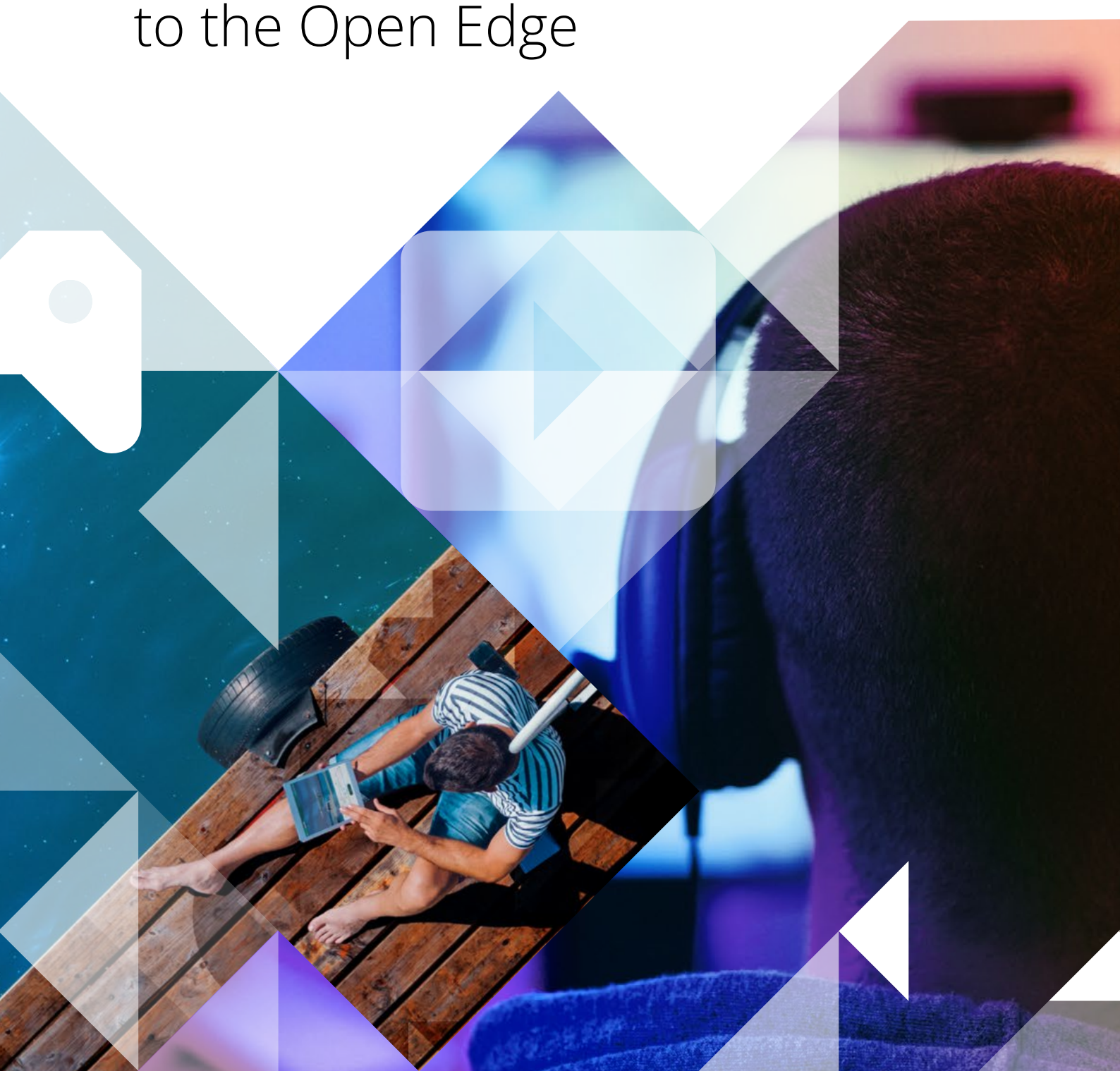
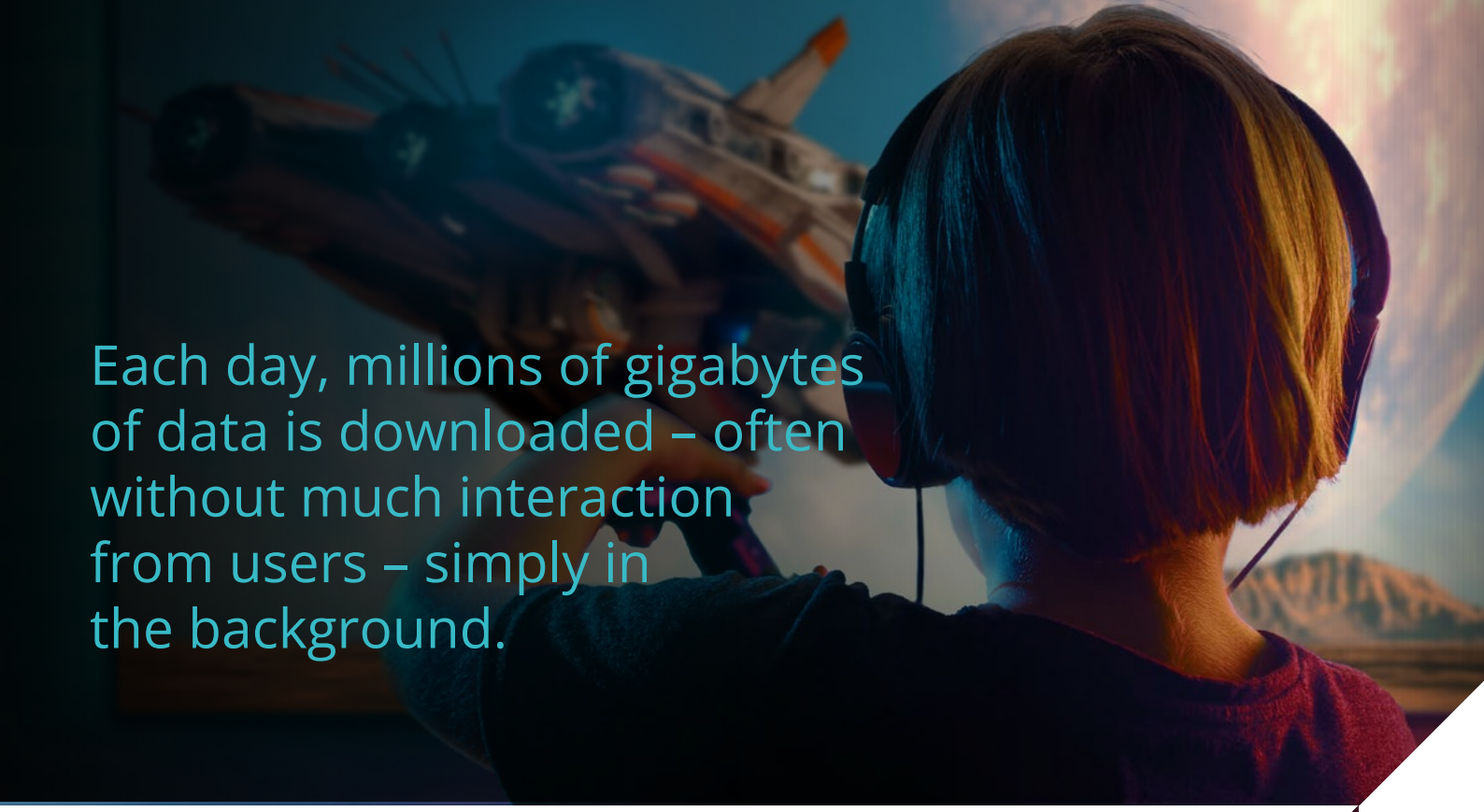
APPLICATION PAPER

Software Downloads and Patches are Moving to the Open Edge





Each day, millions of gigabytes of data is downloaded – often without much interaction from users – simply in the background.

The scale of software downloads has dramatically risen over the last decade. Currently, there are around 10 million mobile applications within the Google and Apple app stores. Yet this number is dwarfed by 2018 data from Microsoft indicating a staggering 175 million application versions for its Windows platforms alone! In addition, firmware software is used to operate billions of electronic devices, from CCTV cameras to washing machines. It is unknown precisely how many software applications reside on planet Earth, but it is clear that much of it is no longer static. Software needs to be upgraded to add new features, solve incompatibility issues, and often, most urgently, to patch newly discovered cybersecurity vulnerabilities.

Software downloads and updates can range from hundreds of kilobytes to tens of gigabytes for a popular video game. Each day, millions of gigabytes of data is downloaded – often without much interaction from users – simply in the background. Microsoft's famous "Patch Tuesday" is one such example where hundreds of millions of users will download large files for a specific update. Although, recognizing the potential bottleneck this would place on the internet, Microsoft staggers this process across its user base which means the process happens incrementally during the proceeding weeks.

175M

MICROSOFT WINDOWS APPLICATIONS IN 2018

FROM FTP TO CDN

Historically, downloading software has been a centralized process. Severs in remote data centers would serve up files on request – from either human interaction or from devices autonomously making requests to see if more recent software is available. As download volumes and concurrency have risen, this process has become more commonly served by Content Delivery Networks (CDNs), allowing the software distribution process to take place from multiple CDN delivery nodes, distributed around the world, removing potential bottlenecks and delivering improved performance.

Although the CDN method improved delivery efficiency, it did not solve the bottleneck problem with the ISP network – often called the last mile. CDNs nodes typically reside outside the ISP network at peering or exchange points, essentially a few gateways between the Internet and the ISP network. This means a software download, must navigate through one of a relatively small number of peering points which are dealing with traffic from myriad Internet sources and are, therefore, subject to congestion and delay. Based on the dramatic growth of software-driven devices in the home, gaming download sizes, and competing media – like video – downloading software using a legacy CDN model is highly inefficient. The traditional CDN method results in millions of redundant copies of a software download – an iPhone app update, for example – being streamed across the network. This 'brute force' approach ultimately places the burden on the ISP network to the detriment of the provider and the user.

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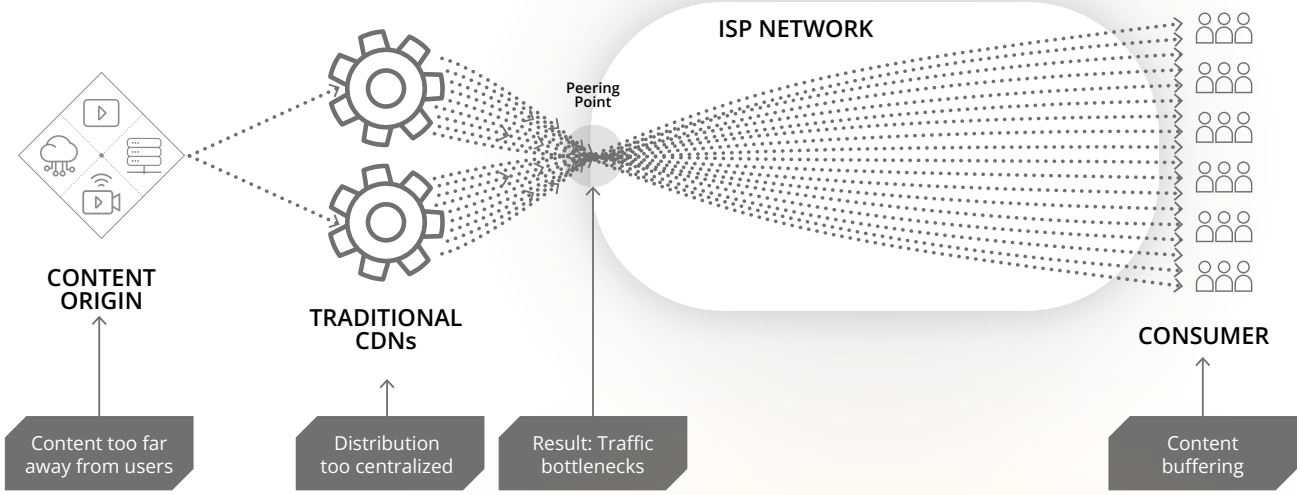
OPEN EDGE CACHING EVOLUTION

In recent years, an innovative alternative has emerged that solves these problems – Open Edge Caching. In simple terms, it moves the distribution of these software downloads much deeper into the ISP network and much closer to the user location. This can include the fixed and mobile edge – efficiently bypassing the need to traverse peering points or the ISP core network, thus saving considerable amounts of bandwidth capacity.

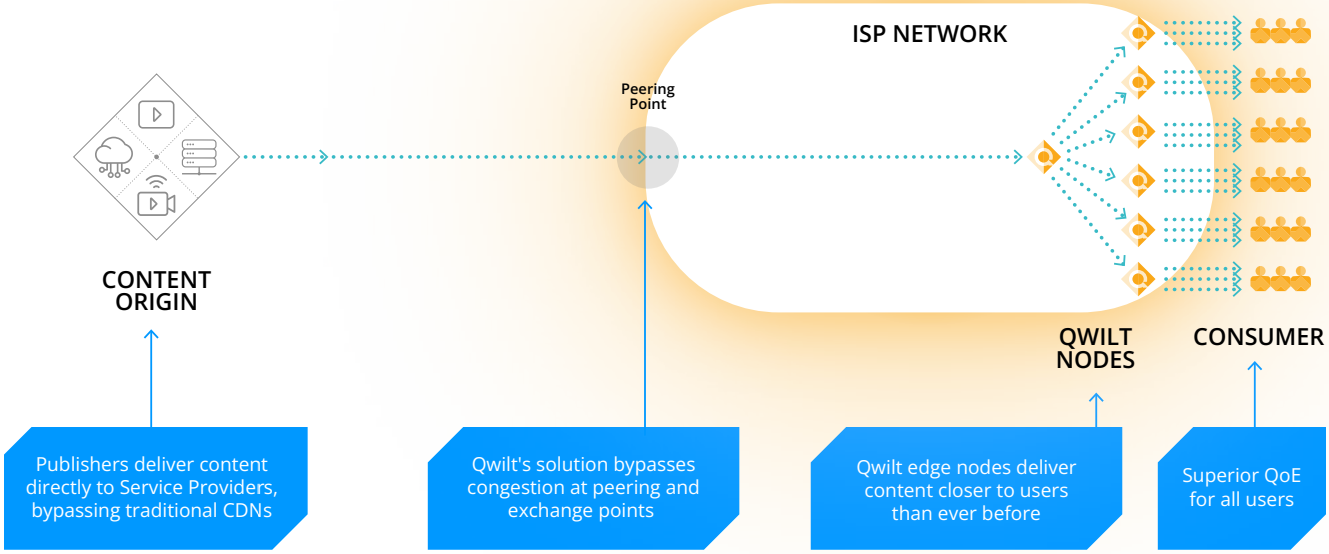
A Qwilt customer, one of the world's largest video game digital distribution services and storefronts, recognized this issue and became an early adopter of the Open Edge Caching approach. In this use case, a new game launch – whereby millions of people suddenly start downloading a 50Gb game file simultaneously – could easily cause significant degradation to download speeds as bottlenecks emerge at the ISP edge all over the world. For Qwilt-enabled ISPs, popular games are pre-cached at Open Edge Caches inside the nearest location,

typically a regional exchange, to preserve valuable peering point and core network capacity. In tests with this client and our ISP partners, this Open Caching approach can result in 90+% core network bandwidth savings – a figure that grows dramatically during the launch of a major new gaming title or update.

Traditional CDN Architecture



Qwilt Architecture



CONSUMER ELECTRONICS AND IoT

Although gaming is a natural fit for this approach, there are multiple industries that have a significant need for large-scale software downloads that can also benefit from Open Edge Caching. Consider the consumer electronics sector where modern devices maintain a software or firmware that requires regular updates. Certain brands will have billions of devices used by customers across every country, and if there is a need to push a major update to hundreds of millions of devices simultaneously – for example, an urgent security patch – this could be a situation that would run into the same peering point and core network bottlenecks that are faced by legacy CDNs. Instead, consumer electronics vendors benefit from Qwilt staging patches directly within secure containers at the ISP level and delivering these as OTA updates with much greater efficiency.

Open Edge Caching as a concept is particularly useful for mobile networks, as these caching nodes are starting to reside at cell sites or clusters of sites. This means that software downloads across 4G and 5G networks can be served with incredible efficiency – with the core network used briefly for the initial seeding ofthe source files. This will have greater value for IoT use cases such as automobiles that will need software updates exclusively via mobile networks.

Over the past year we've been running a live vCDN trial with partners, including Qwilt - a provider of CDN services that is already deployed in BT's network. Serving a variety of content, from video-on-demand and livestream TV content, to gaming downloads, the trial has successfully shown how a vCDN can enable high-levels of cache efficiency. In the trial we saw cache efficiency of 70-90% at peak times with the highest values for live TV consumption. Popular game releases also drove very high levels of efficiency.

Howard Watson
Chief Security
and Networks Officer
BT Group

In support of open caching in mobile networks, BT and Qwilt recently explored the use of a 'Virtual Content Delivery Network' or vCDN in BT's mobile network to assess the value of content delivery functions deeply embedded in mobile networks (note - Qwilt has been commercially deployed to serve fixed broadband customers in BT's network for years.

Howard Watson, Chief Security and Networks Officer, BT Group, wrote in BT's Blog on April 4th, 2023:

"As part of a number of solutions we are exploring, one technology innovation is the 'Virtual Content Delivery Network' (vCDN).

Most CDN infrastructure today does not enable the level of scalability and flexibility of content caching that will be needed to meet future demand. However, vCDNs offer a more agile approach.

Unlike traditional CDNs which are tightly coupled with underlying 'fixed' hardware, with a vCDN, software-based caches can be flexibly used at selected points, deeper in the network, to bring content closer to the 'edge' where our customers consume it.

It is like building a larger footprint of delivery stations closer to where customers make online purchases, but the advantage of this technology is that the delivery stations can be flexibly 'lifted and shifted' to wherever you need them – to wherever the demand is. This flexibility is key to supporting workload management as content can be cached by software in a specific location for a short period of time to meet, say, sudden surges in demand for different types of content.

And by placing the caches 'deeper' in the network, the number of network 'hops' that are needed to distribute content from the 'edge', are reduced.

* Source: https://newsroom.bt.com/bringing-the-action-closer-to-the-customer-with-new-content-delivery-technology/

This enables network capacity to be 'freed up' and reduces pressure on our core network.

This also means a speedier delivery and enables better quality and reliability for customers, whilst offering energy efficiencies to us, through a need for less physical space and lower power consumption.

SO, COULD vCDN HELP BT TO SUPPORT FUTURE CONTENT?

*To explore this, over the past year we've been running a live vCDN trial with partners, including Qwilt - a provider of CDN services that is already deployed in BT's network. Serving a variety of content, from video-on-demand and livestream TV content, to gaming downloads, the trial has successfully shown how a vCDN can enable high-levels of cache efficiency. In the trial we saw cache efficiency of 70-90% at peak times with the highest values for live TV consumption. Popular game releases also drove very high levels of efficiency."**

Along with BT, Qwilt is excited about the expected benefits of vCDN in BT's mobile network. More importantly, we are confident in the value open caching brings today in a wide range of content delivery use cases, including software downloads, in the over 150 service provider networks where Qwilt's technology and services are fully operational.

FIND OUT MORE...

Qwilt is the commercial leader in Open Edge Caching and its adoption has grown rapidly worldwide. Today, over a billion consumers are benefiting from its platforms through connectivity via 150+ ISPs across 30+ countries. To learn more about how Qwilt can help your organization streamline software downloads for your users, or as an ISP keen to better use your network bandwidth, please visit **www.qwilt.com**.

QWILT

We are an Open Edge services company. Our solutions bring to life the content and application delivery platform of the future in service provider networks.

qwilt.com