SOLUTION BRIEF

Communications Service Providers
Content Delivery Network

How Qwilt's CDN Supports Mobile Video Data Growth Using OpenNESS

To deploy its CDN software on a service provider's large-scale edge server network, Qwilt leverages OpenNESS for orchestration services. Qwilt teams with Intel in India to demonstrate CDN orchestration in a communication service provider edge deployment scenario.

Qwilt

Streaming video is a hit on mobile devices, accounting for a large and growing share of mobile network bandwidth consumption. This is driving mobile network operators (MNOs) to build out a new edge network infrastructure with content delivery network (CDN) software running on multi-access edge computing (MEC) network servers deployed in the RAN. The goal of this new infrastructure, often referred to as the service provider edge cloud, is to optimize content delivery, reduce infrastructure cost, and improve streaming quality.

Scalability is an important challenge as there can be thousands of MEC servers in an MNO network. To deliver a complete solution that is easily orchestrated, Intel® Network Builders ecosystem partner Qwilt is integrating its Open Edge Cloud CDN software with Open Network Edge Services Software (OpenNESS) for orchestration of a custom-designed MNO network in India.

Edge Network Deployment Needs Orchestration

To accommodate the increased demand for video, MNOs are building out an edge network infrastructure using virtualized MEC servers that host video content close to consumers, which reduces transport network latency and offers scalable and flexible deployments.

Virtualized CDN services can be deployed from this infrastructure in order to cache content and serve it to consumers. Video content is the most popular for CDNs, but other real-time streaming content such as video games, augmented reality, or virtual reality can also utilize this infrastructure.

One factor that complicates these rollout plans is that the network edge is composed of a diverse collection of servers with different architectures, different CPUs and memory, as well as support for different network access methods, including S1 (LTE), SGI, 5G UPF, and others. VNF developers are challenged to develop and test VNFs that can be deployed on this wide-ranging compute infrastructure. These diverse compute resources can also make it difficult for an MNO to re-instantiate the software on a different server to accommodate changing demand patterns.

The OpenNESS Solution to Edge Orchestration

To meet these challenges, Intel has invested in an open source initiative, OpenNESS, a software toolkit that enables multi-access edge computing. OpenNESS makes network platforms cloud native and delivers edge services (across any type of network) along with hardware and software optimizations.

OpenNESS abstracts away the complexity of a heterogenous edge network, which enables developers to create apps that can run unchanged in any edge location as they do in a centralized cloud.

OpenNESS features standard APIs. It also offers cloud adapters to connect to popular cloud services. With OpenNESS, applications can move data seamlessly from the devices to the edge and to the cloud and back again.

In the Qwilt network, OpenNESS provides orchestration services that reduce the edge network hardware complexity that can interfere with deploying vCDNs on edge servers. With respect to orchestration, OpenNESS provides two key functions: lifecycle management of applications operating in an OpenNESS environment, and configuration of edge data plane traffic to service those applications. Software developers have access to a comprehensive set of APIs and services within OpenNESS to reduce network complexity and accelerate the deployment of edge solutions.

Meeting the Needs of an MNO in India

To help solve a customer challenge in India, Qwilt deployed its vCDN software in an OpenNESS environment to demonstrate the orchestration of a large-scale streaming video caching platform. India is one of the most advanced markets for mobile video, where a fast-growing user base and competitive pricing is driving the highest average mobile data usage per smartphone anywhere in the world. According to the Ericsson Mobility Report,[1] Indian consumers use, on average, a staggering 9.8 GB per month driven by "young people's changing video viewing habits."

Qwilt Open Edge Cloud CDN

Qwilt has developed its Open Edge Cloud platform (see Figure 1) to deliver four content delivery-related services:

- Managed content delivery: Allows MNO to utilize CDN services for better performance of its own streaming services.
- Open caching: Allows MNOs to open up their CDN infrastructure to third-party streaming services via open, cloud-based APIs.
- Transparent caching: Extends CDN services to transparent delivery of all types of media, including video on demand, live streaming, and software updates.
- Multicast adaptive bitrate (M-ABR): Allows optimized streaming of live content over an MNO's closed multicast infrastructure within the access network and is suitable for live business multicast applications.

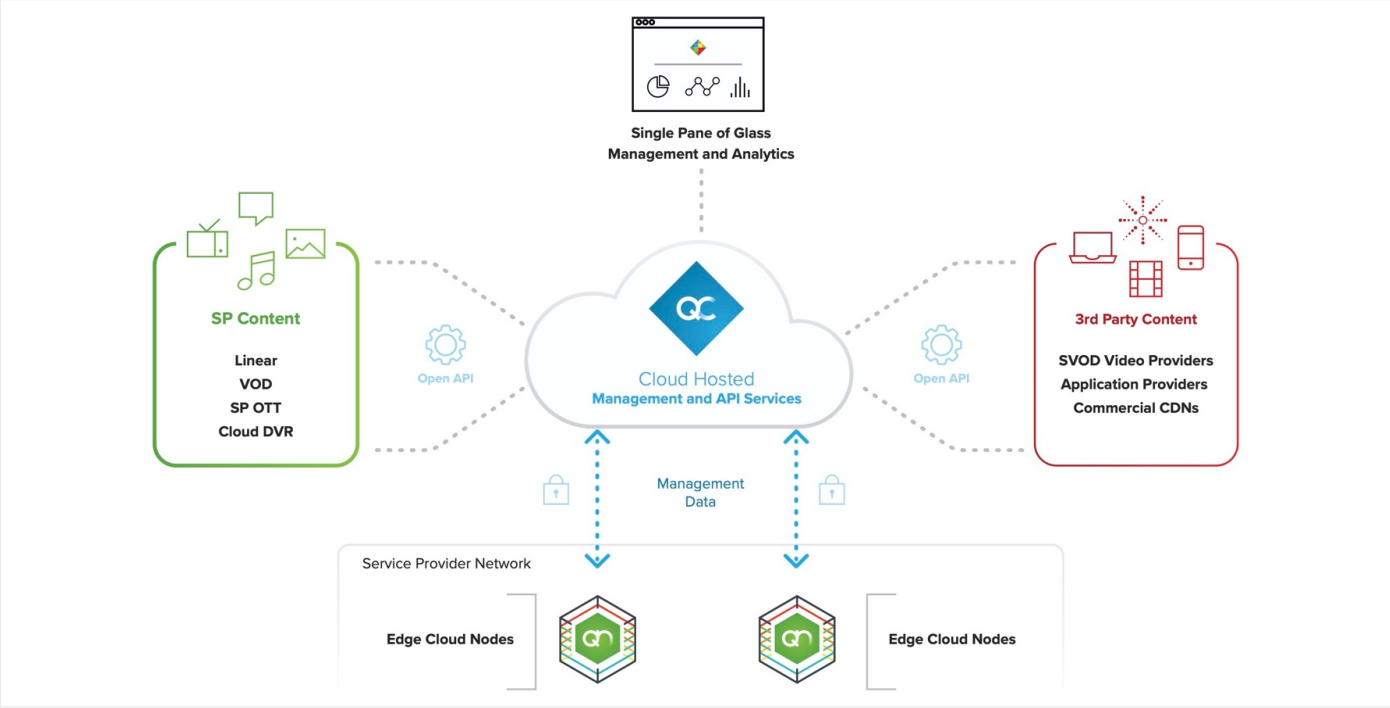

Figure 1. The Qwilt CDN features cloud-based QC control plane and QN edge delivery software.

The Qwilt Cloud (QC) is the cloud-based control plane for the Qwilt CDN. QC works with Qwilt Node (QN) software, which is deployed on Intel® architecture server hardware located at the service provider network edge, to efficiently cache and deliver content to customers.

QNs serve as a network edge proxy that caches content from the content provider's origin server and serves that to users. The QC control plane works with QN edge delivery software to deliver the following functions:

- **Discovery:** The QC searches for QNs and provides the connectivity between the QN and QC. In addition, the discovery function provides ongoing compute system and interface health monitoring in order to spot problems and re-direct content delivery requests to other available QN resources and notify administrators.
- **Control:** The QC defines the delivery service, which dictates how the CDN will distribute content to customers. Operators can define a number of parameters, including host names and transport protocols. The control function also provides content validation and content purging.
- **Request Routing:** The QC can select the QN closest to the customer to receive content either based on geographic criteria or factoring in QN congestion levels.

- **Logging:** All delivery actions are logged, and the QC aggregates the transaction logs from every QN, which the MNO can access from its management portal. Additionally, these logs can be streamed to third-party log management services that an MNO already has set up.
- **Analytics:** The QC presents a single dashboard for operating the CDN as well as for managing CDN performance, including the bandwidth being delivered, cache hits, and additional information on the health of the node.

The use of Open Cache APIs together with the broad CDN coverage developed for MNO customer bases makes it possible for MNOs to develop "CDN as a service" offerings that can become a new revenue stream. If the MNO builds out an Open Edge Cloud CDN that completely covers its service area, it can provide the same access as today's commercial CDN offerings, but with the advantage of being closer to the customer for outstanding quality of experience (QoE).

How Qwilt Embraced OpenNESS

Qwilt collaborated with Intel in India to develop OpenNESS-enabled QNs to demonstrate CDN orchestration in a communications service provider (CommSP) edge deployment scenario. The proof of concept was mainly targeted to show the benefits of migrating the CDN workload to an edge node closer to the user, thereby providing a better experience for the end users when viewing video on demand (VOD) content.

Qwilt has developed its QN as a bare metal application, but to support OpenNESS, Qwilt also offers a virtualized network function (VNF) version of the QN. This allows more flexibility for the QN to run within an OpenNESS environment. VNF support is made easier by Qwilt's NFV-friendly software architecture that supports different user profiles with support for usage profiles, mobile environments, devices, and more.

The lab network emulated an open edge cloud with MEC servers located on mobile towers and running the Qwilt QN software. The Qwilt CDN successfully demonstrated full functionality within the environment along with easy deployment across a wide range of servers within the labs. The test showed that use of the OpenNESS environment resulted in fast and simple deployment of CDN workloads in the edge platform while providing continuous high resolution video streams to end clients when viewing VOD content with adaptive bit rate (ABR).

Conclusion

Edge networks are enabling low-latency mobile video streaming using CDNs from companies like Qwilt to cache content and serve it to customers from the closest possible network location. The diversity of the underlying compute platform is driving the need to use OpenNESS to abstract those disparate resources, allowing the CDN software to run on all platforms without change. Qwilt teamed with Intel to demonstrate the deployment simplicity of the Qwilt Open Edge CDN platform in an OpenNESS environment.

About Qwilt

A growing number of the world's leading cable, telco, and mobile service providers rely on Qwilt for Edge Cloud applications. Founded in 2010 by industry veterans from Cisco and Juniper, Qwilt is backed by Accel Partners, Bessemer Venture Partners, Cisco Ventures, Disrupt-ive, Innovation Endeavors, Marker, and Redpoint Ventures. Learn more at www.qwilt.com.

About Intel® Network Builders

Intel Network Builders is an ecosystem of infrastructure, software, and technology vendors coming together with communications service providers and end users to accelerate the adoption of solutions based on network functions virtualization (NFV) and software defined networking (SDN) in telecommunications and data center networks. The Intel® Network Builders Edge Ecosystem is a new initiative gathering ecosystem partners with a focus on accelerating network edge solutions. As an integral part of the broader Intel Network Builders program, this initiative aims to facilitate partners' access to tested and optimized solutions for network edge and cloud environments. Learn more at https://networkbuilders.intel.com/networkedgeecosystem.

[1] Ericsson Mobility Report: https://www.ericsson.com/en/press-releases/2/2019/6/data-usage-per-smartphone-is-the-highest-in-india--ericsson

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