Strategies to improve video delivery in a multi-CDN environment

How to enhance QoE while lowering your infrastructure cost
The global nature of traffic surges requires a global focus on reliability to keep up. Driven by larger audiences consuming content from home, internet-delivered streaming is expected to expand by 14% annually and exceed US $190 billion by 2024.

Meanwhile, unforeseen global conditions—such as the pandemic, which caused internet traffic to rise by as much as 40% in most countries—and unpredictable responses to single events, will put even more pressure on over-the-top (OTT) providers. These providers need to create infrastructure and architectures that ensure high availability and ample bandwidth both in existing and future markets.

Combining multiple content delivery networks (multi-CDN) has become a common solution to dealing with unpredictable bandwidth volumes. However, right-sizing your origin to handle the influx of requests from multiple networks can still overwhelm your infrastructure. Fastly works with some of the biggest names in media and entertainment such as Fox, A&E, Fubo TV and AtresMedia to solve this problem.

1. Techtimes.com, How to Improve the Speed of Your Website, Dec. 2020

Benefits of multi-CDN:

Using multiple content delivery networks allows streaming services and content providers to:

- Provision enough bandwidth that might otherwise not be available from a single provider
- Use multiple regional networks to better respond to local conditions
- Avoid reliance on a single vendor, allowing a move to more cost-effective platforms as they become available
- Provide redundancy in the event of failure of any single CDN
Savvy content providers understand that their ability to deliver high quality of experience (QoE) while controlling costs, is a multi-tiered competitive advantage — making it increasingly important to provide smooth streaming experiences for viewers.

Over the past few years, the concept of using multiple CDNs has taken root and is today a common practice for large-scale media and entertainment networks. **Multi-CDN delivery provides content owners increased control over the quality of delivery, such as the ability to select optimized routes based on latency or geography, but also greater cost-control capabilities.**

Yet, managing multiple CDN connections in real time is complex. CDN and load balancing services do not automatically collapse multiple service requests into a single content fetch, nor do they unify the management of the customer’s configuration policies across all CDNs. Finally, the content owner only has limited visibility into the actual distribution of content.

Companies that attempt to handle every request using a cluster of origin servers end up relying on a network architecture that is easy to overwhelm. **Even the use of two content delivery networks can result in a massive influx of incoming requests for in-demand content.**

Content providers can’t always anticipate when millions of people might log into their platforms, nor where those traffic requests will originate. Never has this been more true than in recent times. With the global pandemic, stay-at-home orders forced businesses and schools to shift to remote work arrangements, severely impacting content consumption habits. The volume of Internet traffic in many developed countries rose at least 40% by April, while the median download speed declined by about 15%. Streaming services in Europe had agreed to limit video quality for at least 30 days to combat surging demand and protect the reliability of crucial services. And, when the US government declared the coronavirus pandemic to be a national emergency, traffic to news sites jumped 20%.
Fastly Media Shield solves these issues by reducing the number of content requests to the owner’s origin, minimizing network bottlenecks, and eliminating the need to make configuration changes to multiple origins.

Fastly Media Shield sits between the edge CDNs and origin to combine—or collapse—multiple requests into a single request for content to the origin, significantly reducing traffic to the servers. When multiple simultaneous requests come in for the same piece of content, regardless of whether it’s in the same region or continent, Fastly will collapse those to a single request back to origin.

Additionally, Fastly Media Shield is able to stream content out to the edge CDNs as soon as data starts to arrive – instead of waiting for the entire piece of content to download. **This brings the best of both worlds: lowering costs by reducing traffic to origin and maintaining high performance/low latency.**

Best of all: Media Shield works with existing infrastructure, bringing multi-CDN management and capabilities without the need for additional hardware.

The following benefits of Media Shield help address four primary shortcomings of multi-CDN deployments:
In a typical multi-CDN deployment, users make requests to various content distribution networks, which — when the requested content segment is not in the local cache or the segment has expired — make requests to the origin server(s). Because every CDN provider operates independently and each CDN’s nodes make requests back to origin, the number of content requests grows even if the users are requesting the same content. Thus, the number of simultaneous, redundant requests sent to origin for high demand content can put a significant burden on backend infrastructure and potentially cause degradation of QoE.

Fastly Media Shield provides a unique and effective solution to this problem. Requests for identical content are aggregated and connections left open across all downstream CDNs and one single combined request is forwarded to the origin. Once data is received from the origin, it is sent to the player without having to wait for the download to complete. Commonly known as request collapsing, this process minimizes the number of requests to the origin, allowing the provider to avoid disruptions due to request volume and to stay performant.

1. Increase in Request Volume

“Fastly Media Shield enables us to get new adaptive video streaming features to our global OTT customers quickly and at scale, while also significantly decreasing our origin costs.”

John Luther
SVP of Technology
2. Cost Reduction

Content providers who serve the same content from the origin to multiple content delivery networks are multiplying their costs. The ability of Fastly Media Shield to reduce the number of requests to the origin server provides significant cost savings. Media Shield’s request collapsing feature allows content owners to lower delivery charges by de-duplicating requests for the same content within a certain window of time.

The technique also reduces infrastructure costs by reducing the number of physical and cloud servers—and redundant workloads—needed to handle a certain audience size. In addition, creating origin servers from cloud infrastructure requires complex orchestration of less performant resources, increasing costs.

While cost savings varies based on the content owner’s specific approach to infrastructure, the reduction can often be significant.

“Thanks to Media Shield, we have managed to reduce the cost of access to origin by 60%”

Carlos Santos
Video Platform Manager, Atresmedia
With more users watching content online and high-definition video expectations increasing, the bandwidth load that content providers must handle represents an increasingly challenging technical problem. Using third-party solutions to micro-manage the origin server cluster is one approach to this problem, but there is a better way.

Fastly Media Shield allows content providers to manage the multiple networks they use for content delivery with unparalleled control. In addition, the ability to change a rule once and have it applied to a single origin, rather than across all subsidiary CDNs, simplifies control and reduces work.

Content can also be grouped across CDNs to allow for more efficient management of content types. By surfacing specific metrics aggregated from all CDNs, Fastly Media Shield helps the content owner know when to adjust their infrastructure for current bandwidth rates and avoid networks with excessive quality issues.

In addition, content owners can let Fastly Media Shield handle the load, allowing it to take into account current local network conditions and re-route traffic when necessary. While adding an extra step to the content-request chain, a cache miss for content streams does not slow down delivery and usually results in an overall increase in responsiveness. Finally, functions such as serving paid content can also be made more efficient by serving up edge authentication tokens and storing them at the edge.

“Now we don’t have to worry about having separate configs and doing things differently on each of our CDNs. We’ve shifted all of that logic onto Fastly’s Media Shield, which has been a unifying force that makes configs much easier.”

Abhishek Neralla
Senior Manager and Architect, Video Streaming and Delivery, A&E
Media Shield has time and time again proven successful for content providers delivering live events, whether live sports broadcasts, presidential debates, or concerts with a global audience. In one large live streaming event in the US, for example, the customer used four different content delivery networks, including Fastly, serviced by two instances of Media Shield and geographically separate origin servers (one on the East coast and one on the West coast). This streaming architecture provided both load balancing and fail-over redundancy. As more and more live content is delivered online the pressure to deliver successful feeds will only grow.

4. (Re)gain Visibility

Content owners that use multiple CDNs often have little to no real-time visibility into the individual delivery networks, preventing the identification of bandwidth and delivery issues in a timely manner. Every CDN may deliver a different set of metrics for their network and often only after an extended period of time, resulting in limited and incomplete visibility into the quality of the content delivery. Without a clear view into their network operations and problem areas, content owners cannot respond quickly to bandwidth issues and other delivery problems.

Fastly Media Shield allows customers to have near real-time logging of every CDN whose requests are routed through Fastly Media Shield, giving content providers better overall visibility into content demand. Visibility into each CDN connection allows broadcasters to route around problems in the infrastructure to avoid low-latency networks or other conditions that impact the quality of experience.
Fastly Media Shield at a Glance

Media Shield’s ability to aggregate requests from multiple content delivery networks (CDNs) provide a significant advantage to video streaming services in terms of cost savings, reliability, faster request handling, and greater visibility.

**Request collapsing**
- Decreases origin bandwidth and infrastructure requirements without negatively affecting QoE
- Eliminates disruptions due to spikes in volume to the origin server

**Better control and performance**
- Improves both performance and availability by acting as a single origin for multiple CDNs
- Centralizes management by enabling routing through the component content delivery network

**Cost reduction**
- De-duplicates requests for the same content for a window of time reducing overall bandwidth and request volume
- Requires fewer physical and cloud servers to handle the same volume of traffic

**(Re)gain visibility**
- Gathers consistent information about upstream requests from multiple content delivery networks
- Delivers real-time logs allowing content owners to respond to network problems quickly

A closer look: Video on Demand

Live events are not the only reason to use Media Shield. With consumers hungry for on-demand music and videos, what is usually asynchronous content can often have a surge in streaming connections similar to live feeds. As an example, 2020 saw some of the biggest theatrical releases go straight to online delivery, and few expect this trend to reverse even as theaters open up again. Asked about where they would rather watch new movies, a recent study found that 70% of consumers want to watch at home, while only 13% say they are more likely to watch at a local cinema (17% not sure - link).
Fastly is purpose-built to address the needs of the competitive market for streaming and online content, with the ability to deliver outstanding viewer experiences for live streaming and on-demand content. As a digital broadcaster, you need to serve content to your customers with the best quality of experience.

By reducing the load on origin servers, Fastly Media Shield improves reliability and efficiency while reducing cost for content owners. **Fastly Media Shield not only protects against surges in requests during spikes in demand but also gives content providers better visibility and the ability to manage multiple CDNs consistently and in near real time.**

With Media Shield, content providers gain flexibility in how to approach future streaming events and the visibility and control that they need to manage the events—all while protecting the origin against unforeseen bandwidth surges.

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**Why Fastly for your Media & Entertainment needs**

**Want to learn more?**

Interested in Fastly Media Shield and multi-CDN delivery? Check out these other resources:

- Download the Fastly Media Shield datasheet
- Is multi-CDN delivery the solution to your QoE goals?
- Contact a Fastly M&E Sales Executive

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