

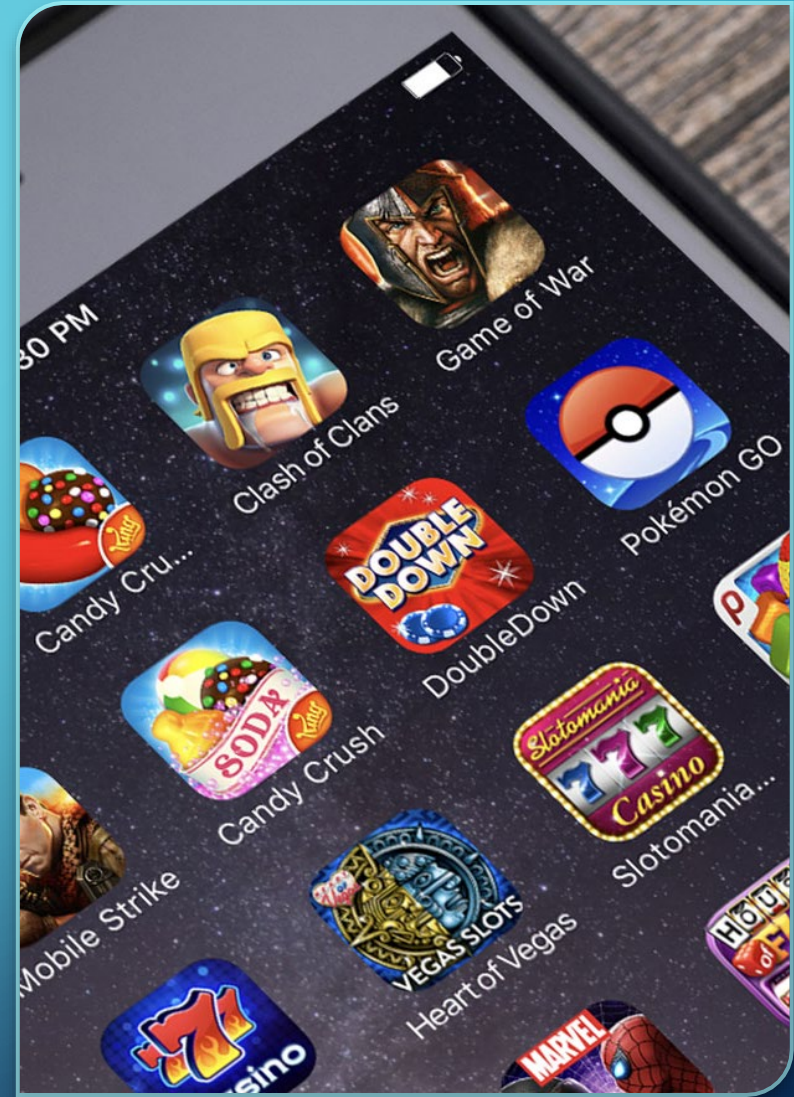


INFLUENCE OF 5G ON MOBILE GAMES

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INTRODUCTION

The biggest change in infrastructure we'll see in the near future is the introduction of 5G, which stands for the fifth generation of wireless networking. 5G has the potential to change consumer behavior thanks to its exponentially greater speeds and low latency. We're talking about 10-100x speed gains over our current 4G networks and low latency means we'll have access to mobile gaming experiences that weren't previously possible.



WHY IS 5G SUCH A BIG DEAL FOR MOBILE GAMES?

5G's technological advancements will drive the next wave on mobile innovation, especially in mobile gaming. The exponentially faster download and upload speeds unlock the ability for mobile games to be downloaded nearly instantly. Large mobile games, those that are bigger than a hundred megabytes, can be downloaded in one go, without the annoyance of downloading additional content during the first launch, allowing players to get to content immediately. Nintendo's mobile RPG, Dragalia Lost, is a great example of this annoyance as it requires additional content to be downloaded on the first start, as well as new levels to be downloaded as players progress.



THE RISE OF GAME STREAMING



5G is coming at a time when there's a simultaneous rise in game streaming services. Think of game streaming as Netflix for video games, allowing users access to a vast catalog of games to be streamed to any device, including your smartphone, for a monthly price. These services, combined with 5G, mean mobile gamers of the future will have access to the console and PC-quality games no matter what device they have. We've already seen full console ports of popular games like PUBG and Fortnite working well on mobile, and with game streaming and 5G, players can jump directly into a game without lengthy download times or a large file taking up space on their phones.

AR AND VR



For the past several years, virtual reality (VR) and augmented reality (AR) have been hyped as the next big computing platform. Oculus wowed developers and reporters with VR's potential when it showed off its prototype DK1 headset in 2013. On the AR side, Google showed what would be possible with its awkward-looking Glass headset, which was unveiled in 2012. From then on, it wasn't a question of if AR and VR would become the next big computing and gaming platform, but when.

VR and AR have seen their biggest successes with gaming, which makes sense as the platforms are tailored for immersive experiences. Games like EVE: Valkyrie and Raw Data impressed everyone who played them, thanks to their immersive and natural gameplay. Anyone who has spent time with a VR headset for an extended period of time is convinced that it's the future of gaming. It was no surprise, then, that Facebook paid over \$2 billion to acquire Oculus back in 2014.

THE FUTURE OF MOBILE MONETIZATION

Today, mobile gaming has matured beyond the one-price structure of the past. Mobile is now the most profitable gaming platform and as a result, it has driven and continues driving innovation in games monetization. Mobile game developers now have more monetization options ever before.

Mobile game monetization has changed dramatically since the creation of the App Store just over a decade ago. In the beginning, mobile game developers followed console and desktop gaming monetization by charging a one-time price (also called premium pricing), usually around \$5-10, for a shorter and less graphically impressive experience than console and PC games at the time.



CONCLUSIONS AND FUTURE WORK

- Ultimately, we want this experience to be seamless for everyone. Game providers should be able to utilize network features without concern of what specific network is being used and users should be able to play games without too much concern of their specific hardware. There are, however, several challenges that need to be addressed to accomplish this.
- Game designers will have to figure out which part of the processing should be done remotely, which part should be done locally, and how to effectively balance this out to achieve the best possible experience. Ideally, everyone would have the right amount of bandwidth and latency for the game they want to play.
- Game designers are also in for a whole new level of integration with networks. They may need to inform a network of a person's bandwidth demands beforehand or ask the network how the user's bandwidth is going to be for the next five minutes, then adapt the game accordingly.
- When it comes to providing great experiences with these new interactions, the role of the network is evolving, and in turn, our work is evolving with it. There are many people working hard with domain experts and industry leaders to realize not only what it means to build these networks alongside developing technologies, but to understand what it means to provide a truly great experience for end users and developers.