

Cloud Gaming

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Abstract— I have given a piece of brief information about Cloud Gaming. I discussed its functionality, its potential Software and Hardware problems, System requirements, Technology Used, Future Scope and Conclusions. Cloud Gaming may be the upcoming revolution of the gaming industry and can make it more portable to use any time anywhere.

Keywords: FPS (Frames per Second), Mbps (Megabits per Second), GHz (Gigahertz), GPU (Graphical Processing Unit)

I. INTRODUCTION

In the past recent year, there has been a lot of discussion about how can we entertain someone anywhere any time in the form of gaming means how can we provide a service which can be used to play games on any platform. Cloud computing has become a popular model for reducing cost of business, improvise quality of services, and provide good & secure computing [1].

Many of the people think that companies like Google, Microsoft were the first to deploy this technology. But only some of them realized that it is much older than it looks.

Before we proceed we should understand what is Cloud Gaming?

Cloud gaming is an online server-based platform which runs the game on a remote-based server and streams directly to any gaming or non-gaming devices or we can say it transforms a non-gaming machine to a powerhouse of infinite gaming without upgrading any piece of hardware or software.

The way it works is as simple just download the application which offers these services and you will get access to tons of games libraries the service can offer and pay a monthly, hourly or yearly based subscription and start playing. Though some service may not offer every game either due to availability or exclusiveness of the games such as some PlayStation games can't be played on pc due to their exclusiveness. But we need not worry about these things since we are left with lots of and lot s of games to play in the library and we must think about what kinds of problems we can we face during gaming using these kinds of services so we will discuss about it in detail

II. FUNCTIONALITY

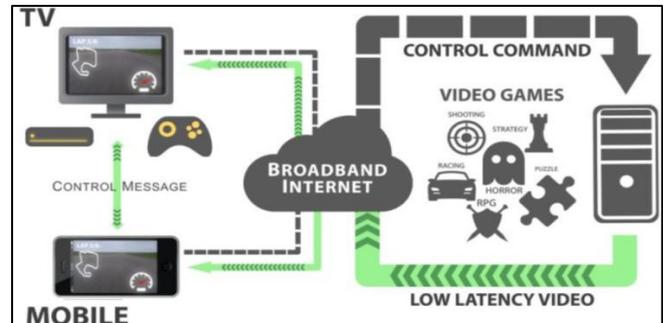


Fig. 1: Working Model

Cloud Gaming in a layman language we say it just works similar to a video streaming services such as Netflix, Amazon Prime, YouTube Premium, etc., but here, in this case, its video games rather than just a video.

The idea here is that the user will just have to open his/her laptop or device which has the operating system and can be used to play games and download applications that offer cloud gaming services and the user will be directed to the games library where he will be asked for a monthly subscription to enjoy the game.

Here the procedure is supposed a person has a high-end gaming device such as pc, console, etc. while another person is not able to afford one, in this case, he can use cloud gaming to his advantage wherein, he can borrow a high-end configuration machine remotely by paying some amount of money in form of monthly access fee for the remote machine.

Whenever we try to game-like this our device input get registered to the server using a high-speed internet connection and the server hardware processes those input using a server-based CPU like Intel Xeon 2620 CPU and then the feedback will arrive. It means we may be able to game on any device without worrying about filling up the device storage. And maybe live-streaming combined with Cloud Gaming may become a great option for a person who wants to stream on the platforms like twitch, youtube, etc without spending a single penny on expensive hardware.

III. PROBLEMS

We all saw the potential of Cloud Gaming, how can it change the shape of future gaming and what potential it has shortly.

But we all know everything has its flaws too.

Cloud Gaming suffers from a critical problem such as Input lag, Hardware Issues, video compression-grade and system requirements.

A. Input Lag

Since the input data has to go back to the server and process the same and return before it could produce the visible result

on the device display machine depending on your internet connection the whole thing may give rise to Input lag.

But depending on how far are you away from the data centre which means less distance less input lag more distance high input lag. But we don't have to worry about this since companies providing these services are constantly trying to develop new ways to reduce input lag, but the experience with this technology is good enough to offer great gaming experience in a single-player genre but can't be said for multiplayer or competitive gaming for now.

Here are some statistics regarding the comparison of input lag among different services and local gaming machine.

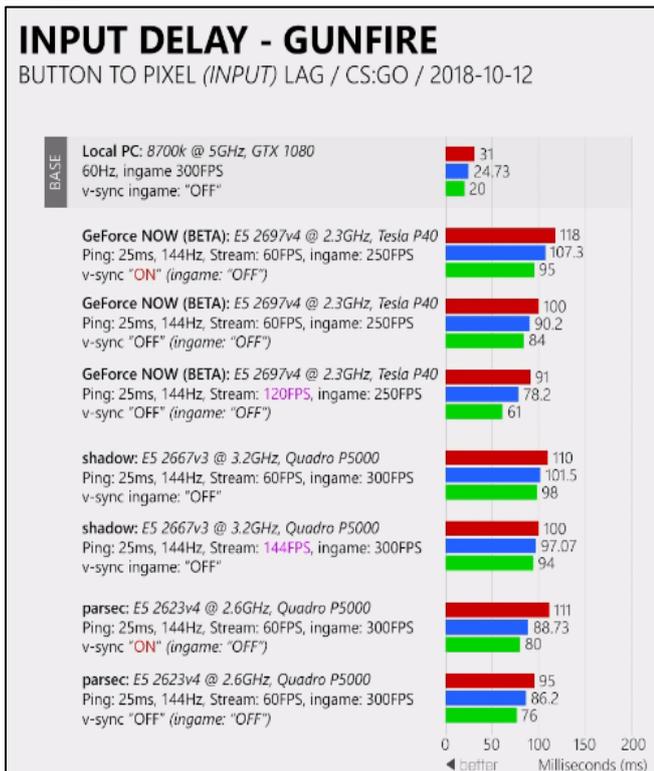


Fig. 2: Comparison of Input Lag on Different Gaming Services and a Local Gaming Machine

B. Hardware Issue

Cloud Gaming offers us gaming on any kind of devices without the need for any additional storage or a powerful gaming machine. But hardware issue isn't related to device hardware its related to the server hardware. Since the service used by cloud-gaming requires server-grade hardware which is optimised for server needs, and gaming machine needs are different from one and other. Services like Nvidia Geforce Now and Shadow uses server-based Processor such as Intel Xeon processor and allocates more cores as compare to normal server based task and Graphic Card is also used for rendering the game. The Processor does the multitasking rather than depends on single-core performance in gaming. Thus this type of processor with low clock speed isn't optimal for gaming right now since these processors clock speeds are well below 3 GHz.



Fig. 3: Intel Xeon Processor (Server-based Processor for server need).



Fig. 4: Nvidia GPU for Cloud Gaming.

C. System Requirements

Since we are gaming on a low-end device using cloud service we aren't required to fulfil any kind of hardware requirement. But Here at this point, we are talking about the server requirements that are required for making the cloud gaming happen. Every Cloud Gaming services has different Internet Speed requirements which are crucial for Cloud Gaming but most common requirements are either stable Ethernet-based internet connection or a 5GHz wireless router.

Here are a few services internet speed requirements.

1) Nvidia Geforce Now

Requires at least 15 Mbps for gaming at 720p and 60fps, 25 Mbps at 1080p and 60 fps

2) Google Stadia

At least 10 Mbps stable connection or greater

3) Shadow

A connection may range from 5 Mbps to 25 Mbps

Connection speed may vary among different services that companies offer.

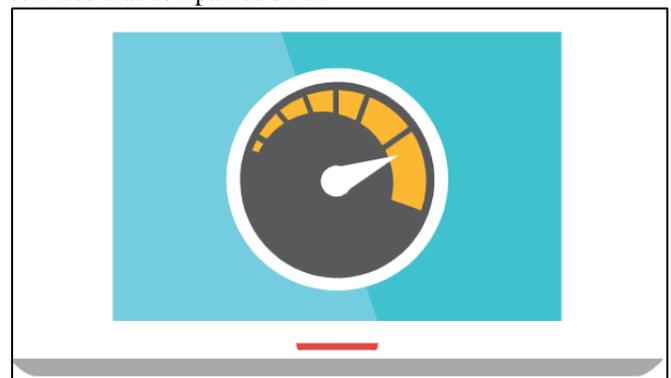


Fig. 5: Internet Speed Image

IV. TECHNOLOGY USED

Cloud Gaming came into the picture when top companies like Google, Nvidia and Microsoft were taking interest in this technology. But it has never gained that much recognition as it does today.

The concept of cloud gaming is not new by any means. The concept was introduced way back in 2003 by company name OnLive situated in Mountain View, California, United States and came into operation in 2010 but it ended in 2012 and by 2015 Sony Entertainment has acquired all its patents.

Soon after Sony announced its cloud gaming platform called Play Station Now in 2014 and in 2015 Nvidia announced its Cloud Gaming platform known as Geforce Now followed by Parsec, Shadow, GameFly (Electronic Arts), Google Stadia, and xCloud (Microsoft).



Fig. 6: Nvidia Geforce Now (Cloud Gaming Service by Nvidia)



Fig. 7: Shadow (Cloud Gaming Platform)

V. FUTURE SCOPE

Gaming on a cloud-based platform may have great potential but for now, it is mostly good for a single player title such a story mode games like Resident Evil 2 Remake, Shadow of Tomb Raider, etc. Since in single-player games, the input lag can be handled and tolerated but playing online multiplayer games on the cloud, for now, is a dream. But in future, there may be a chance that we may be able to play competitive games with zero input lag.

Companies like Google, Microsoft and Nvidia are backing up these kinds of services with their infinite amount of money which will make them a competitor in this Cloud Gaming Business and with their help we can see the potential of this service and someday it may also become a viable replacement of the local and high-end gaming machine.

VI. CONCLUSION

Technological innovations such as robotics, machine learning, cloud technology etc have established themselves very fast over the last few years and have now become a key element of the commercial and social economy [2]. Cloud Gaming may be an answer to those people who can't afford expensive and high-end gaming machine and are compelled to use their normal devices such as a cheap laptop or an android tv. But we can't deny the fact that it still need some work upon its main issue that is input lag so that user may enjoy a quality-based gaming experience.

But if someone wants to try these services they may opt for PlayStation now which is available for both pc and PlayStation consoles or if don't have money there are other options such as Steam Remote Play, a gaming platform in which a user can play his pc games on any of his devices like Mobile or laptop but here the user must have his gaming machine at home.

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