VARNISH
SOFTWARE

RTÉ

RTÉ uses Varnish Enterprise for flexible live and on-demand video streaming at scale with a Varnish-based CDN solution

Case Study:

RTÉ

RTÉ moves to future-proof its streaming-first technology

Background

RTÉ (Raidió Teilifís Éireann) is the national broadcaster of Ireland headquartered in Dublin. It produces and broadcasts programs on television, radio and online. As a national broadcaster, RTÉ is a public service provider, regulated by the Broadcasting Authority of Ireland.

The challenge

Streaming-first content delivery

Nearly a decade ago, RTÉ, Ireland's public broadcaster, discovered Varnish Cache and used it to secure web performance for their website and achieved stability and scale.

As streaming video has increasingly become the norm, the RTÉ team recognized a need to move away from their RTMP-based video streaming service to a newer HTML5-compatible service. It quickly became clear that they would need to maximize the efficiency of their streaming resources. Their old SD stack had a maximum bitrate of 2 Mbps per stream, and the demands of streaming required more. RTÉ was moving to full HD with the clear intention of being able to serve UHD bitrates into the future. There was no way to do this successfully without looking at new ways to reduce reads on backend storage and maximize cache efficiency.

RTÉ at a glance

Organization

- RTÉ (Raidió Teilifís Éireann) is the national broadcaster of Ireland, producing and broadcasting programs on television, radio and online.

Challenge

- Evolve the existing Varnish-based private CDN solution to future-proof broadcasting capabilities, as broadcasts move to streaming-first distribution

Varnish Enterprise for RTÉ

- Turned to Varnish Plus in 2014 to for website performance and caching issues
- Evolved to embrace Varnish Enterprise for video streaming use cases, e.g., building private CDN to achieve greater control over content delivery and QoE and QoS
- Professional expertise/support from Varnish core developers
- Using Varnish private CDN solution and caching; Varnish Broadcaster/High Availability to replicate cache data; Massive Storage Engine; TLS; Traffic Router, Varnish Controller, Intel reference architecture, i.e., 500GB/sec per server

The solution

Varnish Enterprise and the flexibility of a private CDN

When the time came to shift their video delivery technology to accommodate present and future capacity, RTÉ looked at Varnish Enterprise as a flexible tool for building their own in-house CDN. The evolution of the private CDN has continued to support the flexibility and stability of content delivery, even as the volume of traffic across devices has increased exponentially.

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>
> *- Michael Loftus,*
> *Senior Technology Infrastructure Engineer*
> *RTÉ*

Varnish offered solutions for managing the challenges of both on-demand and live streaming. Volumetrically, on-demand is (as is the case for all OTT providers, public or private) the biggest service and what audiences consistently rely on. Being able to leverage features like Massive Storage Engine (MSE) eliminates the concern that someone accidentally wipes out the entire cache. MSE persists the cache on restart, so a machine going offline accidentally is not a catastrophe and can be the difference between doing business and not. Live events might get massive bandwidths and large public engagement but live streaming isn't as demanding in the day-to-day of streaming operations but poses different challenges for which Varnish is suited.

With a private CDN, RTÉ gained greater control over content delivery and their overall OTT video-streaming infrastructure. Keeping pace with other European broadcasters, current linear broadcast technologies will be phased out in the coming years, leading the RTÉ organization to plan its infrastructure and platform around future-proof technologies.

Results

Private CDN for future-proofing streaming-first present and future

Flexibility and granular control

RTÉ Senior Technology Infrastructure Engineer, Michael Loftus, explained, "Adopting our own CDN, we gained better control over quality of streaming and quality of experience for users. That's not to say that commercial CDNs don't do what they are supposed to do, but integrations that should be straightforward often aren't. Simple issues like cross-origin request sharing might break your application. Commercial CDN providers are really big carriers, and smaller customers can run into difficulties effecting change when onboarding such services. This is where running our own CDN is really valuable – you have a certain level of freedom and flexibility, and other benefits like potential cost reductions."

Michael continued, "For us it is important to access an unmatched, simplified, clean and easy-to-understand toolset to manipulate inbound request URLs and headers. Being able to remediate misconfigured or misemployed applications in the wild at the edge without needing separate components or layers (e.g., web server scripting) is everything."

Potential for creative logic

When implementing new features, such as dynamic ad insertion, RTÉ has discovered Varnish Enterprise's scope not only for their streaming CDN but also the potential for other creative use cases. For example, working with an ad provider on ad insertion, they are able to use Varnish Configuration Language (VCL) to customize responses based on client requests for testing or for implementation into production pipelines.

"Varnish Enterprise makes my job a lot easier," Michael shared. "Maybe we would not like to work this way, but Varnish offers so many ways to work around different issues or problems. We can manipulate Varnish Enterprise in ways that are not possible with other reverse proxies. Creativity is important because you can develop any kind of logic with VCL – it is simple, and you are only limited by what you can imagine."

Deliver speed more efficiently

RTÉ like many broadcasters continue to experience unprecedented levels of streaming consumption across their platforms which they forecast to continue as both digital only homes and levels of broadband penetration continues to rise. To meet the coming demands based on content delivery, population and the need to scale up in five, seven or ten years, the new broadcast paradigm calls for doing more with less.

Accessing an Intel and Varnish Software white paper on the speed of delivery possible from a single server, the RTÉ team decided to explore the technologies used in the Inter reference architecture to find out whether following the same implementation would produce similarly impressive results (at the time 500 Gbps throughput per server). Achieving higher throughput levels will be critical for meeting peak capacity requirements at high bandwidth and user density, making the Intel/Varnish approach a potentially cost effective way to build a high-performance CDN to meet the coming dominance of streaming-first broadcasting.

Michael added, "From an infrastructure provisioning point of view, if you can deliver the same or better demand with less infrastructure or investment, from fewer boxes on live streams, why wouldn't you?"

Michael explained the benefits of adopting the Intel and Varnish reference architecture, including less management overhead and more raw speed from a box when streaming live. The failover domain is easier to manage. With a multiple-PoP setup, you can tolerate a larger failure and still deliver demand at peak, even if some of those PoPs fail.

If data centers were to go down and machines to fail, whether due to power outages or misconfigurations, being able to keep all content delivery on a subset of PoPs and not have it affect user experience would be ideal – and to do this, it would be critical to get the most bandwidth possible from a single box.

As of early 2023, RTÉ continues to test the Intel architecture, reaching 400 Gbps/s in their test environment.

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The future means more with less

Supercharging the private CDN approach

Michael elaborated on RTÉ's approach to the future of streaming, "We know the viewing habits of our audience is going this direction, and getting ahead of that curve is where we want to be, and what Varnish is helping us do. Ideally we would be able to deliver a peak event from a single PoP and would stay on the air even if we had a catastrophic failure of all but one PoP. We want to be ready when we reach the tipping point and go all-streaming."

Another coming focus could potentially be a regulatory push for more sustainable streaming, and being a public broadcaster, RTÉ will be subject to such considerations early on. Being able to do more with less in terms of servers, caching and streaming infrastructure is one way to capitalize and deliver streaming content in a greener way.

The future-proof infrastructure enables both the inevitable switch over to a streaming-only paradigm and the ability to withstand major failure. The evolving technology, Michael shared, lets RTÉ do more with less and anticipate the needs of the audience and be ready with the technology to serve them.

> By leveraging Varnish caching, we continued to optimise our user satisfaction and experience whilst also staying in control of our steady state distribution costs, making it an indispensable asset in our pursuit of streaming excellence.
>
> *- Brian Wynne,*
> *Head of Technology Infrastructure,*
> *RTÉ*

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