Solving business challenges in gaming and media & entertainment experiences with AWS
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Introduction

Delight worldwide audiences with high-fidelity media and games. Easily collaborate and create immersive entertainment to meet customer demands, and increase your market competitiveness.

Gaming and media and entertainment (M&E) customers face industry-wide transformation, with companies reinventing how they create content, optimize IT operations, and compete for audience attention across diverse platforms. Digital entertainment experiences of all kinds are deepening in complexity, needing to be accessible anywhere and run with seamless playback and responsiveness.

Amazon Web Services (AWS) already understands these blockers for the markets of video gaming, real-money gaming, and M&E well, as many heavily utilize the cloud already. AWS is helping companies break down these barriers so they can carry on delighting audiences with exciting new products, shorten time to market, make IT operations more seamless for creators, and still adhere to any regulations around where data is kept.
What are some of the barriers to success?

Online multiplayer games rely on latency-sensitive infrastructures close to players to provide a level playing field, decrease “peeker’s advantage,” and increase fairness for all.

Virtual reality and augmented reality (VR/AR) experiences require low latencies to enable responsive in-game interactions. And for innovative media companies, delivering unique experiences like real-time 360-degree cameras that can be controlled by viewers or enabling content creation teams to leverage the cloud while using virtual workstations on premises requires very low latencies.

However, low latency is not the only reason entertainment providers require access to cloud resources on premises or at edge locations (where data processing and analysis need to be close to endpoints where it’s generated). In the case of real-money gaming, betting operators also have to adhere to data residency regulations, which require them to keep players’ data in approved locations within the boundary of a particular jurisdiction.

As entertainment experiences evolve and new market opportunities arise, gaming providers and media and entertainment providers need to reimagine their infrastructure setup. Increased low-latency requirements amplify the need for cloud infrastructure and services in physical proximity to where applications and customers are located, such as large metropolitan areas and the mobile network edge.

To remain competitive, entertainment providers need access to a consistent set of tools and scalable compute capacity that supports their development, testing, and delivery process across on-premises and edge locations.

AWS hybrid and edge solutions deliver a consistent AWS experience wherever entertainment providers need them—from the cloud to on premises and at the edge. AWS hybrid and edge offerings bring a broad set of tools and services to help build hybrid architectures that resolve latency issues and local data processing needs, as well as meet data residency demands. With AWS, media and entertainment and gaming companies can focus on creating and delivering new experiences instead of procuring and managing hardware.

AWS hybrid and edge solutions include the AWS Outposts Family, AWS Local Zones, AWS Wavelength, and AWS Snow Family. We’ll dive into how customers are benefiting from these solutions but first, a deeper dive into the challenges that need to be overcome in the sectors of video gaming, real-money gaming, and media and entertainment.
Digital entertainment experiences are growing

### Video gaming

**1 billion new players**

A billion more people are playing video games today than five years ago.¹ They are playing in many different ways, including on PCs, consoles from multiple generations, mobile devices, and in the cloud.

**$13.6 billion by 2026²**

Cloud gaming is estimated to reach $13.6 billion by 2026.

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### Real-money gaming

**200 percent year-over-year increase³**

Sports betting and internet gambling revenue increased more than 200 percent year over year for the first nine months of 2021 following legalization across the US.

**$153.6 billion by 2030⁴**

The global online gambling market size is expected to reach USD 153.6 billion by 2030, registering a growth of 11.7 percent from 2022 to 2030.

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### Media and entertainment

**$330.51 billion by 2030⁵**

Video streaming market size projected growth.

**43 percent**

of active smartphones will be 5G-ready by 2023.⁶

**69 percent**

of 5G smartphone shipments are expected to grow in global volume in 2025.⁷

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¹ "A Billion New Players Are Set to Transform the Gaming Industry," Wired, December 2019
² "Cloud Gaming Forecasted to Reach $13.6 Billion by 2026," DFC, November 2021
³ "The Sportsbetting Boom 2022 – Massive Revenue Growth in the US," The Comeback, February 2022
⁴ "Online Gambling Market Growth & Trends," Grand View Research, May 2022
⁵ "Video Streaming Market Size Worth $330.51 Billion by 2030," Grand View Research, April 2022
⁶ "43% of Active Smartphones Will Be 5G-Ready by 2023: The Global Mobile Market Is on Track for Substantial Growth and Game-Related Engagement," Newzoo, September 2020
⁷ "5G Statistics You Must Read: 2022 Adoption Analysis & Data," FinancesOnline, Accessed May 2022
Ongoing issues faced by today’s gaming and media companies

As companies in these sectors look for further growth opportunities, keeping a seamless customer experience is paramount. To achieve this, there are some specific key challenges to address:

Latency

Interactive applications, like real-time multiplayer games, require low latency to deliver a high-quality gaming experience wherever players may be located in the world. Similarly, delivering real-time video content, such as with video streaming, live broadcast, and video conferencing, requires low video transcoding latencies to provide a first-rate user experience. Even sectors such as real-money gaming are needing very low-latency access to give great customer experiences on apps, such as when digital betting slips are issued.

Online gaming is perhaps one of the fastest-growing markets where latency can still be an issue. Challenges due to latency can cause peeker’s advantage, which leads to an unfair advantage for gamers who are close to data centers. As a result, the game’s competitive integrity is compromised, which can lead to a loss of repeat customers. Essentially, players with higher latencies are always acting on a slight delay, and in a world of split-second decision making, it makes all the difference in how seamless and enjoyable the experience is.

In a different gaming scenario, real-money gaming operators can be processing hundreds of in-game bets for players every second, with betting options changing thousands of times a minute. If customers see performance drop, chances are they would abandon the platform for a competitor.

In the digital entertainment sector, delivering real-time video content requires low video transcoding latencies to avoid the delay between when a live event happens and when the viewer sees it. It’s not just the end user who needs the best experience, however. Content creators also have high demands on their workstations. Due to the interactive nature of these rendering applications, creators need very low-latency access to their workstations to have a good working experience across on-premises and cloud.
Data residency

Real-money gaming operators that want to enter new territories and provide responsible gaming to users require data residency solutions that meet the guidelines of their jurisdiction. For example, US regulations require that online bookmakers maintain their user data on premises within state boundaries. Regulations between states or countries can vary widely.

Competing development priorities and infrastructure restrictions

Creative teams need to be able to focus on developing and innovating new entertainment experiences, not “undifferentiated heavy lifting” (IT work that doesn’t add value). Their infrastructure setup requires consistency across different locations and production pipelines to enable high productivity and easy collaboration.

In streaming and gaming industries, compute demands fluctuate depending on the market receptivity and usage. Building and delivering experiences on limited capacity can also lead to unnecessary IT work, such as procuring new infrastructure that can get complicated and take a long time.
AWS is tackling latency issues and data residency requirements and providing a consistent set of infrastructure, tools, and APIs so that teams can build great experiences with less friction. AWS brings the cloud to exactly where it’s needed with solutions for hybrid and edge use cases, meeting the compute and storage requirements of gaming, VR/AR, streaming, the Internet of Things (IoT), and artificial intelligence (AI) and machine learning (ML) workloads. These infrastructures and services suit different needs, and even a combination of them can be deployed to fit unique challenges.

AWS hybrid and edge solutions include AWS Outposts, AWS Local Zones, and AWS Wavelength. AWS Outposts is a family (rack and servers) of fully managed solutions delivering AWS infrastructure and services to almost any on-premises location.

AWS Local Zones enables organizations to run latency-sensitive applications closer to end users, perfect for when a full AWS Region may not be close enough.

There is also AWS Wavelength for operating at the edge of 5G networks, and AWS Snow Family for hard to reach disconnected environments with space, power, or capacity constraints. AWS also has services such as AWS IoT Greengrass for building IoT applications faster, and for containerized applications that you want to run on your own hardware there’s ECS/EKS Anywhere.
The AWS Outposts Family

AWS Outposts are fully managed infrastructure and services that offer the same AWS services, APIs, and tools to virtually any customer data center, colocation space, or on-premises facility. AWS Outposts are managed, monitored, and updated by AWS just like in the cloud, saving time and expense for gaming and media and entertainment firms. It provides low-latency access and the ability to solve data residency issues as an on-premises piece of hardware, and they provide access to the compute, storage, and other cloud services needed for businesses to build, manage, and rapidly scale their applications.

AWS Outposts rack is an industry-standard 42U form factor. Customers can scale from a single 42U rack to multiple rack deployments of up to 96 racks to create pools of compute and storage capacity.

AWS Outposts servers come in a 1U or 2U form factor. They are ideal for smaller capacity or space requirements where businesses need local compute and networking services.

Highlights:

- AWS Outposts rack and servers are installed in locations you choose, almost anywhere.
- Use the AWS infrastructure, APIs, and tools on premises as in the cloud.
- Easily migrate workloads between AWS Outposts and AWS Regions with minimal application changes.
- Easily scale development resources—run critical and latency-sensitive workloads on AWS Outposts. Workloads can burst seamlessly to AWS Regions where there are virtually no limits on capacity.
Run AWS compute and storage and other AWS services on your own premises with AWS Outposts.

AWS SERVICES RUN LOCALLY ON AWS Outposts

Amazon EC2 instances
Outposts rack supports EC2 instance types with or without local instance storage, either general purpose, compute, memory, graphics or IO-optimized. Outposts servers are aimed at compute-optimized instances.

Analytics
AWS Outposts rack brings Amazon Elastic MapReduce (Amazon EMR) on premises to help set up, deploy, manage, and scale Apache Hadoop, Apache Hive, Apache Spark, and Presto clusters.

Application Load Balancer (ALB)
AWS Outposts rack supports application load balancing for advanced request routing for web traffic.

Containers
On Outposts rack run fully managed container orchestration services (Amazon ECS & Amazon EKS). On Outposts servers, you can launch Amazon ECS for containers, Kubernetes container support is coming soon.

Outposts servers services
Run IoT Greengrass or Sagemaker Edge Manager locally on Outposts servers, and connect to the AWS Region for a broad range of services available in the AWS Region.

Amazon RDS
Outposts rack supports real-time applications with low-latency requirements with Amazon RDS, enabling the setup, operation, and scale-up of relational databases in the cloud (Amazon ElastiCache is available in all AWS Regions).

Amazon Virtual Private Cloud (Amazon VPC)
Amazon VPC provisions a logically isolated section of the AWS Cloud. Applications can use services available in the AWS Region associated with your Outpost.

Storage
AWS Outposts rack brings Amazon EBS and Amazon Simple Storage Service (Amazon S3) on premises, and AWS Outposts servers support Amazon EC2 instance storage, located on local SSD NVMe disks.

Containers
On Outposts rack run fully managed container orchestration services (Amazon ECS & Amazon EKS). On Outposts servers, you can launch Amazon ECS for containers, Kubernetes container support is coming soon.
AWS Local Zones

AWS Local Zones place AWS compute, storage, and networking services in large metropolitan areas, and extend an AWS Region closer to end users and industry centers. When an AWS Region is not close enough to achieve low latency and data residency requirements, digital entertainment providers can use AWS Local Zones to satisfy low-latency requirements by connecting back to workloads running in AWS and bringing them closer to their end users. Local Zones achieve single digit millisecond latency for end users and content creators alike. Local Zones have their own connection to the internet and support AWS Direct Connect, enabling very low-latency communications between end users.

AWS Local Zones allows firms to achieve single-digit millisecond latency for their business applications, meet data residency requirements, and two-step hybrid cloud migration. AWS Local Zones are continuing to be rolled out to metropolitan areas where there is demand, currently launching in 32 cities around the world.

Highlights:

- Leverage fast, secure, and seamless access to the same services, APIs, and tools on edge locations directly from your existing AWS Management Console.
- Perfect for “two-step” migrations to the cloud.
- Architect for high availability across AWS Local Zones and AWS Regions.
AWS Local Zones

AWS Local Zones allow you to seamlessly connect to the full range of services in the AWS Region through the same APIs and toolsets as in the cloud.

**AWS Direct Connect**
Supports AWS Direct Connect, allowing you to route your traffic over a private network connection and achieve 1–2 milliseconds latency.

**Amazon EC2 instances**
A selection of general-purpose, compute-optimized, memory-optimized, graphics-optimized, and I/O-optimized instances.

**Storage**
Connect to the full range of services in the AWS Region, such as Amazon S3 and Amazon DynamoDB.

**Containers**
Amazon ECS and Amazon EKS (fully managed container orchestration services).

**File Services**
Amazon FSx for Lustre and Amazon FSx for Windows File Server.

**Amazon VPC**
Seamlessly extend Amazon VPC in an account to span across AWS Availability Zones and AWS Local Zones.

**Amazon RDS**
Amazon RDS enables the setup, operation, and scale-up of relational databases in the cloud. (Amazon ElastiCache is available in all AWS Regions.)
AWS Wavelength

AWS Wavelength combines the high bandwidth and ultra-low latency of 5G networks with AWS compute and storage services so that developers can innovate and build a new class of applications. Infrastructure deployments that embed AWS compute and storage services within telecommunications providers’ data centers at the edge of the 5G network are known as AWS Wavelength Zones.

AWS Wavelength suits particular edge needs when businesses need to deploy high-performance applications accessed by mobile end users and devices requiring single-digit millisecond latency.

AWS customers that want to build public applications like game streaming and VR/AR services can use AWS Wavelength to reach end users with millisecond-level connections, optimizing the user experience and application performance.

Customers with edge data processing needs, such as image and video recognition, inference, data aggregation, and responsive analytics, can use AWS Wavelength to perform low-latency operations and processing right where their data is generated. This reduces the need to move large amounts of data for processing in centralized locations.

**Highlights:**

- Perfect for workloads requiring compute and storage close to the edge to ensure ultra-low latency for end users and devices connecting via mobile networks.
- Create a variety of instance types and connect to storage services like Amazon Elastic Block Store (Amazon EBS).
- Connectivity to 5G networks via virtual private clouds (VPCs) and Carrier Gateway.
AWS Wavelength Zones allow you to embed AWS tools at the edge of 5G networks.

**Amazon EC2 instances**
General-purpose instances AWS Wavelength Zones support t3.medium, t3.xlarge, and r5.2xlarge instances. For applications such as game streaming at the edge requiring GPU acceleration, AWS Wavelength Zones support g4dn.2xlarge instances.

**Orchestration services**
Amazon EC2 Auto Scaling, Amazon EKS clusters, Amazon ECS clusters, Amazon EC2 Systems Manager, Amazon CloudWatch, AWS CloudTrail, AWS CloudFormation, and AWS Application Load Balancer (AWS ALB).

**Carrier Gateway**
AWS Wavelength brings Carrier Gateway to enable connectivity from the user’s subnet in the AWS Wavelength Zone to the communications service provider (CSP) networks, the internet, or the AWS Region through the CSP’s network.

**Storage**
Connect to the full range of services in the AWS Region, such as Amazon S3.

**Amazon VPC**
Seamlessly extend Amazon VPC in an account to span across multiple AWS Availability Zones, including AWS Wavelength Zones.
Using AWS hybrid and edge solutions to solve latency, residency, and other challenges

Achieving low latency compute wherever it’s needed

When the nearest public cloud servers are not close enough to meet application latency requirements, an alternative is required.

Use case:
Riot Games experience exactly this scenario of needing to get gaming servers closer to players. As the company planned to launch a new game, it wanted to ensure fairness for its subscribers by addressing the latency issues that affected its users. This was down to their proximity to gaming servers. Riot Games also wanted a way of being able to deploy extra capacity quickly into colocation facilities to support their planned future rollouts.

Solution:
Riot Games was able to rapidly deploy an AWS Outposts (42U) rack into a remote site and manage this as part of its global architecture, using the same tools, services, and APIs that it already uses for applications deployed inside an AWS Region. The firm could deploy game servers closer to players and rapidly lower latency for hard-to-reach areas without the need to deploy its own hardware. Latency was reduced by between 10–20 milliseconds, ensuring greater fairness and delighting players.

Use case:
In the world of content creation, leading streaming service Netflix needed its animators and 3D designers to stay on premises for the best performance (due to latency sensitive interdependencies) when it came to compiling and rendering 3D models and animations. Due to the interactive nature of these applications, Netflix’s artists needed very low-latency access to their powerful workstations.

Solution:
AWS Local Zones brought cloud resources closer to Netflix’s artists, it could enable low latency on a remote desktop, empowering remote workstations for content creators. And by taking advantage of access to the highly performant and cost-effective compute resources of AWS, Netflix has been able to migrate portions of its content creation while ensuring an even better experience for artists.
Use case:
In the real-money gaming sector, latency issues can also be a challenge. In the case of sports betting operators like FanDuel, response times for issuing betting wagers are critical to a seamless customer experience. In a highly competitive area, FanDuel needed to ensure the fastest response times.

Solution:
With AWS Outposts rack, FanDuel was able to completely optimize latency between applications, giving a 30–40 percent performance improvement.

Use case:
Emerging applications at the edge of 5G networks have particular latency demands which existing infrastructures suffer from due to the multiple network hops the data has to make. YBVR could not have achieved its real-time user-controlled 360-degree event experiences the latency would be too high without a new solution.

Solution:
AWS Wavelength solved this for YBVR by enabling consumer data to go from the device on the 5G network to its application’s resources in AWS with fewer network hops because compute and storage are hosted directly within the telco providers’ 5G networks.
Staying compliant while still accessing cloud services

In gaming and M&E sectors it’s important to control where your workloads run and where your customer data resides. For both data residency reasons and the need for low-friction movement of workloads between cloud, on-premises, and edge locations (allowing to quickly adapt to regulatory changes while minimizing application changes), AWS hybrid and edge solutions are ready to solve these challenges.

Regulations that stipulate where data resides are a particular top priority in sectors like real-money gaming as customer data is subject to many regional rules when it comes to transactions. Imagine a real-money gaming operator looking to modernize its operations with a consistent set of APIs and tools, but as it wants to expand to new areas it faces having to deploy infrastructure in colocation facilities and use different tools and services to run its application than it uses in the cloud. This adds complexity rather than reduces it. A solution such as AWS Outposts allows operators to meet its data residency requirements without the overhead of setting up on-premises infrastructure or rewriting a software stack.

AWS Local Zones also provide a way to ensure a company complies with data residency laws. Customers can configure their data to remain on AWS Local Zones using Amazon EC2, Amazon EBS, Amazon FSx, and other local services. To ensure a jurisdiction’s unique data residency requirements are met, customers are advised to work closely with their internal compliance and security teams for confirmation.
Modernize and set up new services with ease

Existing infrastructure can hold back a business’ ambitions to deliver innovative new gaming and media experiences or not allow them to enter new markets fast enough. The ability to leverage the same expertise, common code, and APIs already created in AWS can be a significant advantage in making firms more agile and efficient, allowing IT and developer teams to spend more time on new services to meet emerging customer demands.

Through a ‘build once, deploy anywhere’ model offered by utilizing AWS hybrid and edge solutions, organizations can eliminate blockers to IT administration and achieve their goals in creating new services and broadening into new markets.
Next steps

The global gaming and M&E markets continue to grow bigger and more competitive, with billions of players and viewers expecting high-fidelity experiences. Meanwhile, developing such experiences keeps getting more resource-intensive. With the AWS hybrid and edge portfolio, you can focus on creating unique experiences. AWS helps you scale to meet new demands quickly, satisfy data residency requirements, and solve latency challenges by bringing AWS services and tools closer to where they are needed.

Learn more about AWS hybrid and edge solutions here.