Optimising

video delivery with Open Caching

By Shira Kadmon, Programme Manager, Qwilt

In the streaming industry, there is one goal, and one goal only – deliver video streams in the quality they were intended. That's what Qwilt's mission is today. Shira Kadmon, programme manager at Qwilt speaks to Broadband Journal about what open caching is, how it works and what problems it's trying to solve.

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There's no hiding from it, more people today are shifting from watching video through traditional broadcasts to consuming streaming video across various devices. One shift that likely won't ever happen is consumer expectations for a flawless video experience. Even though most streaming video is delivered over the Internet - an unmanaged network that can cause issues – viewers' appetite for a high quality of experience remains the same. They want their online video to look and operate like broadcast television from cable providers. Indeed, as streaming video quality expands with UHD and 4K formats, network operators have struggled to create scalable delivery architectures devoid of buffering and providing seamless playback across various connected devices, including smartphones, computers, and smart TVs.

On the Internet Service Provider (ISP) side, the demand for and subsequent rollout of high-speed broadband continues to surge, and service providers are finding themselves in a perpetual cycle of deploying additional capacity to meet viewers' appetite for quality content. The typical strategy employed to address this demand is to expand their core and edge capacity through technologies like fibre to the cabinet (FTTC) and fibre to the home (FTTH), the latter being the primary strategy for large swathes of the sector. But ISPs are also unrelenting. They continue to look at new ways to improve network utilisation and ultimately reduce the inevitable bottlenecks within the network and across peering points caused by the more media-rich diet their subscribers are now consuming.

So, what's the way forward here? Open Caching promises to be the answer.

What is Open Caching?

Let's start by defining Open Caching – simply put, it's a set of interface specifications designed to implement a fully featured and unified content delivery network (CDN) whose edge nodes are deeply embedded in ISP networks. Open Caching was created by the Streaming Video Technology Alliance (SVTA),

a consortium of companies focused on solving the critical challenges facing streaming video to ultimately enable a better end-user experience and increase adoption. It includes members from across the video ecosystem, such as media companies, studios, broadcasters, ISPs, traditional CDN providers, and streaming technology and services companies like Qwilt.

Open Caching offers content providers a standardised CDN model that delivers better end-customer Quality of Experience (QoE) and offers ISPs new operational efficiencies and new revenues from the delivery of OTT services. However, its ultimate goal is to ensure that video streams look and perform better across all screens and that content is enjoyed in the way it was always intended.

How does Open Caching work?

The typical video delivery flow starts with an end-user requesting content from the content provider's origin. When the request is received by origin, the content provider uses its load balancer to delegate delivery responsibility to Qwilt's unified Open Caching CDN (shown in Figure 1) through Qwilt's cloud-based, open APIs. Once delegation to Qwilt is made, the cloud-hosted management and control plane will select the best open cache node, which is both inside the end-user's ISP network and closest to the end-user to maximise delivery QoE. That selected open cache node then delivers the content locally and keeps the content in-cache, so it is available when requested again.

From an architecture perspective, Open Caching comprises three components that work together to deliver content to requesting users.

The first is a request router, which handles the inbound request for content and forwards it to the appropriate caching node within an environment. The second is a caching node, deeply embedded in the ISP network for content distribution. The third component is the control plane, which handles all communication related to the management of configurations, content purging/pre-positioning, logging and security.

While the request workflow is focused on the end user's ability to retrieve content, the control plane is focused on how the different members of the video distribution chain are empowered to partake in the delivery process. As shown in Figure 1, in the Open Caching implementation, the request routing and control plane functions are handled by the Qwilt Cloud (QC) while the caching node function is handled by the Open Cache Nodes within each of the three ISP networks depicted.

Overall, Open Caching architecture offers delivery from closer to end users than ever before and, due to proximity, unmatched QoE. It harmonises the value chain, offering content rights holders, network operators, and Open Caching-based CDNs full visibility into the caching network, and the opportunity to collaborate for the benefit of all.

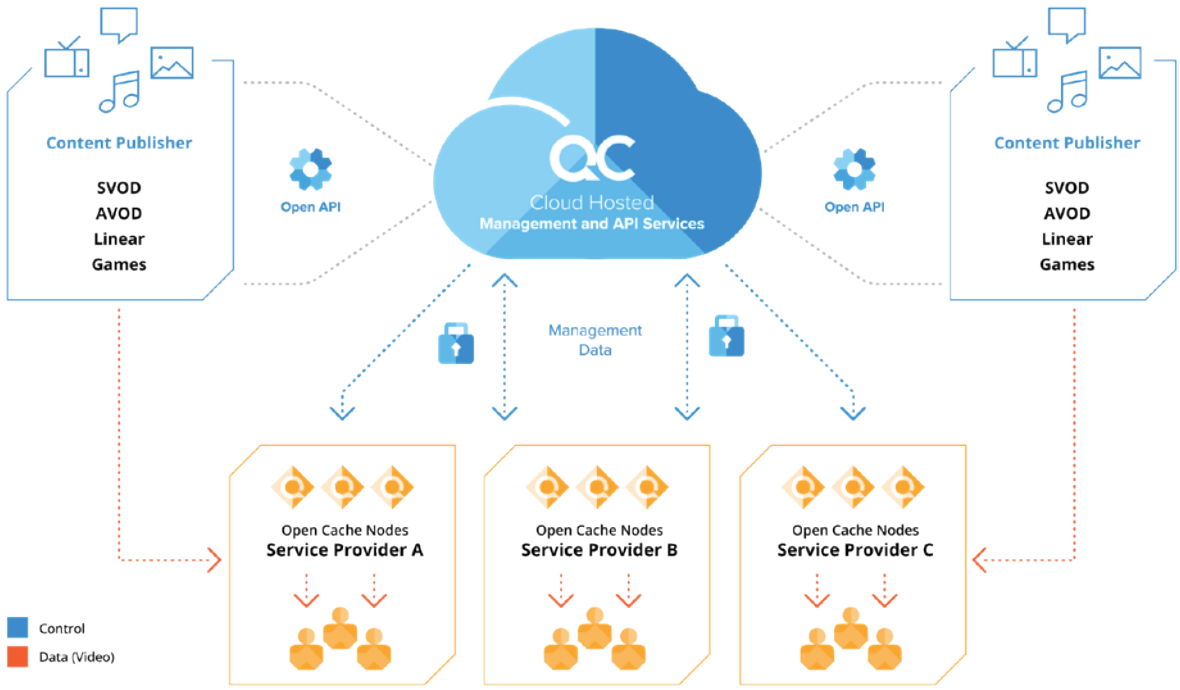

Figure 1: Qwilt's Unified Open Caching-based CDN

The benefits of Open Caching

Enhanced performance, operational efficiencies, new opportunities.

Open Caching is a strategic solution that effectively tackles challenges in today's dynamic streaming and broadband landscape. One of its key advantages lies in significantly reducing the distance between content cache and end-users, resulting in enhanced performance. Furthermore, ISPs can benefit substantially by deeply embedding caches in their networks downstream of potential congestion at peering and exchange points. This approach optimises content delivery quality and brings about operational efficiencies in network utilisation and cost savings when expanding network capacity. Moreover, the closer proximity to end-users opens up new opportunities for business growth, attracting content publishers and generating additional revenue streams. Embracing an advanced edge computing infrastructure empowers ISPs to scale more efficiently and deliver high-quality streaming content directly from the edge, creating a more robust and responsive network environment.

Better visibility and control, new revenue

Content owners need commercial relationships with CDNs to deliver their content to subscribers through their ISPs. However, this arrangement poses many challenges as content owners must also manage many different delivery networks that deploy complex architectures with different routing rules. Content owners also don't have any meaningful visibility on CDN capacity. Open Caching offers content owners a unified way to manage their delivery architecture from a single control interface. Network operators, in turn, often have CDNs terminating traffic inside their network with little or no regard for downstream network capacity, which can cause congestion issues and leave them without compensation for the traffic that the network operator has to deliver to end users. Open Caching offers network operators an active role in the value chain with visibility into the caches at the edge of their network, which results in greater collaboration, better and faster video delivery, opportunity to generate new revenue from in-network traffic and ultimately happier subscribers.

As a result, Open Caching proves to be an instrumental tool in navigating the evolving streaming and broadband landscape and delivering superior digital experiences.

Embracing innovative solutions for a transformed future at the edge

How we consume video has changed, and it's clear that content delivery must change with it. Today's content has demanding requirements, including massive peak capacity, low latency and high bandwidth. Streaming video consumption has overtaken traditional broadcast TV in many regions, and new applications which will increase the demands on ISP networks – such as gaming, immersive experiences and IoT – are coming online rapidly.

The utilisation of an edge computing infrastructure to deliver CDN functionality optimises content delivery by positioning caching and distribution as close to end-users as feasible. If we look at the bottom of Figure 1, multiple service providers are depicted, each equipped with its edge compute platform, featuring numerous open cache nodes distributed across the network's edge. These nodes establish secure connections to the cloud, enabling information collection for provisioning, configuring and monitoring purposes. The nodes are interconnected through an open, cloud-based API, forming a unified global CDN that content publishers can leverage for efficient content delivery. This integration of edge computing and CDN functionality brings content closer to users, enhancing the overall user experience and streamlining content distribution across the network.

In the past, high-traffic bottlenecks for events such as live sports and major premieres have not resulted from limited server capacity, but more from issues with network capacity, especially at choke points such as internet exchange and peering sites.

Partnering with ISPs and deploying delivery architectures inside the network brings a much-needed reinvention to the traditional model. Open Caching-enabled ISPs have established business models and ecosystems to meet the growing demand for low latency, high-performance, high-capacity content delivery. They are also poised to address other emerging cloud services that are ideally suited for this edge computing environment.

For more information, see www.qwilt.com