

# Game time is real time with edge computing



## Innovations in cloud technology and edge computing are driving advances in the gaming industry

More reliable internet connections and the ability to stream games make it possible to deliver a more varied and customizable user experience than console-based games. But the advantages don't stop there. Gaming companies rely heavily on the data analytics and storage capabilities of the cloud. Extending those data workflows to the edge, especially in hard-to-reach areas, combines the benefits of a centralized database with the optimized performance of edge computing. This enables minimized latency, enhanced operational efficiency and accelerated performance.

Latency continues to be a big concern in online gaming. Lag, stutter, time delays, slow loading, failed downloads, and video buffering detract from the immersive experience players expect of their online experiences. For example, first person shooter games require nearly instantaneous response. Even the smallest delays can cause players to lose advantage and interrupt game play. High latency and excessive lag make most fast-paced games unplayable.

And it doesn't take much to cause customers to walk away. Latency rates of just 500 milliseconds are enough to frustrate users. When those delays reach 2 seconds, 87% of users will abandon the game.

It's not just game play that suffers from latency issues. The applications that manage the business model are often separate from the content, but they are part of the overall experience. User authentication, content guides, in-game purchases, ad serving for some content and other pieces of monetizing the user experience are all part of the experience itself. These kinds of transactions depend on the ability to quickly collect and act on large amounts of data and often require access to centralized databases. The business model's success relies on architecting all these pieces into a single solution.

## Challenges: Reduce latency, deliver flawless game experience

Hybrid clouds have become the key mechanism for delivering and managing online games. Having a central location for serving content solves many issues, but it also potentially introduces new challenges.

<sup>1</sup> Zha, M. X., & Zhang, Y. (2019). The Effects of Network Latency on Player Gaming Experience.

Online games require detailed computation work such as scene rendering, game logic processing, video encoding, and video streaming. And it all must happen at the blink of an eye. While cloud data centers are able to store massive amounts of data, their physical locations can introduce limitations to content delivery. Latency occurs with each network step when serving content from one location to another, even if the backbone is fiber. The last-mile network might be basic broadband. Latency accumulates with every hop in the network between the cloud and the user.

Huge internet traffic loads from streaming, gaming, and IoT can also overwhelm networks and result in packet loss and increased lag time. Overloaded servers compound the problem when they stutter under the huge number of data requests. This is especially true with shared servers or limited cloud capacity.

This cumulative latency negatively impacts the real-time user experience. Relying solely on the cloud also introduces potential cost issues in constantly shipping large amounts of data from the edge to the cloud and back again.

High bandwidth alone will not solve latency or network cost issues. By creating persistent storage at the edge and moving some of the processing power out of the cloud and closer to users, enterprises can reduce latency, improve customer experience and lower costs.

## Solution: Edge computing drives a high-quality, low-latency user experience

Gaming solutions from Lumen offer exceptional customer experiences and enhanced performance. Powerful analytics and access to real-time reporting provide critical insights for improving operational efficiencies. The combination of Content Delivery Network (CDN) and Edge Compute and Storage from Lumen provides direct control over security, performance and game delivery. It's architected to take advantage of the network edge for high-capacity, high-availability and low-latency, resulting in rapid and reliable delivery of content to users.

Because of Lumen's relationships with major cloud providers, these edge sites can provide Persistent Data Storage at the edge. This can effectively replicate a cloud database to drive the user experience with resources situated much closer to the edge, while maintaining the ability to synchronize with the central database in the cloud. In many cases, Lumen can create API-level interfaces between edge and cloud-based resources. Additional tools can allow all the operational efficiencies of data collection, server orchestration, and monitoring of network health all at the edge.

The combination of strategically placed data centers and deep peering relationships across the world enables Lumen to achieve high performance content delivery by putting key resources where they need to be to help reduce latency and optimize user experience. These edge deployments are designed to reduce latency from hundreds of milliseconds to as little as 5 milliseconds in various regions around the world. The result is a rich gaming experience free of lag and jitter over a global network that serves customers in over 60 countries.

These edge cloud facilities can be configured in different ways, from bare metal to colocation facilities to fully managed hosting services. security applications protect the overall business from DDoS and other attacks originating at the network edge. The edge cloud sites can also act as "data base camps," staging data harvested about the business – user behavior, performance monitoring, etc. – for eventual processing for insights by analytic software. The analytics can run in the edge cloud or pass the most important data on up to the cloud for further algorithmic processing.

## Results: Engaged gamers

For interaction-intensive firms such as gaming industry, replicating the most popular content in facilities at the network edge, along with the applications that control and monetize the content stream, helps improve performance and enhances security. This enables reduced latency for a better user experience and higher customer satisfaction.

It also allows game publishers to customize the user experience to meet specific regional or international needs. Data can be processed at the edge to reduce traffic on the WAN.

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