieving the quality objectives of streaming platforms requires, in many but not all cases, pushing CDN POPs into the serving ISP networks. In addition to providing better network efficiency for the ISP and better QoE for the viewer, this results in a more cost-effective deployment model for the CDN. In most cases, the CDN provides the ISP with the appropriate caching hardware for free and the ISP, in turn, provides space, power, connectivity, and transit for free. This “settlement free” deployment model dramatically reduces overall infrastructure costs for the CDN and gives streaming platforms a more dependable CDN partner.

Netskrt is unique among CDNs in that its technology footprint can be deployed into relatively small ISPs, smaller even than Netflix OCAs can cost-effectively achieve.

03 • Software-based POPs. For many legacy CDNs, a single point of presence (POP) may consist of one or more entire racks (44U) of equipment. This hugely-expensive deployment model not only constrains where and how quickly capacity can be deployed, it weakens the ability of CDNs to rapidly and cost effectively respond to the needs of content streamers.

The Netskrt CDN is deployed as pure software running either on bare metal or in virtualized (VMs or containers) environments, substantially reducing cost and enhancing flexibility.

Summary

Since Netflix launched streaming in 2007, video has steadily shifted from broadcast and cable to internet delivery. By 2025, streaming surpassed traditional TV in total viewership. While video on demand (VOD) drove much of this growth, the bigger challenge now is live streaming—especially sports—which requires real-time delivery at massive scale and creates sudden traffic spikes. This shift comes as the CDN market, the backbone of streaming, faces financial strain. Several providers have exited in recent years, raising concerns for platforms that rely on multi-CDN strategies for reliability. To adapt, streaming services need CDNs purpose-built for video rather than general-purpose networks.

Future CDNs must excel in three areas: quality of experience, reach, and economics. QoE goes beyond average bit rates to include latency, reliability, and readiness for formats like 4K.

Reach requires both global capacity and local presence within ISP networks to ensure smooth last-mile delivery. Economically, CDNs must evolve from costly, fixed infrastructure to more flexible, cloud-like models with dynamic scaling and lightweight deployments.

To keep pace with growing demand, streaming platforms must push for CDNs optimized for video, ensuring reliable, high-quality delivery in an era increasingly defined by live events.

Netskrt has pioneered a range of patented technologies specifically designed for streaming video platforms and other providers of high-value, quality-sensitive payloads (e.g., game downloads).

