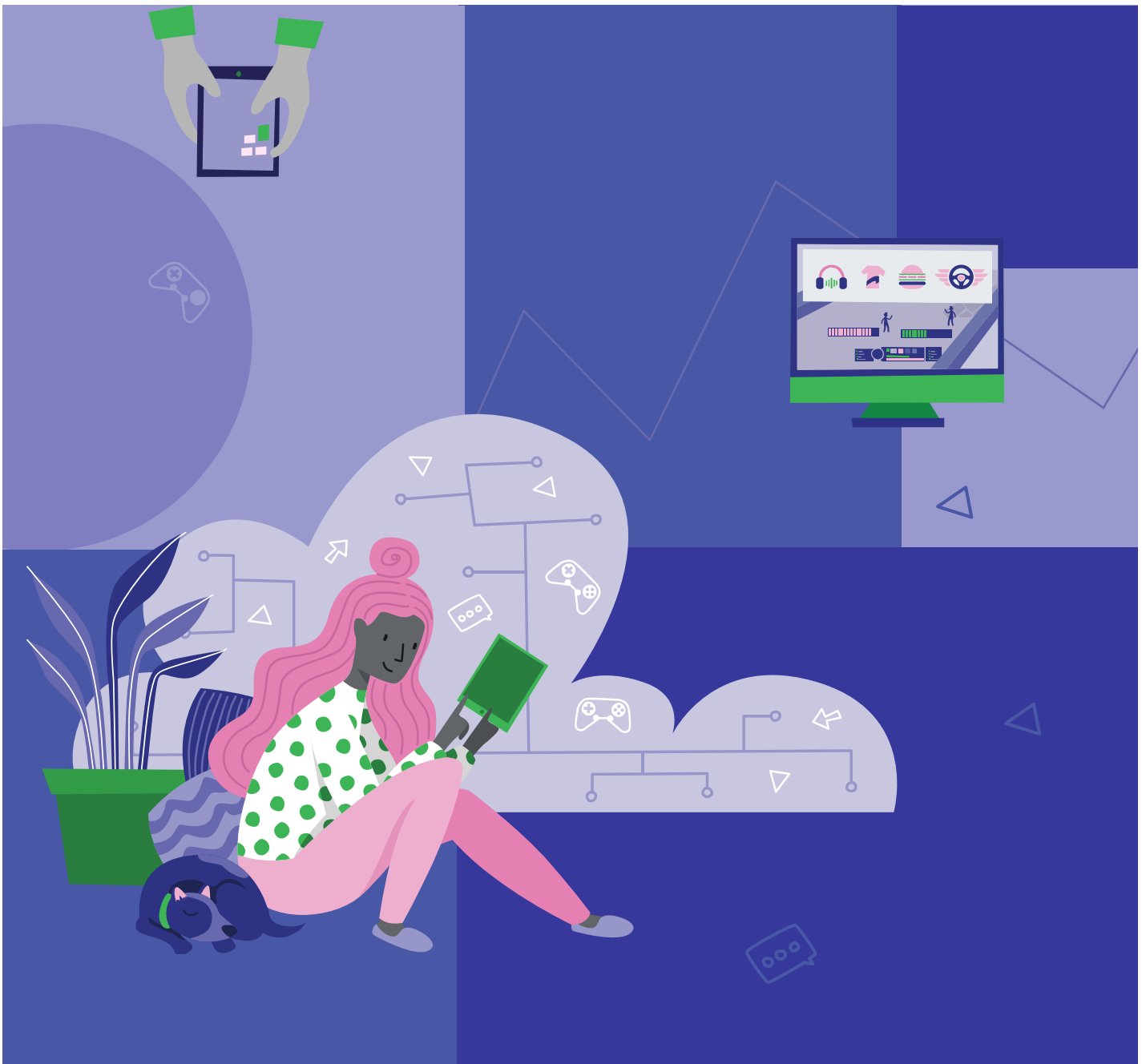newzoo

Global Cloud Gaming Report
The Infrastructure Edition

Key Developments | Stakeholder Spotlight | Consumer Insights
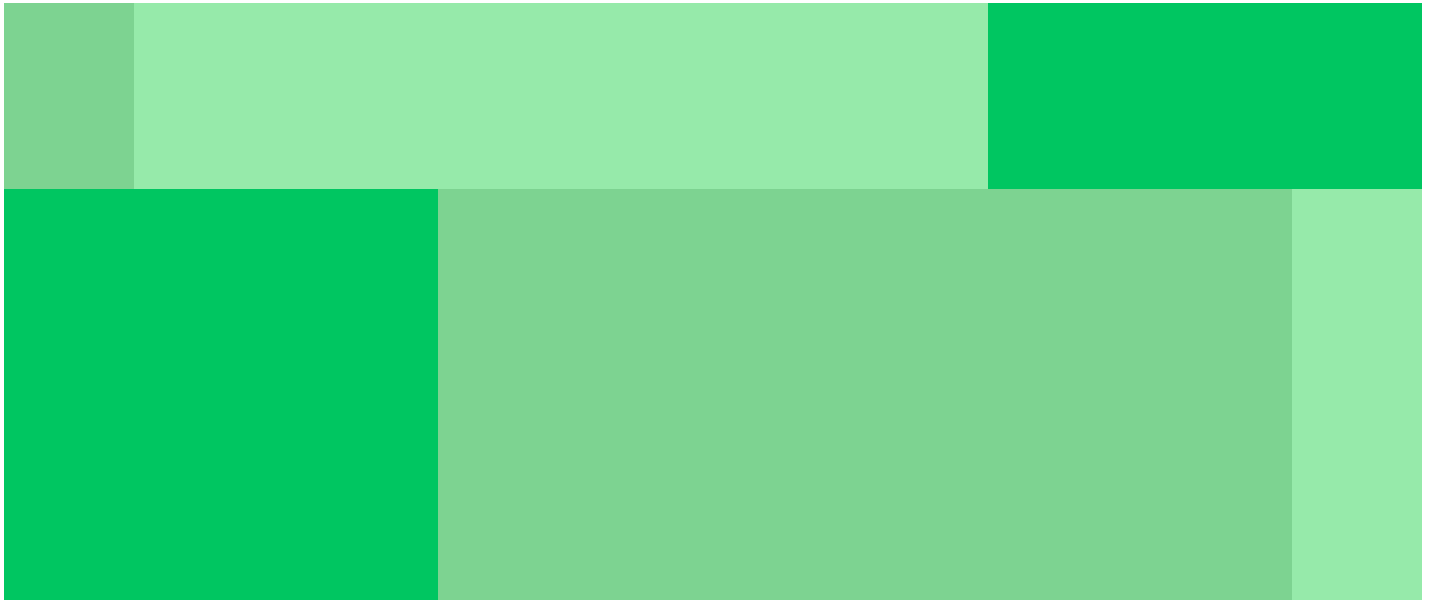Special Focus: Network Infrastructure | Market Sizing and Forecasts

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Foreword

Foreword

Throughout 2020 and into 2021, engagement and spending on games grew significantly as people's lives were affected by the pandemic. During those times, cloud gaming offered an easy and alternative way for veteran, new, and returning players to enjoy the games that allowed them to pass the time or socialize with others. A key question now is whether this spike in activity for this relatively new industry is lasting or temporary, and where will it go from here?

We are extremely proud to present our third Global Cloud Gaming Report, which provides a comprehensive overview of the entire cloud gaming ecosystem, complete with data and exclusive insights to show readers that the cloud gaming market has indeed benefitted from the social distancing measures that led to an acceleration in adoption, but there is more to the observed growth than just that.

Alongside the pandemic, the world experienced a global shortage of semiconductors. This shortage continues to impact the entire games ecosystem. Individual gamers looking to upgrade their gaming rigs or purchase new consoles find that supply is very limited. On the business side, cloud gaming service providers around the world had to scramble as players embraced their services as a suitable alternative to upgrading. While it was challenging to keep up with demand at first, the situation has since improved substantially.

Under these unique circumstances, early cloud gaming providers were able to prove that the underlying technology works, and that cloud gaming can provide a seamless experience almost indistinguishable from local gaming but with plenty of added benefits.

Since cloud gaming was thrust into the spotlight, interest has kept growing both from players and potential business partners. Every month, additional partnerships are signed between cloud gaming service providers and companies looking to offer this latest form of entertainment to their users. Communications Service Providers are particularly eager to add cloud gaming to their portfolio, as it shows what their new 5G networks can achieve. Through these partnerships, the cloud gaming service providers see opportunities to expand their reach and engage with new audiences. Lately, the most targeted regions are emerging markets, such as Latin America, the Middle East, and Southeast Asia, showing how cloud gaming has global potential despite regional asymmetries in network infrastructure.

As the industry for cloud gaming grows, it is to be expected that not all services achieve the level of success they set out to, and in some cases, resources are shifted elsewhere. Overall, however, the past 18 months have been a transformative and positive time for

the cloud gaming market. The companies continue to invest in growing their services, both in the technological backend but also in the content being offered to players. To provide a better understanding of the latest developments in the network infrastructure that powers cloud gaming behind the scenes, we have added a new section that focuses specifically on the innovative technology and companies that create the foundation for cloud gaming to grow.

In this year's Stakeholder Spotlight chapter, we highlight four of the key players that continue to invest in cloud gaming's growth, ranging from a cloud gaming service provider to infrastructure players. The full report's Stakeholder Spotlight section includes exclusive interviews with leaders from NVIDIA GeForce NOW, Haima Cloud, StackPath, and now.gg.

Ultimately, it is cloud players that make the success and future potential of this exciting technology. Understanding current users' perception of cloud gaming technology is crucial to improving and offering the kind of experience that players want. To address this need, we conducted a survey among gamers from four key markets around the world. The never-before-seen data in this new section shows that interest in trying cloud gaming is high and churn levels are low, with most current users playing via the cloud multiple times per week. High consumer engagement and satisfaction bode well for the future of cloud gaming as awareness of the possibilities unlocked by cloud gaming rises.

Besides the three new chapters mentioned above, the full report includes our forecasts with the latest available information, offering the highest level of granularity to date, with all metrics available for 10 subregions and 33 individual markets (in the paid report's accompanying data book).

Guilherme Fernandes
Market Consultant

$1.6Bn

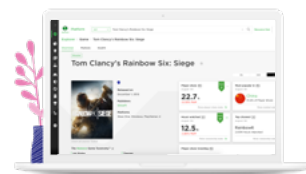Global cloud gaming revenues in 2021 (base scenario)

23.7M

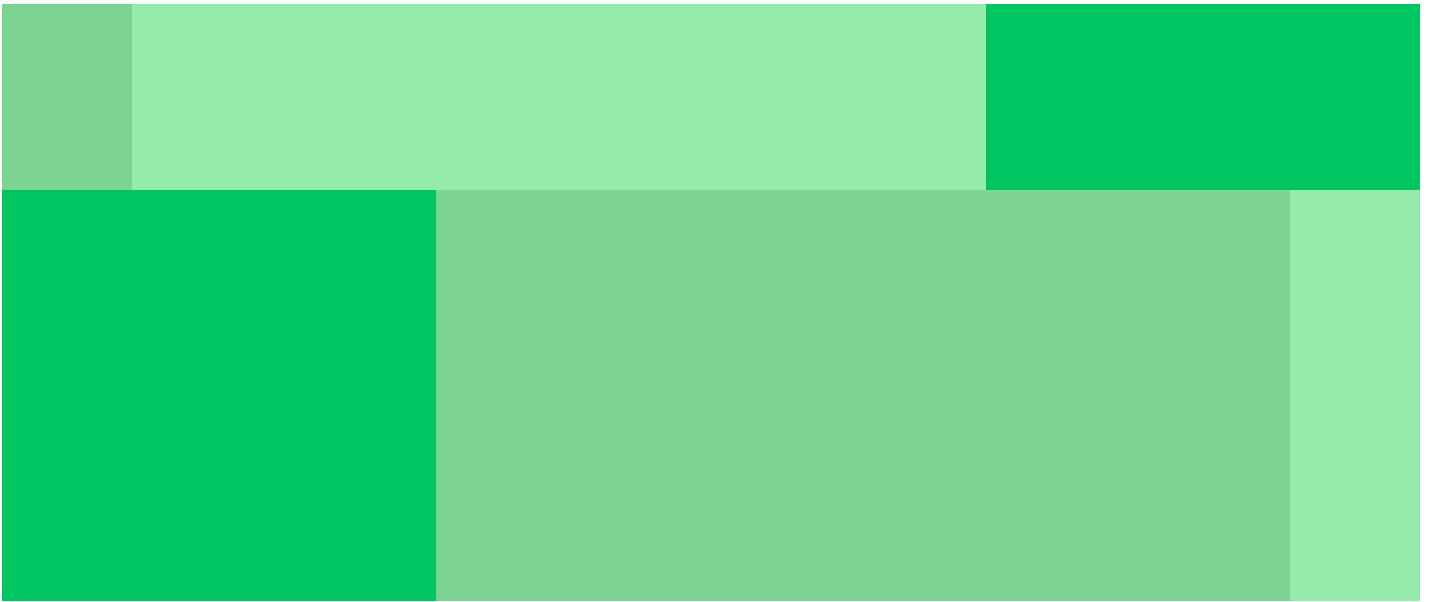Global cloud gaming paying users in 2021 (base scenario)

| Free 38-page version | Full 153-page version $7,500 |

Includes access to the Newzoo Platform and Newzoo Pro data

01. Methodology

Methodology

Newzoo aims to provide its community with the best possible overview of cloud gaming's potential in the games market. Following the launch of many of the most anticipated services, expectations around cloud gaming are becoming clearer. Nonetheless, the market is still young, so we continue to model multiple scenarios, as the novelty of cloud gaming makes this market more susceptible to a range of unforeseen developments. The reasoning behind our model is mostly unchanged. However, we thoroughly updated the several data points that support the model, ensuring that the numbers in each scenario make sense regionally and globally. For the first time, we are now also sharing all the metrics for the 33 markets we survey in Newzoo's yearly syndicated research (Consumer Insights – Games & Esports) with the complete, paid version of this report.

Our forecast is based on our proprietary research in the games market. At the highest level, Newzoo's cloud gaming model focuses on three key metrics: serviceable obtainable market by number of players, paying users, and market cap. The online population and number of players per country are the starting point of our forecasts. In addition, we use average internet connection speeds in each country, urbanization rates, and service availability to estimate the size of the potential user base. From the total addressable market of game enthusiasts, we zoom in on those who are aware of and have access to a cloud gaming service. We then segment these enthusiasts into different personas based on Newzoo's Gamer Segmentation and analyze the likelihood of cloud gaming interest and adoption for each persona. We also look at the game enthusiast persona split per market, which comes from our proprietary consumer research. Together, the personas encapsulate all the ways an individual can engage with gaming content. Ultimately, this leads us to the serviceable obtainable market (SOM) for cloud gaming services.

The revenue scenarios use the same model as a foundation. Starting with the SOM, we developed three scenarios for the future of cloud gaming. The differences between the scenarios are based on four major inputs: the conversion rate to paying users, the share of year-long subscribers among those paying users, the availability of each of the major services analyzed per market, and the average revenue per paying user (ARPPU).

First, we determine the share of the SOM likely to convert to paying users. These ratios come from our primary consumer research and publicly available data on subscriber numbers for existing services. We expect the share of paying users to grow over the years as services become more robust and gamers can experience their quality. Since many of

these services are subscription-based, the second input is the share of year-long subscribers among those paying users. This share is the result of benchmarking against public data of similar services in other industries (e.g., Netflix, Spotify, and others), as well as information provided by cloud gaming companies that have agreed to share some of their data with us. The third input is the availability of the analyzed services across markets. The initial situation for all historical years is derived from publicly available information regarding various cloud gaming service providers. The forecast is based on the existing geographical footprint and internet infrastructure in different markets, as well as our own assumptions. Finally, the ARPPU presents the average spend on cloud gaming services and games played via the cloud. ARPPU is split between monthly fees (for subscription-based services), in-platform spend (which can be both full-game purchases and in-game transactions), and games bought with the sole purpose of being played via cloud gaming services.

Our revenues and growth rates reflect the year-end US$ exchange rate. All numbers in the report represent the state of the market by the end of that year. For example, if we state that the market cap in 2020 was $669 million, this implies that players spent that much on cloud gaming services between January 1 and December 31, 2020.

We define cloud gaming revenues as the amount the market generates via consumer spending on cloud gaming services and games played via the cloud. This includes digital full-game purchases, in-game spending, and monthly fees for cloud platforms like GeForce NOW and cloud-powered subscription services like Stadia Pro. Naturally, we use a different approach for subscriptions offering more than cloud gaming, like PS Now (which also allows users to download games). For these hybrid services, we include a representative share of the revenues generated via cloud gaming—not all revenues generated via the service. Our revenue numbers exclude taxes, advertising revenues earned in and around games, (peripheral) hardware, and business-to-business services.

In terms of countries and regions, we define the market size as the amount companies generate from consumers in that specific territory, as opposed to the amount companies based in a particular territory generate worldwide.

Overall, our forecasts are always the outcome of an iterative process, reviewing the implications of our assumptions on a very granular level. During this process, we rely on quantifiable metrics, such as historical growth rates, and include hard-to-quantify metrics, such as (gaming) culture, spending behavior, and other societal factors. Thanks to expanding conversations with multiple industry stakeholders, we also have increasing access to actuals and insights, which add to the accuracy of the results.

02. Cloud Gaming
Market Sizing & Forecasts

These estimates are from August 2021. We review these quarterly and update them if needed here: newzoo.com/key-numbers.

Cloud Gaming Market Sizing & Forecasts

The most influential factors that have defined and will continue to impact the performance of the cloud gaming market are:

- The COVID-19 lockdowns around the world, which have persisted so far into 2021. Although these were less frequent than in 2020, they are likely to become a common occurrence for as long as there are new outbreaks. Therefore, games will remain an attractive form of entertainment and socialization during these periods, and cloud gaming will provide easy access;

- The continued difficulty that many consumers still face in securing next-generation gaming hardware, including the latest consoles, GPUs, and CPUs;

- The rise in consumer awareness of cloud gaming, thanks to increased marketing efforts and services being launched worldwide (most often as a result of B2B partnerships between cloud gaming services and local CSPs);

- The launch of hardware-intensive titles will attract those without the required devices to cloud gaming, especially when cloud-native titles begin to launch;

- The diversification of cloud gaming business models, with some services (such as Facebook Cloud Gaming) opting to provide games via the cloud without users even realizing it. Players will not need to register or subscribe to any additional service—just click and play—especially on mobile, as user experience becomes seamless.

The growth drivers for the cloud gaming market remain similar to the ones mentioned in the March 2021 Update to the Global Cloud Gaming Report, but we included some additions that might impact the longer-term forecasts.

Now that more time has passed since the February 2021 announcement that Google would close its first-party development studios that were working on cloud-native titles, we remain confident that this was an isolated event and does not negatively affect the outlook of the market as a whole.

Throughout the research we did for this report and conversations with the companies featured in this year's Stakeholder Spotlight, we found that all are continuing to invest in

the technology and are committed to developing and growing their services. Moreover, their investments are paying off. User numbers continue to rise, and churn rates remain low. In a way, the negative response to Google's move may have benefited the future of cloud gaming, as expectations were lowered and the market was set on a path to sustainable growth.

In this section of the report, we provide our updated take on the current size and future potential of the cloud gaming market. As in previous years, we provide three scenarios. Our base scenario is what we think is most likely to unfold based on current developments. The optimistic scenario represents the opportunity of cloud gaming hitting its full stride, with services expanding more rapidly. However, we acknowledge that cloud gaming technology is still relatively new and faces both technical and commercial hurdles. Our pessimistic scenario represents a situation in which services struggle to find new audiences and retain their current audience and have to focus on fixing issues rather than expansion.

Global Cloud Gaming Market Funnel
Segmentation of the Market in 2021

Note: funnel is not to scale with totals

Online Population
4,779M

Total Players
2,960M

Players With Minimum Required Internet Speed
2,934M

Aware of Cloud Gaming
1,060M

Living Where Service Is Available
607M

**Serviceable Obtainable Market**
165M

Paying Users
24M

Serviceable Obtainable Market

Players in emerging markets score higher in cloud gaming awareness than those in Western markets. In emerging markets, gaming hardware tends to be prohibitively expensive to own. Thus, these players perceive higher potential benefits from using this technology, meaning they are more interested in cloud gaming.

At the same time, games streaming technology has evolved to less strict connection requirements and internet connections are improving around the world, making technical constraints less of an issue. As a result, emerging markets make up an even larger part of the SOM. Combined, these markets are now set to represent more than 43% of the SOM in 2021, growing to almost 48% by 2024. China will remain the largest single market by number of potential cloud-gaming-interested players due to the wide range of services already available and the fast adoption of 5G.

Cloud Gaming's Global Market Opportunity

Serviceable Obtainable Market (SOM) per Region | 2020-2024

- North America
- Latin America
- Europe
- Middle East & Africa
- Asia-Pacific
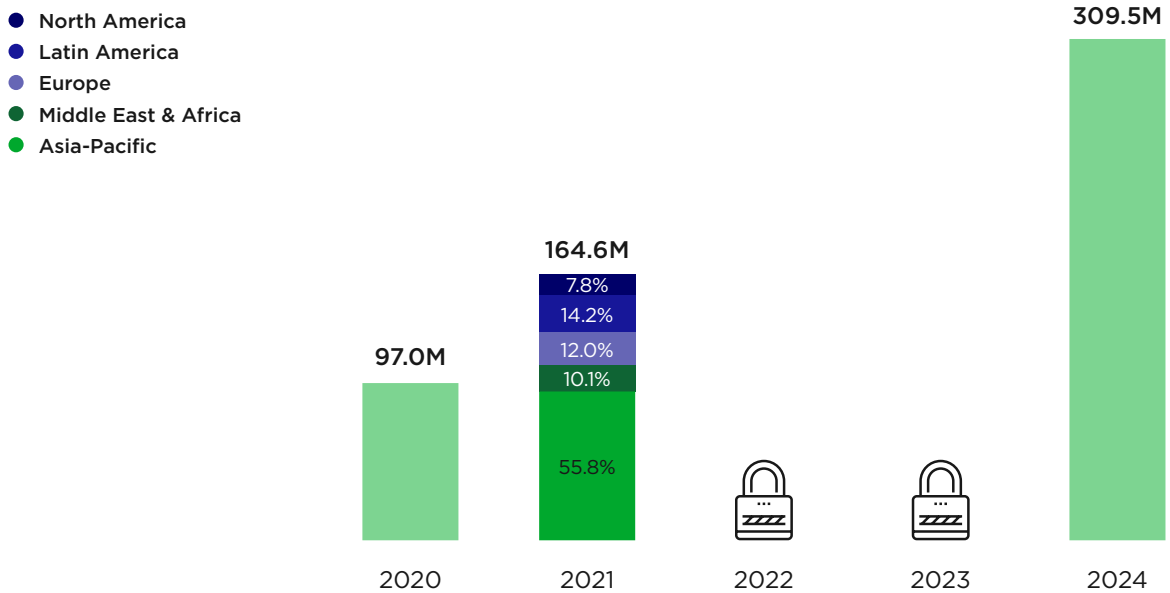
Find the complete SOM forecast per market in the full report.

Scenarios for Paying Users and Revenues

Base Scenario

In our most likely scenario, we forecast that there will be 23.7 million paying users of cloud gaming services at the end of 2021, spending a combined $1.6 billion on cloud gaming services and games streamed via the cloud. By 2024, we forecast these metrics to grow to 60.7 million paying users spending a combined $6.5 billion. ARPPU will grow from $66.3 in 2021 to $107.6 by 2024.

Cloud Gaming Paying User Forecast per Region
Base Scenario | 2020-2024

- ● North America
- ● Latin America
- ● Europe
- ● Middle East & Africa
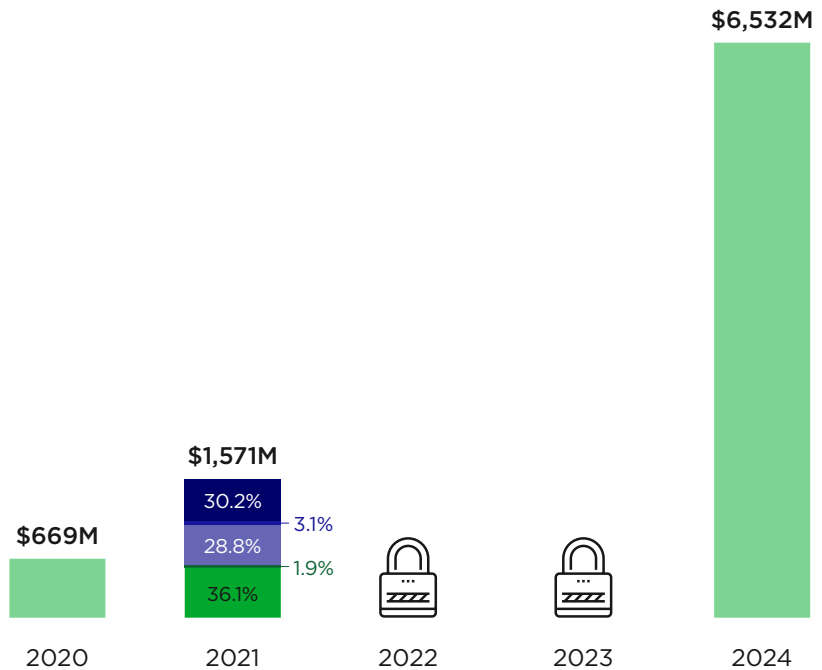- ● Asia-Pacific
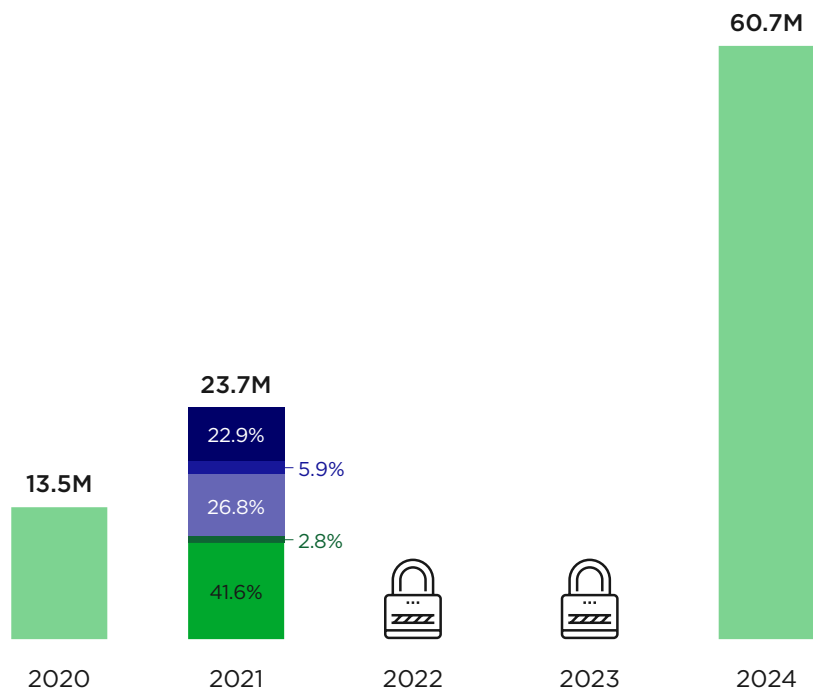
Find the complete paying user forecast per market in the full report.

Cloud Gaming Revenue Forecast per Region
Base Scenario | 2020-2024

● North America
● Latin America
● Europe
● Middle East & Africa
● Asia-Pacific

By region, China now represents a larger share of global spending on cloud gaming, as available services have been able to improve. Notably, Tencent seems to be closer to officially launching its definitive cloud gaming service(s) after integrating one of the services it was testing into another. Services not owned by the Chinese gaming giant also seem to be doing quite well, including those launched by the main Chinese CSPs. Thus, we expect consumer spending on cloud gaming services in China to catch up with Western markets.

Nevertheless, North America and Western Europe will still dominate the market in 2021, as combined players from these regions are expected to generate 59% of consumer spending.

The emerging markets will gain market share toward 2024 as their potential is unlocked by higher service availability and better infrastructure. Players in these markets will experience some of the most significant improvements in connection speeds due to the continued rollout of 5G, which will provide users a better gaming experience and contribute to the growth of the cloud gaming market.

Find the complete revenue forecast per market in the full report.

Following the 2020 boom in the cloud gaming market caused in great part by the COVID-19 pandemic and the following surge in demand for games as a form of entertainment and socialization, 2021 will be crucial in determining how the market will evolve in the coming years. In our most likely scenario, we are still confident that strong growth should be expected this year and toward 2024 for the following reasons:

I.   New cloud gaming services continue to launch, and existing ones are expanding.

II. Publishers have embraced cloud gaming as an alternative distribution option. New titles launched on cloud gaming platforms are a massive growth opportunity for cloud gaming.

III. Technological progress and more refined business plans are enabling an increasingly frictionless user experience.

IV. The effects of COVID-19 are still being felt as new outbreaks and ensuing lockdowns occur.

V.   Securing new gaming hardware will remain quite challenging until at least 2022.

Find complete insights on the base scenario in the full report.

These five key factors are, on a global level, the foundation to our base scenario of cloud gaming paying users and market sizing forecasts. The ongoing expansion of services, new and current, and the prolonged impact of the COVID-19 pandemic will positively impact consumer spending on cloud gaming in 2021.

Long term, however, we expect it will take multiple years before paying users will see cloud gaming as their main way of playing games. Thus, we lowered our expectations as to how quickly they will start spending the majority of their gaming budget on cloud gaming. We expect cloud gaming revenues to surpass the $5-billion mark by 2024, a year later than in our March 2021 forecast, as a result of lower ARPPU from 2022 onward. This represents a return to fundamental growth drivers outside of the short-term boost from the ongoing pandemic.
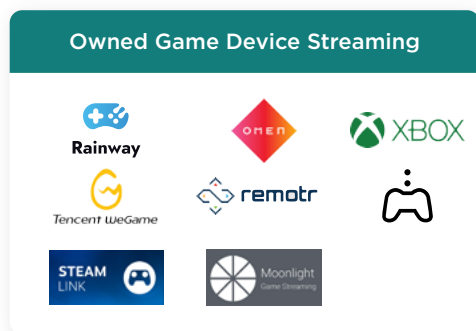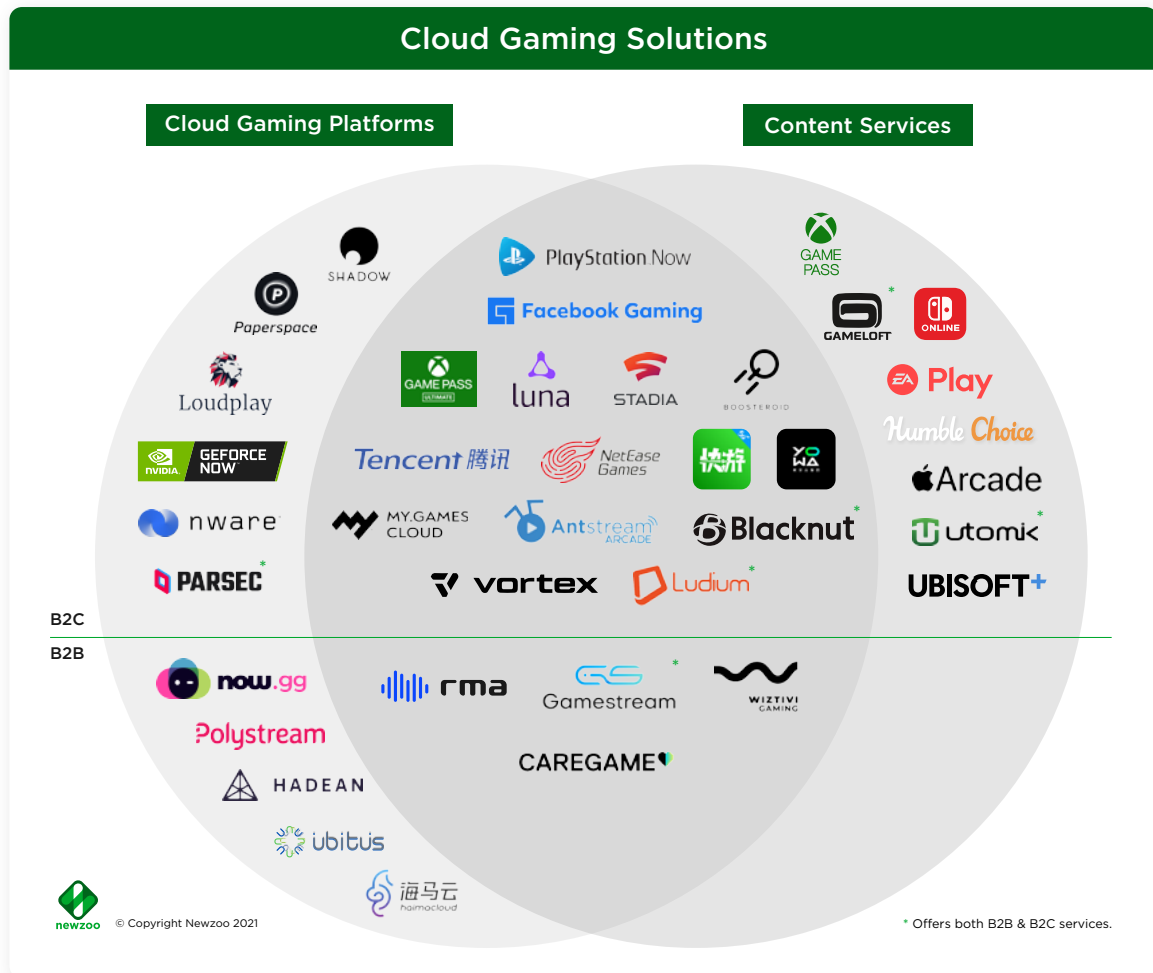
Find complete data and insights on the optimistic and pessimistic scenarios in the full report.

03. State of the Ecosystem

Cloud Gaming Ecosystem Overview

Service Analysis & Latest Developments

There have been plenty of new developments in the cloud gaming market since our 2020 Global Cloud Gaming Report and its subsequent update, from new platforms and partnerships to shifting strategies of key stakeholders. Attentive readers will notice that the middle section of our cloud gaming ecosystem infographic is becoming increasingly fuller, a testament to the high levels of activity in the cloud gaming business. Thus, the ecosystem diagram in the previous page focuses predominantly on cloud gaming solutions, as well as publishers and developers actively involved in cloud gaming.

In this section of the full report, we analyze available and upcoming cloud gaming services, providing Newzoo's key takeaways on the most relevant recent developments concerning each service (all information is up to date as of August 13, 2021). Additionally, you may find our discussion of cloud gaming's impact on various stakeholders in the broader games business in the **Impact to Stakeholders** chapter of the full report.

Cloud Gaming Platforms

1. NVIDIA GeForce NOW

Newzoo's Key Takeaways

- **NVIDIA** is one of the global leaders in cloud gaming thanks to its popular **GeForce NOW** service. The company is further bolstering this service with higher-performance and -fidelity experiences—as well as via (local) partnerships around the world.

- Additional insights can be found in this report's exclusive interview with Phil Eisler, VP at NVIDIA and Head of GeForce NOW, in the **Stakeholder Spotlight** chapter.

Highlights

- In March 2021, **NVIDIA** announced a new premium subscription, the Priority membership, which replaces the Founders membership. The new subscription offers the same benefits, including priority access to gaming sessions, extended session lengths, RTX ON for ray-tracing-enabled graphics, and DLSS for resolution upscaling in supported games. The difference is that these new monthly memberships start at $9.99/month. There is also a new annual membership option (at $99.99) which provides the best value, representing a tried-and-tested strategy for enticing long-term users in the subscriptions space. To recognize their support, NVIDIA added "The Founders for Life" benefit for Founders members who subscribed prior to March 18, 2021 and keep their accounts in good standing, allowing them to continue paying the special $4.99 introductory price without a set date.

- In May 2021, NVIDIA announced that GeForce Now amassed more than 10 million members in more than 70 countries and was approaching 1,000 games in its library (a milestone the company reached in July).

- In April 2021, **ABYA** announced a collaboration with NVIDIA to bring premium cloud gaming to Latin America with **GeForce NOW Powered by ABYA**. Launching later this year, the service targets an estimated 100 million gamers in the region, giving access to hundreds of AAA PC games on many devices. ABYA's partnerships and connections with local CSPs may support NVIDIA in reaching the mass market with GeForce NOW.

- On the user experience side, the ABYA collaboration will provide access to carrier billing, regional currencies, and reduced gameplay latency. Initial plans include launching with support in Argentina, Brazil, Chile, Paraguay, and Uruguay. Lastly, in May 2021, **StarHub** announced it would be the first operator in Southeast Asia to introduce the NVIDIA GeForce NOW. This makes it the first cloud gaming service from all the offerings from global big tech companies to enter this regional market. **GeForce NOW Powered by StarHub** will launch in Singapore in the third quarter of 2021, featuring monthly and yearly subscriptions and discounts for StarHub customers.

- During NVIDIA's GTC 2021 developer conference in April, the company announced that CloudXR tech became publicly available in **AWS Marketplace**—and is coming to **Microsoft's Azure** and **Google Cloud**. This addition means the service will be available across the three leading cloud computing platforms in the West, massively expanding access to cloud-rendered AR and VR capabilities for companies building cloud applications. In China, NVIDIA is also working to bring CloudXR to **Tencent Cloud**.

PARSEC

2. Parsec

- Remote-desktop and B2B cloud-computing company **Parsec**, which many developers have used to demo games to journalists during the pandemic, has been acquired by game engine company **Unity** for $320 million. Parsec's technologies have synergy with Unity's goal of streamlining remote game development, a way of working that was of course accelerated by the pandemic.

- Current Parsec users will likely remain unaffected by this acquisition, at least in the short term. The company announced on Twitter that it has "no plans to change anything about the free Parsec app." Although, changes to current paid subscriptions in the future were not entirely dismissed.

Find complete insights on each cloud gaming service in the full report.

Consumer Insights into Cloud Gaming

Understanding Current Player Engagement with Cloud Gaming and Future Growth Opportunities

To get a consumer perspective on the current use of cloud gaming services and potential interest, we conducted a survey in China, Germany, Japan, and the United States, in July 2021. The findings presented in this section represent data from 6,788 respondents evenly distributed across those four key markets. Respondents were 10 to 50 years old and current players of video games (any platform) at the time of the survey.

A key challenge was to correctly identify those aware of cloud gaming and prevent over-reporting. As cloud gaming is a relatively new technology, there is still confusion among players as to what exactly "cloud gaming" is, which can result in difficulties ensuring they are accurately screened. To overcome this, we used a validation question about basic cloud gaming features, asking respondents to identify what is required to play via the cloud among several options (the correct answer was: a good internet connection).

Headline Findings

- **94% of those aware of cloud gaming have either already tried it (50%) or want to try it (44%).** This highlights the appetite for cloud gaming services and shows the importance of growing consumer awareness for the market to reach its potential.

- Major drivers for cloud gaming adoption include **ease of access, appealing games being available, being able to play on the go**, and the ability to **play the same game across multiple devices**.

- Those who have tried cloud gaming **use it frequently to play**: 36% of those who have tried cloud gaming use it to play games three days or more a week. Another 45% use it weekly (29%) or at least monthly (16%). Once players start using a cloud gaming service, they are likely to stick.

- **Satisfaction levels are high for all cloud gaming services.** This is another positive sign of the technology's potential, as user numbers are expected to keep growing.

- **Key barriers to overcome to increase adoption:**

  - **Internet connections not being good enough.** With further developments in internet technology and with the continued rollout of 5G, this will likely become less of a barrier over time.

  - **Preferring to play on own gaming hardware.** This is likely the most difficult barrier to overcome, as it requires a fundamental change in player preference and perception. Still, perception may change once experimentation rates increase and players become more receptive. Over time, we expect the preference for owning hardware to concentrate in a smaller group of hardware enthusiasts.

  - **No one in the player's social circle uses cloud gaming.** Once awareness and usage rise, this may transform from an obstacle to a driver for adoption, as gamers' choices and platform preferences are strongly influenced by the behavior of their peers.

Find complete findings on consumer insights into cloud gaming in the full report.
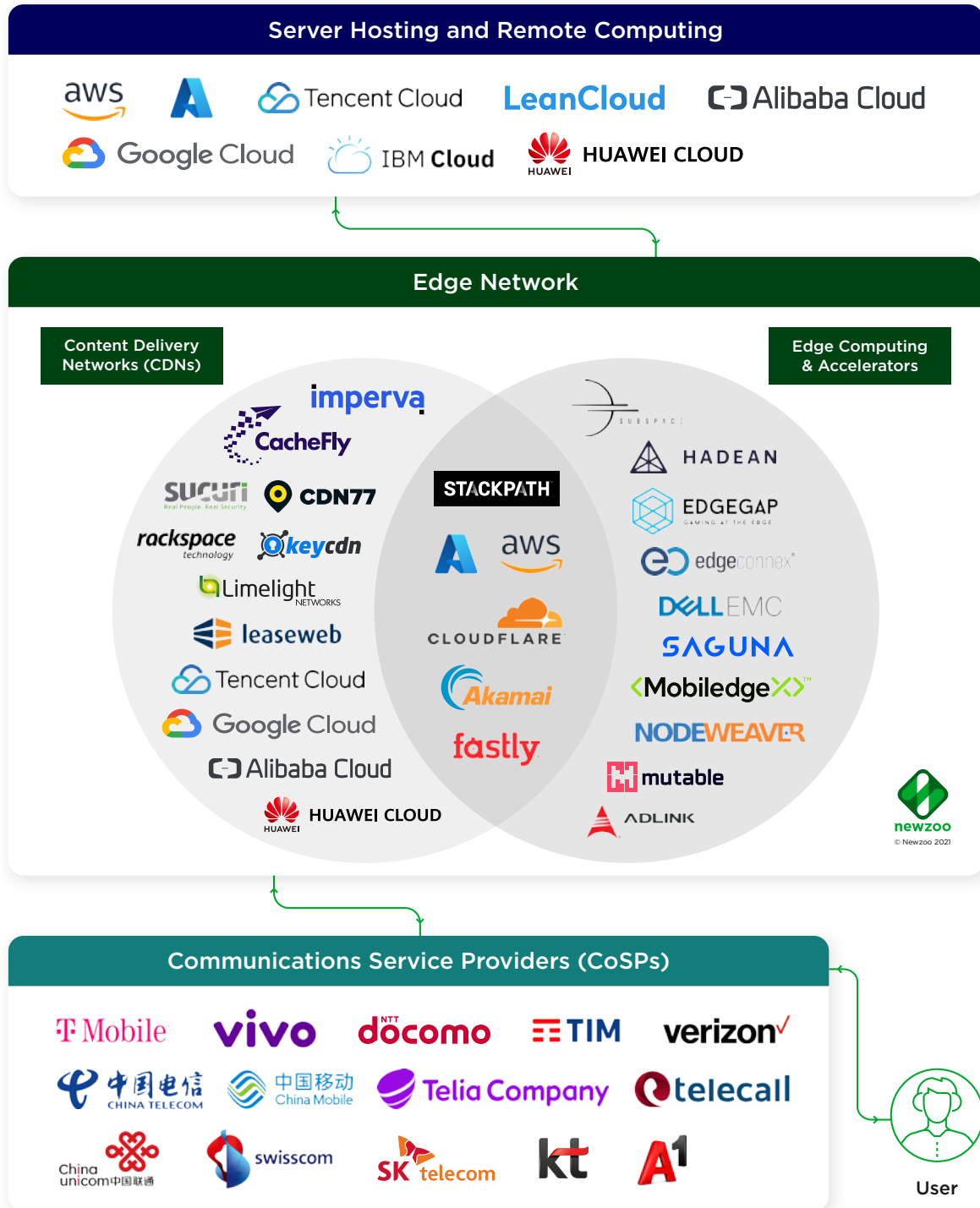
04. Special Focus Topic:
Network Infrastructure

Network Infrastructure Ecosystem

Special Focus Topic
Network Infrastructure

Online games depend on a large, interconnected web of data centers and services to function. Cloud gaming raises this dependency to a whole new level, as it raised the infrastructure requirements considerably. The data centers need to be closer to the access points, equipped with specialized server blades and high-bandwidth, low-latency, and low-jitter internet connections to provide a smooth streaming experience to the end user. While so far, we have focused on the consumer-facing side of cloud gaming, this section provides more insight into the infrastructure that makes all of it work. We believe that understanding the network infrastructure that supports cloud gaming is key to understanding the market's potential growth, pitfalls, and how it has evolved to now being the right time for cloud gaming to grow.

We will begin by explaining the links that make the connection from the data center, where the games are processed, to the access point the player uses. The companies operating in this space are spread across three main sections: Server Hosting and Remote Computing, Edge Network, and Communications Service Providers (CSPs).

Find complete insights on network infrastructure in the full report.
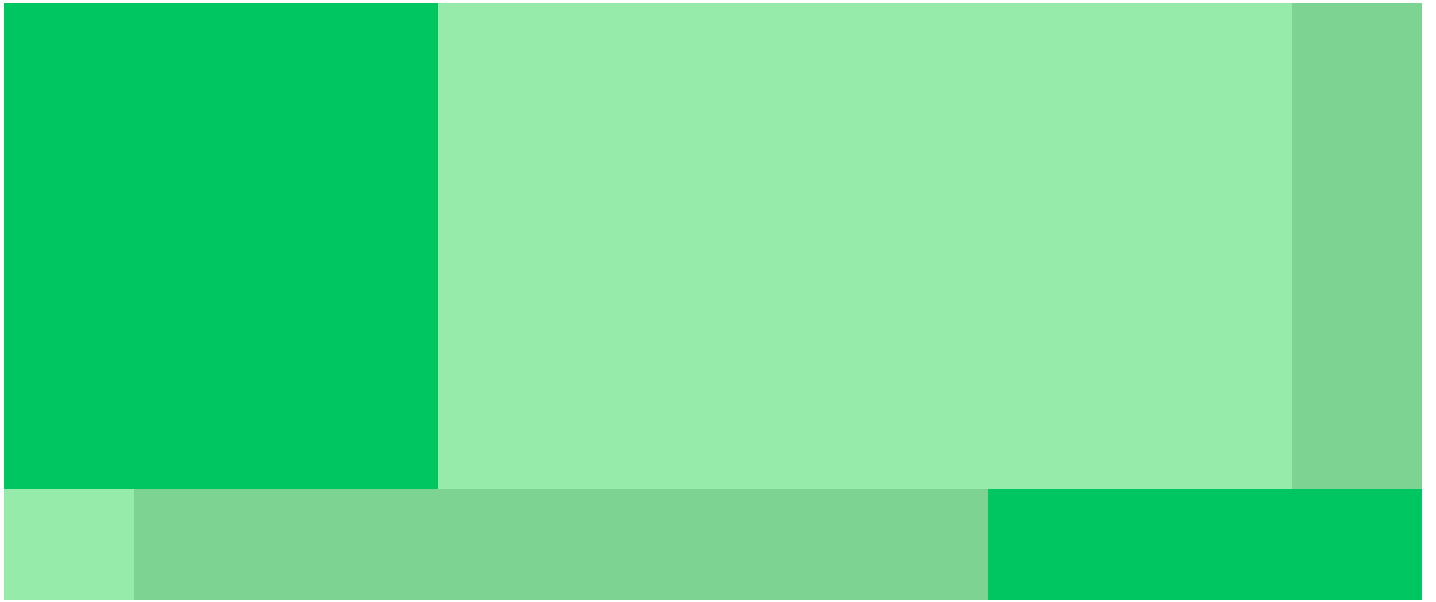
05. Stakeholder Spotlight

Stakeholder Spotlight

This report includes four exclusive interviews with companies currently active within the cloud gaming business. In line with this edition's focus on the infrastructure that powers game streaming, we included two interviews with companies operating the infrastructure that enables cloud gaming to grow: Haima Cloud and StackPath. We also spoke with NVIDIA GeForce NOW, one of the leading cloud gaming service providers, and now.gg, an exciting new platform aimed at mobile cloud gaming.

In the following pages, you will learn more about these four companies, how their business is evolving, and their plans for the future.

Highlights

- **NVIDIA GeForce NOW** is one of the world's largest cloud gaming services, having amassed more than 10 million registered users in a little over a year since launch. The company recently announced multiple partnerships aimed at expanding the service's reach to new regions, particularly emerging markets.

- **Haima Cloud** is the leading full-stack cloud service provider for cloud gaming in China. More than 30 million unique devices per month use its services. Haima Cloud's unique perspective resulted in a rich deep dive into the Chinese cloud gaming market.

- **StackPath** is an edge cloud platform that provides cloud services to end users closer and faster than possible with remote servers. Technology such as this is crucial to improve the cloud gaming user experience.

- **now.gg** is a recently launched B2B mobile cloud platform for game developers, available globally and powered by its proprietary distributed Android stack. It targets a yet under-explored section of the cloud gaming market, as most services do not focus on mobile cloud gaming.

Find complete interviews with the four companies in the full report.
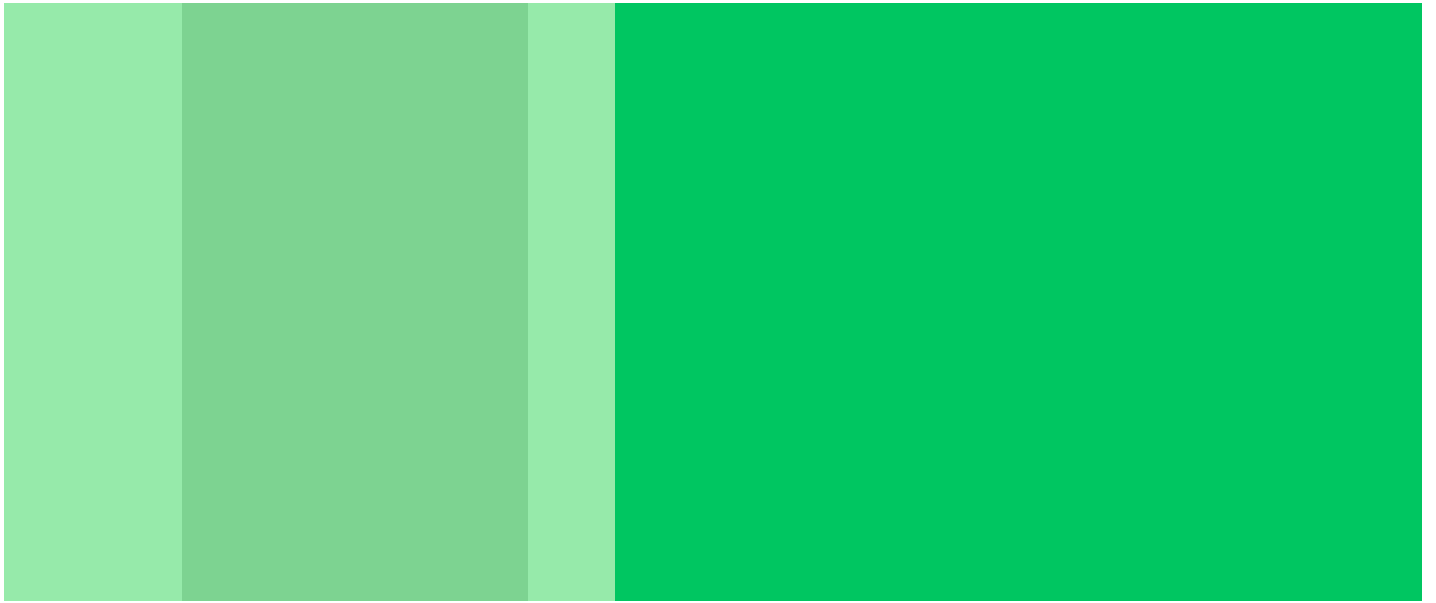
06. Impact to Stakeholders

Impact to Stakeholders

Since the first edition of this report, we have included a chapter about cloud gaming's impact on 11 stakeholder groups in the broader gaming ecosystem, ranging from game developers and publishers to ISPs and device manufacturers. This section focused on the expected positive, neutral, and negative outcomes per group and how we expect each to react to the growth of cloud gaming.

Most of the conclusions shared in the past two editions still ring true today. Therefore, we want to give our new (and returning) readers a chance to (re)familiarize themselves with this content. We made some slight edits compared to 2020 for clarity and correctness and have included a 2021 update to each section where relevant and applicable. Otherwise, this chapter largely resembles that from Newzoo's 2020 Global Cloud Gaming Report.

🔒 **1. Game Publishers and Developers**

🔒 **2. Digital Game Stores**

🔒 **3. Console Makers**

🔒 **4. Internet Data Providers**

🔒 **5. Mobile Devices Manufacturers**

🔒 **6. Hardware Component Manufacturers**

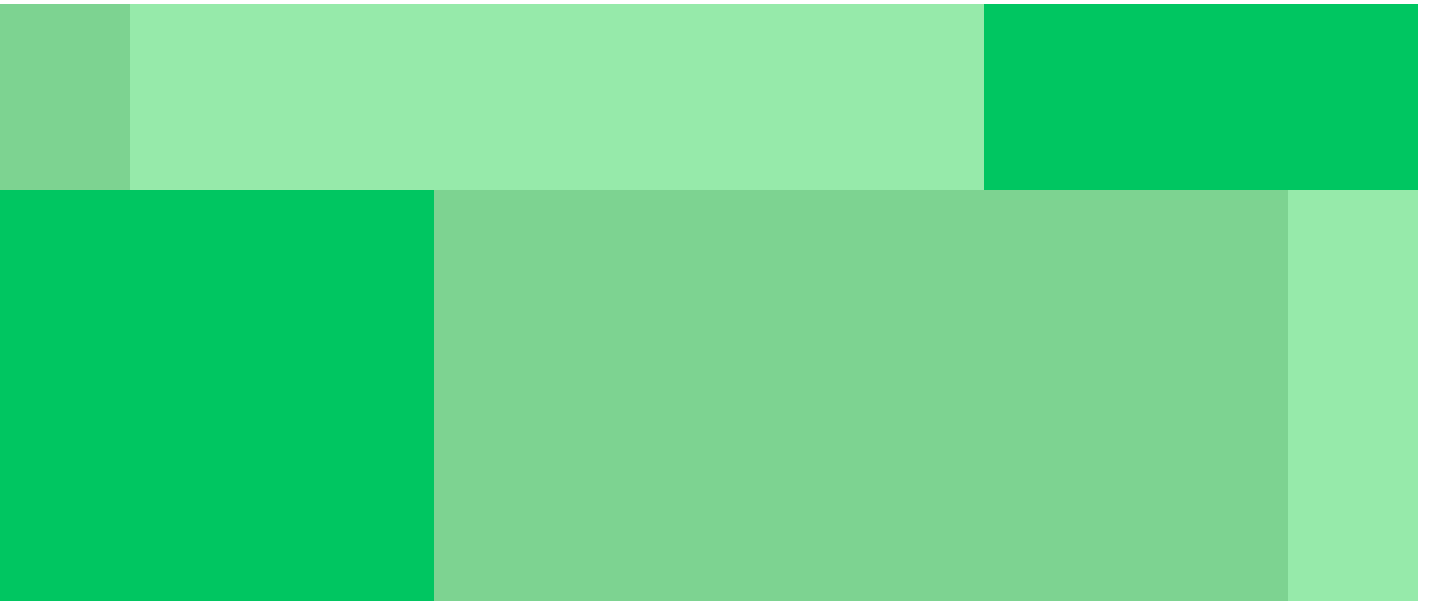🔒 **7. PC, Laptop, Server Manufacturers**

🔒 **8. Peripheral Manufacturers**

🔒 **And 3 more**

🎮 **Find complete insights for all 11 stakeholder groups in the full report.**

07. Terminology

Terminology

Average revenue per paying user (ARPPU): Revenue generated by all the paying users of a service or game, divided by the number of paying users, excluding any free trial period.

Cloud access points: The platforms through which consumers access cloud gaming services. These platforms include consoles, PCs/Macs, smartphones and tablets, media boxes, and other connected devices.

Cloud computing: Using centralized remote servers to process data rather than a local device.

Cloud gaming or game streaming: The ability to play a game on any device without owning the physical hardware required to process it or needing a local copy of the game itself. Also called gaming on demand, the games are processed remotely on cloud or edge servers and streamed directly to a user's device.

Cloud gaming awareness: The share of people who know about cloud gaming. We determine this awareness via self-reported knowledge and a validation question about basic cloud gaming features.

Cloud gaming revenues: All consumer spending on cloud gaming services and games played via the cloud. This includes digital full-game purchases, in-game spending, and monthly fees to use cloud services and subscription services (e.g., Stadia Pro).

Cloud gaming service: A service that enables cloud gaming (i.e., access to hardware). This differs from a standard games subscription service like Humble Choice, which provides access to software only.

Cloud save: Saved game files that are stored in the cloud; that is, not in the player's device.

Communications Service Providers (CSPs): Companies that offer internet, telecommunications, media, entertainment, and other information-related services, often via a physical network. CSPs include Internet Service Providers (ISPs), cable companies, mobile carriers, and others. Examples include Vodafone, T-Mobile, and Verizon.

Container: In computing, a container is an executable unit of software that has everything needed to run a single application, including all the code, its dependencies, and even the operating system itself.

Cross-play: A functionality that allows players on different platforms to play together, regardless of the input method used.

Cross-save: A functionality that allows for the saved game files to be transferred between or accessed from different devices.

Digital revenues: Revenues generated by the sales of games or game-related content purchased directly from an online store, without a physical product being delivered. Digital revenues include in-game purchases, subscription revenues, and any additional downloadable content (DLC).

Edge computing: Like cloud computing, but the processing nodes are more widely distributed and physically closer to the user (compared to a remote cloud). The user's device may perform some of the processing.

Free-to-play (F2P) games: Games that are (legally) free to download and play, often offering in-game spending opportunities.

Games-as-a-Service (GaaS): Providing game content or access to games on a continuous revenue model; for example, a season/battle pass.

Game revenues: Consumer revenues generated by companies in the global games market, excluding hardware sales, tax, business-to-business services, advertising, and online gambling and betting revenues.

Gaming rig: A high-powered device used primarily for gaming, typically referring but not exclusive to desktop PCs.

Hardware components: All internal components that constitute finished electronic devices.

Internet Service Providers (ISPs): The gatekeepers of the internet and, therefore, cloud gaming. All consumer internet traffic passes through these providers. ISPs are a subset of Communications Service Providers (CSPs); however, both terms are sometimes used interchangeably due to the large overlap. Examples in the U.S. include Cox Communications and Comcast.

Network infrastructure: The back-end cloud infrastructure that connects data centers to cloud access points via network providers, including CSPs.

Pay-to-play (P2P) games: Games that must be paid for upfront or paid subscription-based games.

PC gaming café: Location that provides patrons access to gaming rigs and internet connections, mainly focused on playing competitive online games.

Peripherals: Gaming-related hardware products used for gaming, such as gaming mice, keyboards, headsets, controllers, or monitors.

Players or gamers: All people who play (digital) games on a PC, console, TV, or mobile device.

Project xCloud or Xbox Cloud Gaming: Microsoft's cloud gaming service that launched via a public beta in September 2020. The service is bundled with Xbox Game Pass Ultimate at no extra cost.

Serviceable obtainable market (SOM): The number of people who can realistically be considered potential users of a service. They must be somewhere where the service is available, aware of the service, and interested in it conditionally.

Stadia: Google's cloud gaming service that launched in November 2019.

Subscription service: A service a user can access by paying for a pre-determined time period. In this report, the term is used in the context of a games subscription service, which offers access to software content without providing the platform/hardware access that a cloud gaming service provides.

Virtual machine (VM): An emulation of a physical computer. Using VMs allows users to run what appear to be multiple machines (with multiple operating systems) on a single computer. VMs also offer developers total control of edge computing environments, compared to other options such as containers.

Virtual reality (VR): The computer-generated simulation of a three-dimensional image or environment users can interact with in a seemingly real or physical way with special electronic equipment, such as a headset with a screen inside or gloves fitted with sensors.

Xbox Game Pass: Microsoft's subscription-based service that offers access to a library of games, but users must download them first to play. The service is available across Xbox and PC.

Xbox Game Pass Ultimate: Ultimate is the highest subscription tier of Microsoft's Xbox Game Pass. In addition to downloadable access to the Game Pass library, Ultimate allows users to play most of the included titles via the cloud. Xbox Live Gold, which is required to play most games on Xbox consoles, is also included in the Ultimate subscription.

Newzoo's Gaming Personas

All-Round Enthusiast: Consumers who love playing games, watching gaming video content, and owning gaming-dedicated hardware but don't quite reach the same levels as Ultimate Gamers in terms of hours or dollars spent.

Backseat Viewer: Consumers who watch plenty of gaming video content/esports on Twitch and YouTube but hardly ever play games.

Bargain Buyer: Consumers who enjoy high-quality game experiences, preferably free-to-play or discounted titles, and only spend on hardware when necessary.

Community Gamer: Consumers who never shy away from a community discussion and enjoy game-related podcasts, forums, news, and videos (as well as playing!).
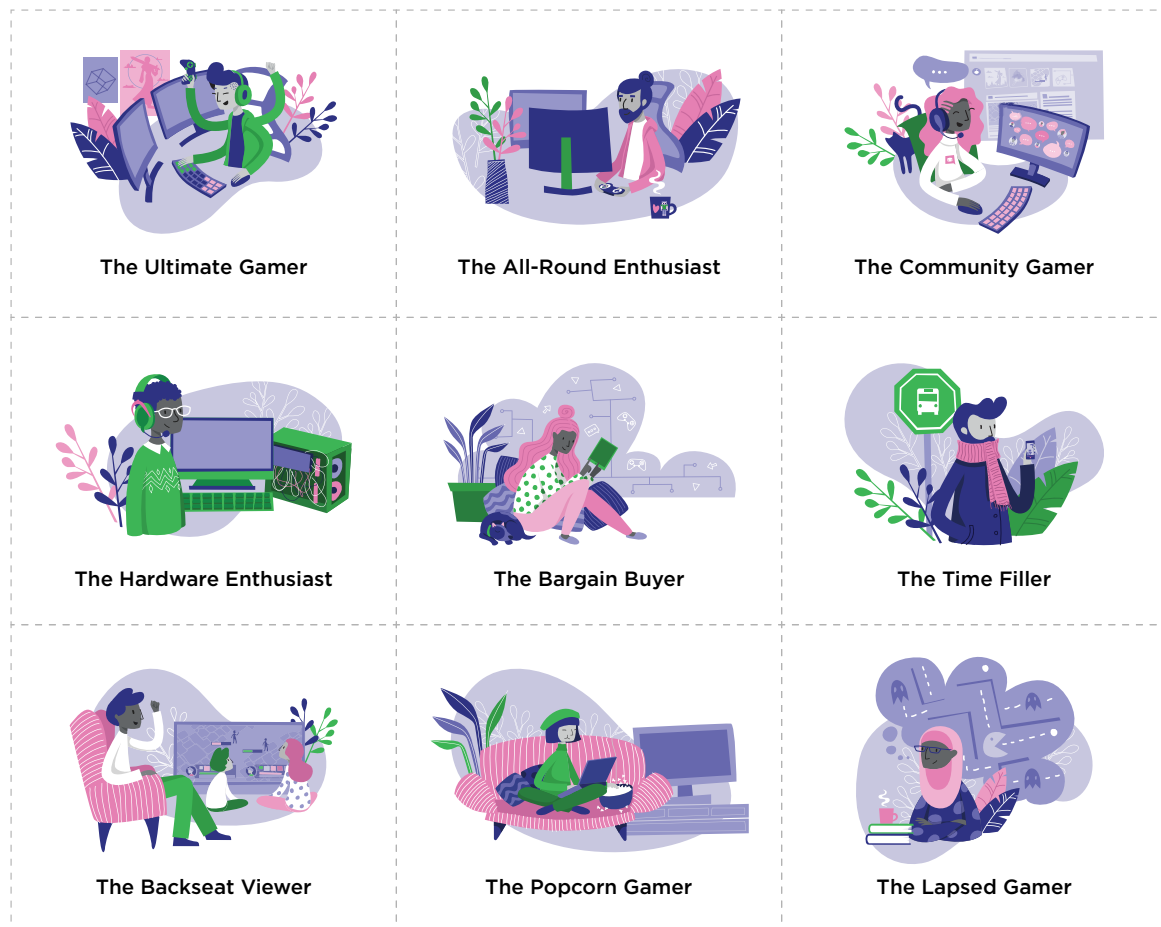
Time Filler: Consumers who play games, typically on mobile, to pass the time. More than a third of all female game enthusiasts fall within this group.

Hardware Enthusiast: These consumers are archetypal technology aficionados. Frequent first-adopters, they like to either build their own computers or try out new gadgets (e.g., VR headsets or smartwatches).

Lapsed Gamer: Consumers who are currently not game enthusiasts. They have played in the past but are now not engaging with gaming whatsoever. However, they can be reactivated; more than a quarter of them intend to play games in the foreseeable future.

Popcorn Gamer: Consumers who play a little but enjoy watching gaming content far more.

Ultimate Gamer: Consumers who love all things gaming—playing, owning, and viewing—and dedicate much of their free time and disposable income to the pastime.

The Ultimate Gamer	The All-Round Enthusiast	The Community Gamer
The Hardware Enthusiast	The Bargain Buyer	The Time Filler
The Backseat Viewer	The Popcorn Gamer	The Lapsed Gamer

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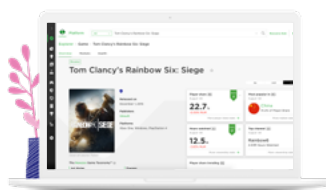

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