

VISION PAPER

The Game is On: Delivering the Ultimate Gaming Experience



The global gaming industry has pioneered myriad innovations in technology, and in the coming years, emerging areas such as VR, AR, 5G, and the metaverse will propel growth to eventually overtake broadcast TV revenues, with an estimated market size of \$321 billion in just four years' time (PwC's Global Entertainment and Media Outlook 2022–26).

Of course, powering these kinds of experiences relies on fast connectivity, low latency, and efficient handling of vast amounts of data. These attributes make gaming an ideal candidate to benefit from both open caching and the network edge. **Open caching is a standard supported by the Streaming Video Technology Alliance (SVTA) and has been broadly commercialized by Qwilt** to stream live and on-demand video, as well as efficiently deliver large software downloads and other content subject to the challenges of latency and peak demand. Open caching's collaborative model connects game developers, publishers, network operators, and consumers within a mutually beneficial ecosystem in which incentives are fully aligned to promote high-quality content delivery.

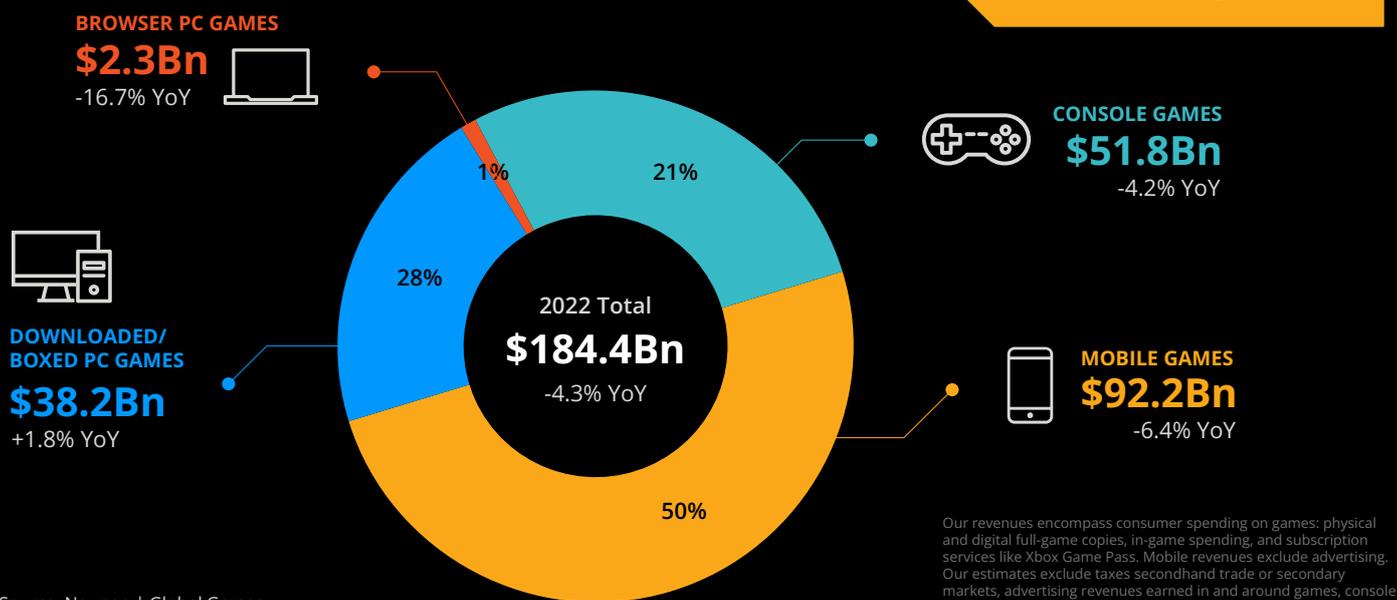
A GROWING INDUSTRY FACES GROWING CHALLENGES

Data from Newzoo, the leading analyst firm for the gaming industry, suggests **there are now just under 3 billion regular gamers globally**, with the popularity of mobile games growing to account for nearly half of the market.



2022 Global Games Market

Per Segment With Year-on-Year Growth Rates



Source: Newzoo | Global Games Market Report | November 2022



Although casual gaming is increasing, the most passionate fans still congregate around PCs and consoles – a space that also dominates the competitive landscape – where high-profile gaming tournaments like “The International 2021 Dota 2 Championships” can offer total prize funds exceeding \$40 million.

The games industry across console, PC, or mobile platforms is also a hotbed of innovation and sustained growth – especially regarding multiplayer gaming. For example, one of the most popular first-person multiplayer combat games, PUBG: Battlegrounds, has been downloaded 1.2 billion times over the last five years and still maintains millions of active players.

For the gaming community, the quality of the experience is more than just graphics and gameplay – **performance, framerate, and the**

dreaded ‘lag’ – a euphemism for latency experienced in games – are **crucial factors in the success or rapid demise of certain gaming franchises.**

As a cautionary tale, eFootball (2021), a rebranding of the famous and long-running Pro Evolution Soccer series, was universally panned by critics for its laggy multiplayer performance. Although its publisher Konami issued multiple patches, the lag was mentioned in every major game review, and its gaming community is now effectively dead.

As games start to have potentially hundreds or even thousands of players within the same virtual world, **the importance of responsiveness is now critical.** This is likely to become even more pronounced as concepts such as the metaverse start to blend with gaming experiences.



PERFORMANCE IS CRITICAL FOR THE BOTTOM LINE

Developers and publishers

Games development has undergone massive change over the last 40 years. Development costs for AAA titles – such as the ‘Grand Theft Auto’ (GTA) series – can top over \$100 million across a three to five-year development cycle. Then, after the launch and the game’s initial sales, publishers capitalize on the ‘long tail’ of expansion packs, in-game purchases, and subscription-based season passes. A hit game such as GTA V – even seven years after launch – made its publisher Take-Two Interactive nearly a billion dollars in 2021 alone. Alongside the concepts that create compelling and differentiated experiences to attract customers, publishers need to manage the distribution and ongoing technical assistance for games. This can include new content updates to the game and patches to fix bugs.

Increasingly, multiplayer gaming elements have the greatest longevity, with gaming servers for popular franchises such as Call of Duty and Battlefield commonly remaining online for more than five years. As such, **publishers need to balance out the cost of maintaining game servers versus the active player base.** This is more complex for truly global franchises where

in some smaller countries, only a handful of players might be active. But having a game server only available in Western Europe, for example, would result in a laggy experience in other distant regions. The savvy social media gaming community is first to react when it feels that a publisher is not fully supporting a game that may have cost an initial \$70, plus potentially hundreds of additional dollars for expansion packs and in-game purchases.

One of the most critical aspects of the industry is software distribution, which increasingly takes place through digital channels. Platforms such as Steam, PlayStation Store, and Xbox Live currently handle petabytes of data transfers to hundreds of millions of worldwide gamers daily. Many of **these services utilize CDNs to handle the massive spikes of data exchange** – and some are now working with edge clouds to improve data transfer performance and mitigate the impact on network operators.

Mobile and fixed network operators

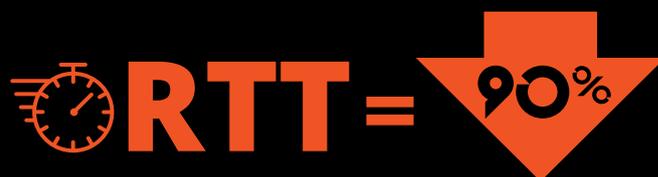
Publishers are not exclusively responsible for ensuring a great gaming experience. In an era where most games have multiplayer capabilities, publishers are increasingly working with mobile and fixed network operators to ensure the gaming experience is delivered as expected to

their communities. PCMAG, a popular magazine for PC enthusiasts, has published a list of the best ISPs for gaming based on just under 300,000 tests from real-world gamers. It crowned **Verizon Fios as the 'Fastest ISP in the world'** nine times in the last 10 years – at least for its US audience. The ranking – based predominantly on the lowest latency and jitter scores – has made Verizon a favorite among professional gaming teams in the US.

Other innovations in gaming have proved more challenging. For example, the rise of cloud-based gaming – where games are streamed like a video from a centralized cloud – has been plagued by poor user experience. Services such as Google Stadia failed in part due to an inconsistent gaming experience. The latency and jitter of data streaming to and from the distant cloud have

made some games “unplayable” for gamers, leading to negative reviews and, ultimately, a lack of adoption.

In a promising development, there is a **potential for rebirth in the coming years with the arrival of mobile edge computing**. As a real-world example, in 2021, one of China’s largest technology and entertainment conglomerates presented a paper on how it had used mobile edge computing (MEC) to move gaming servers closer to gamers instead of running through a centrally managed cloud. Doing so dramatically reduced RTT (Round Trip Time) of the popular multiplayer game Fortnite by 90%.



Deployed In MEC (RTT:12-20ms)

In the paper presented at the MWC (GSMA) event, the case study highlighted that “the lightweight edge cloud provides cloud games with VMs (Virtual Machines), containers, bare metal resources, and acceleration capabilities. It dynamically allocates resources in accordance with game loads, and schedules resources on demand to implement resources sharing and fully exploit valuable edge resources.”

Although this example used its own proprietary technology, the same concept has been developed using industry standards ratified



Deployed In Tencent Cloud (RTT:120ms+)

through the SVTA for open caching. As gaming franchises rise and fall, the industry is increasingly finding ways to deliver a better experience to win new customers and retain fan loyalty. As games become more complex and multiplayer, the need for more cooperation between developers, distributors, and network operators is also growing.



HOW OPEN CACHING GIVES THE GAMING INDUSTRY GAME

Open caching technology, which started life as a way to improve the quality and performance of video-on-demand and live streaming services, is now entering the games industry. The first use case is for digital distribution. While streaming live events at scale or blockbuster video titles, open caching technology can simultaneously transfer large game software files and ongoing patches directly from a point in the ISP network, closer to the gamer. **Qwilt has built a global federation of fixed and mobile network operators equipped with Qwilt’s open caching infrastructure.** Through this federation, Qwilt can stream data from services such as Steam directly to gamers from edge delivery nodes deeply embedded in ISP networks. This approach **offers a vastly superior content delivery architecture and exceptional performance.** With open caching, a major release – like the Call of Duty game – can stream from an edge cache located in the same town or neighborhood of the gamer, bypassing peering and exchange points which can be subject to congestion. Furthermore, this architecture **typically reduces game download traffic on ISP networks by 90%.**

Edge-based services

The second rapidly growing area is edge-based computing services. Although still at an early stage, several publishers are evaluating the idea of having game servers hosted directly within the operator network instead of in a centralized cloud. The concept is particularly attractive in areas with a smaller player base, where the main cloud might be hosted in another country, leading to unacceptable lag for this local gaming community. Another concept under test is a rapid-scaling edge, based on demand, to meet surges on launch days or expansion pack releases that tend to boost concurrent player numbers as gamers return on mass.

Empowering innovation

One of the **most innovative uses of open caching technology** that overlaps with gamification is **volumetric 3D experiences.** In simple terms, a volumetric experience converts an event – for example, a boxing or football match – into a digitally rendered representation that can be viewed from any angle and potentially manipulated. Although in an early stage, the concept melds real and virtual reality into a new digital experience.

Volumetric video is typically captured by rigging multiple cameras around the subject and then recording the target from all camera angles. Once content is captured and translated into volumetric data, an ingest platform provides the tools and technologies that allow this data to be ingested for encoding, compression, and streaming to any network or device.

 **OPEN CACHING**
REDUCES GAME DOWNLOAD TRAFFIC ON ISP NETWORKS
BY 90% 

However, delivering volumetric content requires very high bandwidth and low latency as it must handle anywhere from tens to hundreds of megabits per second in sustained bitrate. To do this at scale requires purpose-built data delivery and data reduction capabilities. This challenge can be efficiently addressed through Qwilt's federation of network service providers that use its high capacity edge cloud delivery networks to get the data as close to users as possible.

The potential is stunning. Imagine watching a football match from the perspective of the striker. Or a tennis match from the perspective of a player on the court. In theory, once the real-world event is digitized, any viewing point is possible. From a commercial perspective, the concept also allows for dynamic advertising that is personalized and seamlessly embedded into the experience.



1

View the action from any angle

With directed, free-view, and impossible cameras



2

Dynamic advertising

Personalized, unintrusive marketing



3

Next-gen analytics

Capture and visualize data in interactive 3D

HOW QWILT'S COLLABORATIVE MODEL HELPS THE INDUSTRY

Qwilt is actively working with the gaming community to provide a technical and business bridge between the different strata to deliver a better gaming experience. This elevated experience is enabled through several concepts, including adopting an API and standards-driven ecosystem that allows innovators to test new concepts utilizing industry-standard hardware, virtualization technologies, and interfaces. This standards-based approach allows for smoother inter-platform interoperability across fixed and mobile networks. By utilizing the same platform for multiple types of entertainment, including video streaming and gaming, network operators can also enjoy the flexibility to adapt new use cases with relative ease.

As a software-centric edge platform, the Qwilt open caching model helps the gaming industry test and measure the efficacy of innovative concepts, such as edge gaming, without the risks of re-tooling. The technology is already proven in

the media sector, with billions of hours of video streamed and **over 1 billion subscribers served via Qwilt technology.**

**OVER
1 BN
SUBSCRIBERS
SERVED VIA QWILT
TECHNOLOGY**

Although still at an early stage, the potential for improving the way games are distributed, updated, and played by the global multiplayer community is set for a new wave of innovation. The tools are in place, and the next generation of creatives and service providers have begun the journey towards a better gaming experience for all.



QWILT

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

qwilt.com

