

Overview: The Economic Influence and Related Functions Offered of 5th Generation Mobile Network on Animation Industry

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Abstract. In this paper, writer analyzes the performance in one of the most attention-grabbing worldwide industries under the attachment of the 5G mobile network. Potential elevation in connection toward product supplier and administrator with customers and users and benefit being raised by the network are expressed. Improvements on the comprehensive atmosphere of the Internet are explained with pictures and exact ways. The purpose of the paper is to reveal some practices and expectations toward the further availability of development 5G offers. The potential outcome is overall positive in effectiveness and efficiency, especially the improvement on rendering velocity and definition of animating, saving time spent, and customer experiences. Nonetheless, several risking concerns based on infrastructure management, along with its cost and insurance, still should be taken into account by firms.

Keywords: animation; 5G, influence; progression; technology

1. Introduction

The animation industry contributes to human life relaxation and the spreading of human values. Nowadays, animation has both impacts on youngsters' occupations and adults' spare time. Animation includes not only cartoons but also games and films. Their audiences and customers are not limited to kids and adolescents, but the whole ages. More and more people start to dabble in the realm of animation and even the whole industry. Just like that, animation has become a kind of culture. As technology developing, 5G (the 5th Generation Mobile Networks) has become a hot theme in the world. From the statistical result, the quickest 4G network's velocity is in Norway, which is around 63 Mb/s, and the broadband's velocity is in Singapore, which is around 189 Mb(megabyte)/s. However, 5G's theoretical velocity can be up to 10000 Mb/s or so. Technically, the 5G network provides the potential economic profits for industries for convenient operation and better experience of consumers. However, 5G Network is still in 'excavation', beyond controversies. The 5G Network can undeniably benefit the TV industry and gaming production industry, including animation tasks. However, it seems that it might be too early to evaluate the feasibility and profit the 5G Network offers the animation industry, and we have a long way to go. This article mainly reveals some possibilities for the 5G Network through animation techniques and market. The writer will do thorough analysis with economic means and methods to provide information of what are the supplement for 5th Generation Mobile Networks can create beneficially economic profit for animation and its further economic

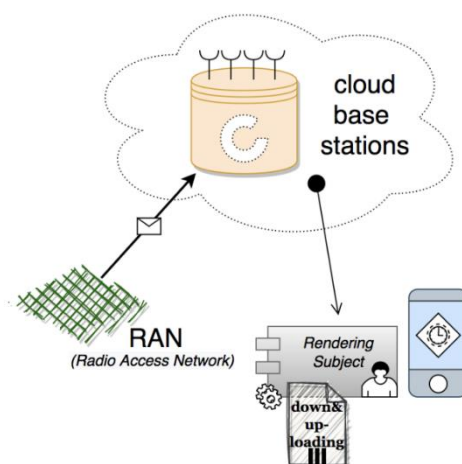


Fig 1. Cloud-loading application sample on electronic devices

development. The context also includes the explanation of what the 5th Generation Mobile Networks can do in elevating the industry atmosphere of market and impact on the general saving budget, and how 5th Generation Mobile Networks meet barriers in operation.

2. The Operation of 5G in The Animation Industry

2.1 What 5G Service Can Do

2.1.1 Cloud Cinema and Cloud Games

Fascinating games and videos also need fascinating devices to load. Inadequate devices are not qualified to enjoy the experience of showing the full appearance of gigantic and fantastic animation works. Even though, Cloud Computing can solve the problem. As shown in figure 1, Cloud computing is a kind of model for realizing the availability of exclusive permits for a data pool of various computing resources, minimizing the effort for network management and space requirement along with a simplification on the interaction between visitor and site administrator [1]. Under the 5G mobile network, using Cloud Computing to do animation rendering instead of individual PCs is a key to most aging problems. Consumers can use conventional PCs to play preserved high-capacity games. This progression can make a big difference. The allowance of Cloud Computing degrades the Barriers to Entry for many media raw recruit players or appreciators. We can easily enjoy high image quality and detailed videos or games, especially animation cuts with a free preserving service. This is an obvious favorable state for the animation industry since the related turnover will potentially upgrade due to an abrupt increase of beginners.

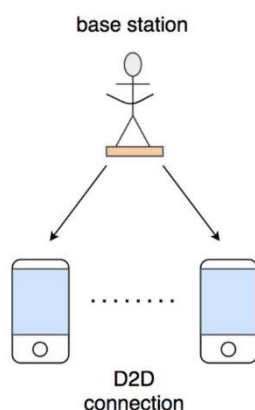


Fig 2. The change D2D makes in the communications of devices

2.1.2 D2D Communication

Commonly, online communication tools transmit messages from a terminal device to the counterpart base station and then to the other. In the 5G era, D2D (device-to-device) technology will change the situation. As shown in figure 2, D2D erases the formal relay station, base station, create a path that directly connects two electronic devices. This is like a tiny regional server, which makes it possible for data interchange directly, without the interference of latency. Additionally, several recent approaches are studying to help with establishing a proper framework and algorithms to reallocate resources and power consumption on the upgrading of D2D implementation [2].

2.2 5G Can Offer in a Developmental Period

2.2.1 Publicity

The public opinion launched by 5G technology's functions attached extra potential clout to the progressive media animation industry. People under such social trends with vigorous pursuit and propaganda of resolution capability, even somehow added exaggerations, are more likely to focus on related animation videos' or games' development [3]. It is a way for some people that never ever dabble in such a realm or with this industry to try to learn something from it. In a way, 5G expands the potential customer width with a fashion concept. It makes people come into contact with industry works in a more accepted way and a more economical way, since it is completely explicit, and in general know-how, with little or no economic expense. 5G development is a kind of win-win for both sides since it strengthens the correlations of two client groups and two technician groups. 5G definitely offers more job positions for technicians in studios or firms, broadening the animation industry's scale.

2.2.2 Experience Improvement

In 2010, YouTube introduced a 4K definition system, and 8K is allowed nowadays. However, most of the media platforms still preserve the incompatibility of 8K, even 4K. We can not tell that they have not achieved the system, neither how YouTube does well in system upgrade. The root cause is, however, the incompatibility of customers' electronic devices. Such devices have to encounter an insoluble latency while playing such animations. The further development of 5G can entirely change the predicament for petitioning advanced devices to the operation field, accelerating products' renovation and regeneration. That pushes companies to add input cost doing innovation, both strategy and products.

3. Developmental Issue

3.1 A Brief Conclusion for the Current Circumstance on the Animation Industry

Currently, the whole industry is experiencing an elevation of technology and management. To sustain many current advanced products, 5G has been regarded as a bunch of light for many online facilities' development. The bandwidth elevation of the fifth-generation mobile network is explicitly huge and effective. Under current circumstances, companies pursue a high speed with low packet loss and latency. However, 4G can not meet the standard. The development of 5G depends on a delicate system that connects the telecommunications room and electronic devices through the base station for wired transmission and wireless transmission successively [4]. Although the 5G network is not more effective than a directly wired network, the advantages compare to the wireless network is enough to show its critical position. The utilization of 5G depends on animation techniques in many realms, and thus chances are offered for the industry to seek further development on the expansion and operation of the 5G devices. Companies are standing on a positive side for seeking economic influences and elevations toward 5G technology. From the anticipations for 5G, developments on video definition seem to be the most reachable target in the first-step study. Such improvements can first promote the animation studios on quality output for 2D or 3D cameracatures and anime. To be exact, they moisten the economic purpose for making high-quality DVDs and BDs with no worryings

on capacity come true. Using a 5G electronic device, studios can make 8K or 16K videos daily for family or company use. For gaming producers, they can also provide consumers with a more realistic gaming atmosphere and servers with a higher capacity. Some technologies can be upgraded under a 5G network atmosphere, such as VR and AR. These new-fashioned products have become hot themes and are targeted by many potential suppliers. Animation rendering is the main problem to be solved as these simulators are gradually putting into operations, while 5G is a penetrating point. The potential profit behind the realm is predictable and would have a sustainable topic lasting long.

3.2 Explanation for Basic Concept and Management

5G's advantages over the 4G network are mainly on parameters of network property, such as packet loss rate, the

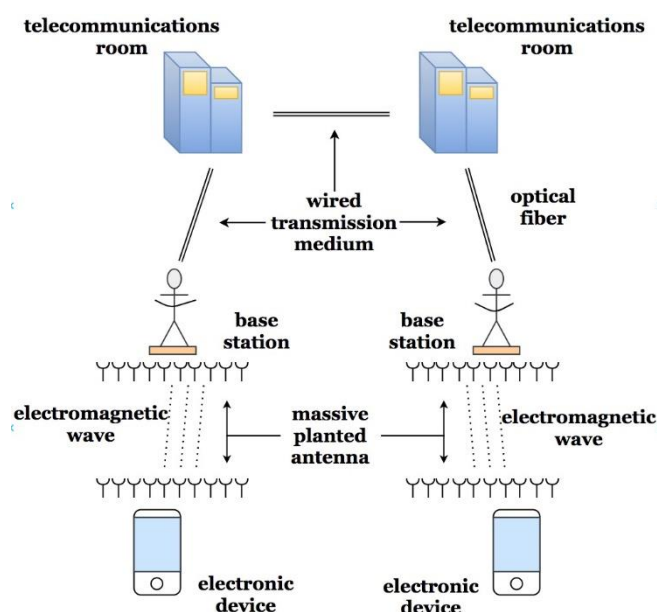


Fig 3. Simple illustration of MIMO implementation

propagation delay, the bandwidth, and so forth. 5G's basic overshadowing toward previous generations of networks is an elevation of the width of the spreading of base stations with capital aggregation. Actually, the improvements it makes are on a cost-input pace. As the fact reveals, the whole network system is from the telecommunications room to base stations and to terminal unit devices. However, the 5G mainly offers convenience about the connection between devices and base stations, which is wireless. Instead of putting the base stations in places separately, the capital aggregation realizes an ideal method that has base stations directly work for a small region of devices, called microcells, being embedded point to point but not regional. This method was not reached before since it needs a lot of capital input to set base stations. 5G uses millimeter-wave with a high frequency, breaking the formal frequency resource limitation. To retain its sustainability, the fifth generation of the network makes progress on massive *MIMO* (*Multiple-input Multiple-output*), which is a technique with the basis of millimeter-wave. From an original perspective, electronic devices accept signals with antennas, and those antennas' length is getting smaller and smaller during the years because of its positive proportional relationship with the wavelength. Using millimeter-wave to create tiny wavelengths can motivate electronic product suppliers to produce a number of micro-antennas implanted in devices instead of putting such "area" resources on one or two single bulky and huge antennas. As shown in figure 3, this gives a space to apply the MIMO in a massive way by implanting numerous antennas in electronic devices, allowing signal processing to take place in a base station, and thus save space for constructing the whole system [5]. Meanwhile, the implementation of massive MIMO can also be utilized on base stations. Thus, under such a huge interactive number of antennas between base stations and devices, the wireless network bandwidth

can be promoted at a higher velocity than ever. Massive MIMO technology speeds up the uploading and downloading velocity, making current devices available for higher quality animation videos and games. These games used to require a huge amount of capacity that may cost a lot of time for being ready for watching or playing. 5G technology allows many companies to produce more real visual experiences on fictitious applications, such as VR or AR, in an exquisite definition for some unimaginable actions and visual features [6]. The wide range of potential economic benefits leads to a bright future for the whole industry.

3.3 The Anticipation for 5G Use

5G means many available usages to current work of companies. For instance, some animation or gaming companies may use the technology of the 5G network to overcome latency complaints and server problems since these are directly related to the experience of customers. VR and AR are two notable topics since it manipulates another kind of actual-world sinking experience other than our real world. The developments of virtual usages in animation pursue a common world-like scene. Nevertheless, it is hard for companies to excavate such detailed features with such amount of cost that cannot be perfectly carried by the contemporary mobile network system. In a manner of speaking, 5G mobile network improve the environment to attain some products or inventions that are developing and testing to a great extent, establishing a platform for these products to be run. Using virtual techniques, like VRMMO, the whole industry has a chance to contribute more, such as developing cloud services or even doing brain rehabilitation through professional facilities [7]. On the other hand, low packet loss and low latency can fertile the gaming part of the industry. Under the 5G mobile network, the availability for giant capacity-need games is offered, which brings about a stage for well-featured games with an open-world and ideal server system. For instance, based on the computer vision aiding system, anime elements can even be a tool for upgrading the publicity of COVID-19, having the possibility to gain crucial influences and play a main role, and the 5G technique actually is a springboard for promoting it [8]. 5G clears out the toughest barrier of latency for immediate feedback for communications and interactions. Such crucial motivations push the whole industry tendency forward to more detailed games and lead the market to lean toward the progressive and creative side.

4. Discussion and Conclusion

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4.1 Realization

To put into real operation, the technique of the 5G network will cost a lot to be developed for proper usages. Although companies probably do not need to worry about the processing innovation by cooperating with professional relative-technique suppliers, the potential expenses are things to worry about. Deciding to implement 5G in the animation industry means to expend sink cost in a progressive way, while it is uncertain to determine the customer return and social opinion. The positive comments got from developing new-fashioned products may not make actual profits for these companies. Nevertheless, adverse or unsuccessful productions or marketing still have the power to disrupt the whole plan, or even the company figure, challenging the cost-efficiency and inner frame of companies [9]. How to use capital wisely on 5G is a kind of required subject for companies to think of.

4.2 Strategy

As the first batch of companies enters the progressive market in a 5G atmosphere, companies are allowed to collaborate on skimming pricing. Therefore, in the short-run, companies have a high percentage to gain a considerable amount of profit. For the next batches of companies entering, they still have a chance to penetrate the market through innovation and consumer welfare. In a word, the 5G market is wide enough for seeking a space to establish the company's position and grab a piece of benefits. The whole market is dividable and filled with differentiated commodities, and comparative advertisement is available in every way out. To meet the different tastes of purchasers, depth and width are inevitable. Potential Constraints may have an impact on firms, however, and current industries should take this risk by paying attention to positive and trendy ways. The inevitable development of cellular infrastructure to sustain the 5G network can raise the expenses considerably, along with the management risky cost for guarantee the connectivity. They need to find a tactic to lead animation products forward, following the year flow [10].

4.3 Conclusion

Animation can connect to many realms. That includes gaming, animation videos, and other profitable parts. 5G network definitely offers more profit for the animation industry to upload and download at high speed and lower capacity demand, but it also goes along with potential risks for further investment. Actions taken before 5G becomes a conventional service are somehow speculations. Companies speculate not only its fascinating property, for some exciting function elevations, but also its popularity with special and wide publicity. Undeniably, 5G pursuit is not unstoppable for companies themselves due to the uncertainty for social responses, and it actually increases the customers' expenses to get compatible devices and permit of Internet plans. However, the motivations it offers are above prices. By doing so, it can release the Internet pressure and online & offline experiences. Implementations of Cloud Computing attached to perfected server system crucially upgrade products compatibility. 5G mobile network truly reduces cost for both users and companies for a generally level-up on current equipment. For another, 5G can gain more consumers through its potential development in VR, AR, and online server realms. VR animation can be expanded on usages of various functions such as brain rehabilitation and real-world experience for gamers and viewers through D2D with low latency and high rendering velocity. In the future, animation can have a connection with diversifying technologies to make viewers have a more clear visual contact and get more exclusive servers or stations to show detailed scenes. Although these functions need our effort and time, the 5G network can at least cut our waiting time down and make all animators and viewers beneficiaries.

5. Contribution

The paper sums the trend of the fifth-generation mobile network application and analyzes economic influence on the animation industry. The main focusing point is the broad range in utilization with anticipated strategy from marketing works. The writer figured out potential benefits and constraints 5G brings to the society, either moist or hinder companies, predicted social opinions, and statement directions. The main purpose of the article is to explain the correlation between the animation industry and the attachment of the 5G mobile network, helping readers to recognize basic points and common arguments.

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