WHITE PAPER

Edge Cloud Powers the new normal for media and entertainment industry

LUMEN® TECHNOLOGIES

Introduction

Streaming media actually started as a trickle. After several years of steady growth, the dams burst, and a flood of content is now available, with more in the pipeline. Physical media, once the predominant mode of application, content and game distribution, is rapidly becoming a point of nostalgia for cinephiles and gamers alike.

The most well-known content makers in the world now offer slates of content that are designated as streaming first. Major motion pictures debut simultaneously in theaters and on streaming channels, with the vast majority of their viewers online. We are still at the beginning of this wave and it will evolve fast.

Streaming films and TV-style programming are growing as over the top (OTT) services. They join gaming which already made the move online and has grown more sophisticated in terms of business models with in-game purchases, downloadable skins and characters. The whole media landscape is shifting in this online rush. Business models and their technology underpinnings are playing catchup in many ways.

This white paper argues that simply placing content in the cloud is not enough to sustain competitive advantage. These are global industries that need to rethink the architectural underpinnings of how they deliver content, and how they conduct business. This white paper outlines some of the challenges and opportunities of this new normal, as well as the technology solution of edge computing, to drive increased revenue and improved customer satisfaction. Edge Computing is part of the Lumen platform, along with adaptive networking, connected security and collaboration services. Lumen experts design and build edge computing architectures for customers all around the world.

LUMEN®
TECHNOLOGIES

A new experience

The media and entertainment industry is an experience business and those experiences are converging on the home. The 2020-21 pandemic accelerated a transition years in the making, and the convergence is happening now.

Traditionally, to see a major motion picture required a trip to a theater, where consumers would sit in a dark room with strangers. The ticket price had to cover a wide range of costs, from all the production needs to the physical theater and its staff. Parents likely had more invested for babysitters and possibly a dinner out.

That experience might still have a place and certainly there was pent-up demand for that "night out" as a result of the pandemic. Yet, the home convergence brings convenience and comforts the night out cannot. Consider a family movie night in the living room. Parents and kids enjoy their familiar surroundings, control of the content, their favorite meals and the dog curled up at their feet. A family gaming night has the same appeal. Without the need for babysitters, dinner reservations, a parking space or other advanced plans it can be enjoyed at any time without even the need for a compelling reason other than enjoying family time. It is a personalized experience, customized by the people enjoying their time together – choosing the movie, activity, food, beverages, moments to pause or cheer.

This cozy, customized experience has other attributes important to the enjoyment. One of the most important – and easily overlooked – is that it is a real-time experience. Any content delivery glitch is immediately noticeable to the audience and the quality of the experience can degrade rapidly as those glitches either extend in time or pile up in number.

Researchers at Price Waterhouse Coopers suggest that a fundamental shift in consumer perspective on streaming services is underway. "Historically, [media and entertainment] spending by consumers has been discretionary and tied tightly to macroeconomic conditions…But increasingly, many people regard their [media and entertainment] spending…as a utility on a par with water or electricity and therefore a non-discretionary expense."[1]

This shift in perspective changes consumer expectations dramatically. A utility is expected to just work. The light comes on with the flip of a switch and water flows with the turn of a spigot. No flickers or sputters.

For the media and entertainment industry, it is not just the content that creates this real-time, utility-like experience. The applications that manage the business model (content access, flow, monetization, data gathering, etc.) are separate from the content, but they are part of the overall experience – sometimes the gatekeeper of that experience. User authentication, in-game purchases, content guides, ad serving for some content and other pieces of monetizing the user experience are all part of the experience. A glitch that interrupts content enjoyment is a problem, no matter what application actually produces it. Architecting this business model on a global basis must prioritize delivering a compelling, glitch-free user experience in all aspects of the business, from content delivery to ancillary applications that monetize and monitor that content.

Milliseconds matter

Typically, streaming content is thought of as requiring high bandwidth. That's certainly true, but there are more factors to consider in addition to bandwidth. Latency looms as a huge threat to the consumers' real-time content experience. Latency is not about bandwidth, per se, but distance.

AZ[1] "Pulling the future forward: The entertainment and media industry reconfigures amid recovery;" https://www.pwc.com/gx/en/entertainment-media/outlook-2020/perspectives.pdf

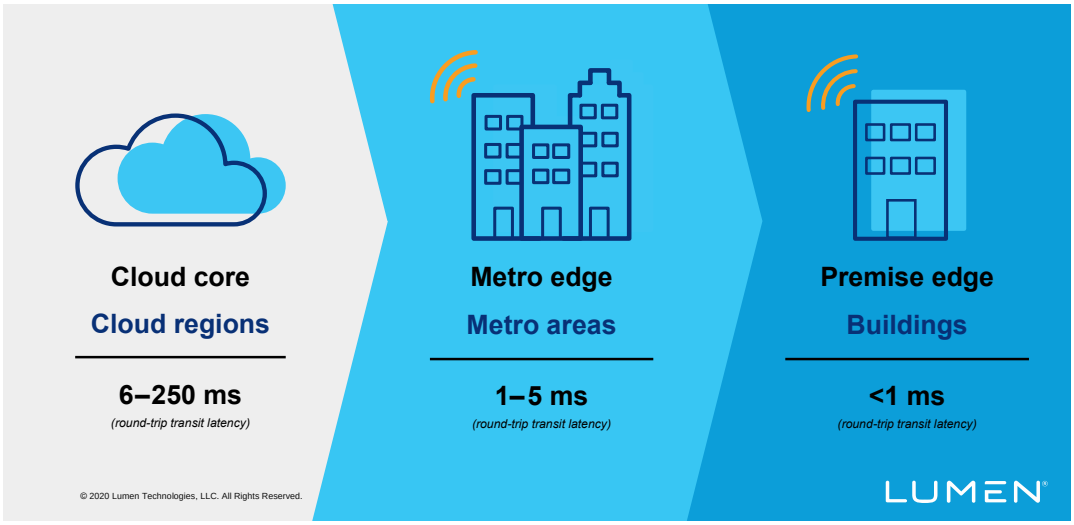
That distance can be geographic (e.g. a cloud data center is hundreds or thousands of miles away from the point of media consumption at the edge) or topological (e.g. there are many network hops between cloud host and edge).

As Netflix notes in their blog, shifting content to the cloud is a key foundation of a global media strategy. Larger producers often use multiple cloud providers. That cloud shift brought all the cost and flexibility benefits of moving beyond legacy approaches seen throughout the IT industry.

Despite their massive size, cloud data centers still have geographic locations, and, as we noted, distance can introduce limitations in a global business such as the media and entertainment industry. Even over the fastest networks, such as Lumen's 450,000 miles of fiber optics, it still takes time to reach the user with any data stream. Even though measured in milliseconds, latency is a problem for the data streams and applications that create a real-time, personalized user experience.

As you see in the graphic below, the farther away from the cloud data center – either geographically or topologically – you get, the greater the latency.

Solutions for specific business needs



In the global M&E industry, that latency can accumulate. Consider a gaming company, serving content to Latin America out of cloud data centers in North America. Latency occurs with each network step, even if the backbone is fiber. The last-mile network might be basic broadband (or slower). In addition, all of the other applications that monetize the game – authentication, game ordering, in-game purchases, etc. – are separate applications that can act as gatekeepers to the main content stream. Throw in ultra-high-definition graphics, some Augmented or Virtual Reality elements, a multi-player gaming experience or other interactivity and latency even further impacts end-user experience. Latency accumulates at each step of the process and every hop in the network between the cloud and the user.

Authentication applications or in-game purchases can timeout if connections and handshakes are missed between the living room and the data center. In the home setting, these are not just technical issues, but disruptions in a family's plans for the evening or a teen gathering for a gaming party.

To compete effectively, companies must modernize their content delivery and monetization approaches to reduce latency. That means putting the right content and applications closer to the users.

Edge Cloud creates new options

To appreciate what “modernizing” these content systems means today, it’s worth stepping back to take a quick look at the history of computing. Computing has moved in waves of centralizing resources to decentralizing resources. The mainframe era was centralized, the PC era was decentralized. The web added centralized resources and the mobile era saw a massive decentralization. The cloud era recentralized resources at massive scale.

What’s happening today is that we are centralizing and decentralizing at the same time. Some resources need to be centralized in the cloud (e.g., at scale, high-performance computing, massive data analytics, machine learning, AI, etc.). However, many things need to be decentralized (human/machine or human-machine-human interactions), moved closer to users to reduce latency.

Enter Edge Computing, or Edge Cloud. This is a network-enabled architectural innovation that puts a cloud-like capability close to the edge, vastly reducing latency for the execution of applications or other forms of business logic.

The majority of the cloud data centers most enterprises use for content hosting, advanced analytics and AI processing are already on Lumen’s fiber network. By adding “cloud-like” compute & storage capacity on our network at the “edge” (close to end-users), Lumen essentially expands the company’s data center (or cloud) functionality out into the network, to put key resources where they need to be, to minimize latency, maximize application response, and optimize the user experience. Latency can be reduced from hundreds of milliseconds to as little as 5 milliseconds. That is a major difference where a variety of applications and data streams need to be coordinated to create that real-time experience.

For the media and entertainment industry, this might mean replicating the most popular content in facilities at the network edge, much closer to the end user. The applications that control and monetize the content stream can also move into these edge facilities.

These Edge Cloud facilities can be configured in different ways, from bare metal to virtualized compute to colocation facilities to fully managed hosting services. Security applications or appliances (virtualized or physical) can also operate in these facilities, to protect the overall business from DDoS and other attacks originating at the network edge.

The Edge Cloud sites can also act as “base camps” for data – staging data harvested about the business or from monitoring the user experience – 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, for historical/seasonal analysis or to perform aggregated data analytics across multiple locations. This “base camp” concept optimizes the WAN for cost, rather than constantly sending all raw data to the cloud for processing, the algorithms and intelligence in the Edge Cloud can do a level of processing that reduces the data load on the network.

In the case of the Latin American gaming scenario described earlier, the most popular games and the monetization applications can move out of the North American cloud data centers, into local Edge Cloud facilities. The entire fabric is tied together by Lumen’s high-speed, fiber optic network. By reducing latency in the overall system, the user experience can be preserved even through the handoff to the last-mile broadband networks through deep peering in local markets. A family gaming night in Rio de Janeiro can happen without any applications timing out and frustrating parents or children.

And once architected for Latin America, that same experience can be replicated in Toronto, Madrid, Milan, Singapore, Tokyo, Honolulu, Sydney, Chicago and all points in between.

Conclusion: Modernize with Edge Cloud

Content streaming turned into a flood. Yet, the business is still changing with new content forms,

new ways to monetize and new interactivity. While streaming content is still an important part of the M&E home experience, there is a much richer user experience available to today's end users and that experience will continue to evolve. M&E businesses need to put the architecture in place to deliver that experience. Positioning assets as close as possible to their users maximizes performance and creates the most enjoyable customer experience.

Competing today and in the future requires it. Edge Cloud builds in flexibility as well as minimizing latency. The right resources can power content and applications of any kind, anywhere.

Each point of evolution will raise the stakes on creating the best user experience, the most utility-like service. The better the experience, the more content will be consumed.