

Discussion on the Application of 5G Technology and Its Influence on the Public

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Abstract: With the advent of the information age, the Internet has changed the world, and the mobile Internet has reshaped life. "You can't live without a network at home, and you can't forget to bring a mobile phone when you go out" has become a common feeling for many people. People's demand for mobile Internet is faster, more convenient, more powerful, and cheaper. This endless demand has prompted the rapid advancement of mobile Internet technology, and the upgrading of technology systems has also become faster and faster. Many users have just stepped into the 4G threshold, but the 5G era is coming soon. The biggest feature of 5G is not the advancement of network speed, but the explosion effect caused by the combination of mobile Internet, smart sensor and big data technology. This will be a subversive revolution in traditional industry and Internet industry. Based on this, this paper first introduces the 5G network, then introduces the application of 5G technology in many aspects of life, and finally analyzes the impact of 5G technology on people's lives.

1. Introduction

Although 4G is faster than 3G, the current rate is only about 10 times higher, and the application mode has not changed fundamentally. In fact, it does not bring too deep feeling to users, but the comprehensive performance of 5G will be better increased by a thousand times than 4G [1]. Under the support of this ultra-high-speed mobile network, many new applications will be born, which will completely change the ecology of the mobile Internet, which will be a revolution in mobile communications. The 5G rate will be as high as 10 Gbps. Due to the extremely fast rate, high-definition video is click-to-play, and "buffer waiting" will become history [2]. The remote interactive 3D virtual reality game will be launched, and the fine quality of the control will be smooth, which will bring users a new feeling of immersiveness. The per capita monthly flow is about 36TB. Users don't have to worry about the tariff. Although the traffic has increased by a thousand times, the overall tariff will not increase [3]. Compared with 4G communication, 5G not only has a leap in speed, but is incomparable to the previous generation of communication technologies in terms of capacity, coverage, privacy, security, ethics, user experience, and communication interaction. Based on these outstanding features, 5G will open a new era of development for mankind.

2. 5g Network Overview

2.1 Introduction to 5G Network

The 5G network refers to the fifth generation mobile communication network. The 5G mobile communication network will form a system of universal connections, creating a fully mobile and fully connected society. The 5G network mainly includes three aspects: ecology, customer and business model. The software and hardware are separately researched in the 5G mobile communication network, and the concept of cloudization and virtualization of the data center is introduced. There are no official 5G networks so far, and there are no globally uniform standards, even though they are in progress. Specific standards may vary from source to source, but all point to the same type of improvement: faster speed, higher capacity, higher reliability, lower latency. The expected speed range for 5G networks ranges from gigabits to tens of gigabits, but at this time, we

don't know what the real 5G network will be. The 5G mobile communication network will have a huge impact on smart technology, with improvements in speed, latency, network resiliency and power consumption, especially allowing devices and sensors to communicate effectively in real time.

2.2 5G Network Requirements

The goal of the 5G network is to provide a very high data transfer rate to a large number of users. It also supports simulating connections for deploying a large number of sensors. Compared with 4G, the spectrum efficiency of 5G mobile communication network is obviously improved. The telecommunications field has been experiencing a new generation of mobile networks, with almost one generation every 10 years. It is expected that in the 5G network era, communication networks will have higher peak bit rates, can process more data at the same time, connect more devices, have higher spectrum efficiency, lower battery consumption, lower shutdown probability, and higher coverage and greater bit rate, lower latency, lower infrastructure deployment costs and higher security.

2.3 5G Technical Route

The core technology of 5G has not been determined by international telecommunication institutions, and it is still in the stage of research and exploration. However, the development of mobile communication has its inherent regularity. Its core is the theory of wireless communication based on information theory. Analysis of demand, it is not difficult to find out the direction of development of 5G technology. High speed is the primary feature of 5G. According to Shannon's channel theory, the most fundamental way to speed up is to increase the bandwidth. In particular, hundreds of thousands of times of speed must rely on greater bandwidth. Although increasing the frequency utilization rate is also a method, its potential is very limited, and the equal speed increase brought by the increase of bandwidth is immediate, and the substantial increase in bandwidth is the king of speed.

3. 5g Technology Application

3.1 Manufacturing Industry Application

5G technology can help manufacturing operations become more flexible and efficient, while increasing safety and reducing maintenance costs. This will enable manufacturers to use automation, artificial intelligence, AR (Augmented Reality) and the Internet of Things to achieve "smart factories. In addition, next-generation wireless has the opportunity to increase the use of AR technology in manufacturing because 5G networks continue to provide enhanced network quality and support the high bandwidth and low latency required. This means that AR can support training, maintenance, construction and maintenance in the factory environment. For example, the Ericsson plant in Tallinn, Estonia uses AR technology for troubleshooting to reduce failure costs and reduce production downtime. It has been reported that AR technology can increase productivity by 50%. As 5G matures, more manufacturers will use 5G technology.

3.2 Applications in Energy and Utilities

5G can bring more innovative solutions to the production, transmission, distribution and use of the existing energy industry, and is expected to develop the next wave of smart grids with more powerful functions and efficiencies. 5G technology can connect and integrate many unconnected energy-consuming devices at low cost, which will improve grid monitoring and make energy demand forecasts more accurate, making energy management more efficient, reducing power peaks and overall energy costs.

3.3 Application in Agriculture

Farmers around the world are using IoT technology to optimize overall agricultural production processes such as water management, fertigation, livestock safety and agricultural product

monitoring. 5G technology can promote the adoption of IoT devices to achieve this goal. 5G provides farmers with more timely data to monitor, track and automate their agricultural systems to improve profitability, efficiency and safety. In high-risk industries such as agriculture, these increases in production and fineness are critical, especially when climate change is blinking at any time. However, the current technology is not advanced enough to cope with the large amount of data and speed required for smart agriculture. This is because the proportion of networks in rural areas is still largely lacking. For example, according to statistics, about 80% of rural areas in the UK are not included in the 4G service; in the United States as of 2015, more than half of the rural areas have no network services. Therefore, in the future, if the 5G can develop smoothly, the rural areas will be online 4 to 5 years later than the urban area.

3.4 Application in the Retail Industry

Shopping with mobile devices is very popular around the world. With 4G / lte technology, more than 100 million Americans shop on smartphones in 2018. Imagine if the network speed is increased by 10 times, how will it affect the mobile shopping experience? In addition, 5G technical support AR /VR applications, so there is an opportunity in the retail industry to launch more VR/AR experiences in physical stores, such as try-on, virtual space and more. According to consumer shopping habits, the same features may also be experienced at home. It is estimated that by 2020, AR/VR application spending for global retail displays is expected to reach approximately \$5.9 billion.

3.5 Application in Financial Services

As financial institutions increasingly focus on the promotion of mobile devices, 5G technology is expected to be used in one-way and two-way services. 5G greatly improves security and network speed, and can complete transactions on the mobile phone faster and safer than any existing process. In addition, 5G allows wearable devices (such as smart watches) to share biometric data with financial services to instantly and accurately authenticate users, and to complete transactions more quickly, in addition to being more secure.

3.6 Application in Media and Entertainment

5G will have a profound impact on media and entertainment at multiple levels, including mobile media and advertising, home networking and television. It is also critical to improving the new interactive technology experience such as AR/VR. Due to the low latency of 5G, movies on the network are unlikely to pause or stop. On 5G networks, movie downloads will be reduced from an average of 7 minutes to just 6 seconds. When browsing social media, games, online media music, and downloading movies and shows, 5G will save users an average of 23 hours of loading per month. In addition, 5G can support user interaction with avatars in future AR/VR applications. According to a study conducted by Ovum, the global media industry will receive an astonishing \$76.5 billion in revenues for new services and applications through 5G technology over the next decade.

3.7 Application in the Health Care Industry

5G can improve global healthcare in a number of ways while increasing the efficiency and income of the healthcare industry. It is estimated that the use of 5G technology in the healthcare sector will create a revenue of \$7.6 billion in 2026. The medical industry is also able to use the features of high-speed networks, greatly reducing the time required to read large amounts of data from patients, whether it is personal information, clinical research or high-resolution mri and ct image information. 5G also enables remote monitoring devices (such as wearable technology) to pass patient health data to doctors in real time.

3.8 Application in Transportation

From buses to taxi fleets, as 5G networks become more common, 5G technology can improve the transparency and deployment of transportation systems. In addition to the existing transportation, 5G can enhance vehicle and vehicle (v2v) communication. V2v communication must be real-time,

because the difference in milliseconds may be the difference between an emergency brake and a fatal collision. Achieving such high speed interconnects requires vehicles to transfer large amounts of data between each other without any delay. The low latency of the 5G network can achieve this goal. 5G technology can even allow vehicles and infrastructure to perform real-time sensing, using vehicle and infrastructure (v2i) communications to automatically automate stop or slow forward for signals to improve traffic flow, reduce external risk factors, and increase vehicle response time and improve public transport efficiency.

3.9 Application in AR/VR

The future of augmented reality (ar) and virtual reality (vr) depends on a broader, more reliable, and more consistent 5G network. Of course, the premise is that the 5G network must be mature enough to achieve the primary goal of reducing development costs. AR and VR need to process large amounts of data. The 5G delay is reduced by 10 times, the traffic and capacity are increased by 100 times, and the network efficiency is increased by 100 times, which means that 5G can solve these problems.

3.10 Application in the Insurance Industry

5G can help insurers make comprehensive, more effective, and more confident decisions because insurers can get more accurate data. Through more efficient data sharing, life insurance companies can make more accurate decisions when offering quotes. With the popularization of wearable 5G connected healthcare devices, insurers may be able to offer a “actively strengthened” policy, and consumers will be able to enjoy premium reductions if they maintain a certain level of activity or health.

3.11 Application in Education

As 5G paves the way for the AR/VR experience, teachers can apply these techniques to a variety of new educational technologies. For example, students can conduct virtual field trips directly from anywhere in the world, from the Egyptian pyramids to the Great Wall of China, without leaving the classroom. Compared to traditional educational methods, the AR/VR education platform offers many benefits, including cost effectiveness and reduced risk.

3.12 Application in the Game Industry

In a community that subscribes to streaming media, Netflix and Spoti is very popular with users, and the 5G solution can open up a whole new market for the game industry. The current 4G delay is about 10 milliseconds, and 5G can handle it more quickly, accelerating the delay to about 1-2 milliseconds. Fast calculations allow users to get a better gaming experience and improve quality synthesis. Large technology companies have begun to join the game as a service.

3.13 Application in Real Estate

The real estate industry may be affected because technologies such as AR/VR will use 5G technology. In terms of existing technology, there has been an intermediary that has used 360-degree viewing services to allow buyers who want to buy homes to watch interesting objects at home. With the development of 5G, AR/VR may be used in exhibition centers or housing companies, so that consumers can directly enter the space of the object in the office, so they don't have to travel to different objects in the initial stage. However, it is worth discussing that this method must add a 5G base station to the new object. For health and cost considerations, whether such a setting can be balanced requires additional evaluation by the real estate industry.

3.14 Application in Public Safety

The 5G network can reduce the time it takes to receive messages and the wider use of the network to enhance public safety. Through the 5G network, the rescue team will be able to help rescue the first time through real-time images, secure communication or media sharing, whether in time or

location to reach a further level. In addition, the 5G network can achieve message publishing and sharing in public safety communities through body monitoring, drones, chat rooms, social media, file sharing and location. On the other hand, it can also be used through Internet of Things technology. In post-disaster situations, 5G connected drones will be able to provide relief supplies and assist in the search for missing persons, which will make public safety more complete.

3.15 Application in Supply Chain Management

Installing a 5G sensor on the device provides a large amount of real-time data for the relevant stakeholders. This data may include location, temperature, humidity, stress, or other information that is critical to the supply chain. Since 5G can extend battery life, installing a 5G sensor will last a long time. In addition, because of the addition of sensors, the yield of the product can be improved. As 5G technology introduces smarter supply chain management, in addition to streamlining logistics processes and reducing costs, there is a certain chance that production will increase.

3.16 Application in the Catering Industry

With the development of 5G, the catering industry will be able to increase interaction with consumers and reduce the original materials cost. Through the 5G IoT device, it is possible to improve the tracking of food and understand the processing of kitchen waste, so that the raw materials are subject to finer control to reduce costs. On the other hand, consumers can use a faster network to complete orders on mobile phones, while restaurants use a wide range of 5G networks to send drones to deliver more meals to consumers. In addition, kitchen staff can use the 5G connected AR / VR experience for training, saving valuable inventory. These 5G applications above will be able to effectively reduce costs, increase productivity and enhance the consumer experience.

3.17 Application in Tourism

There are many government-sponsored tripartite cooperation with tourism and technology companies, or the tourism industry to research and develop 5G connectivity technology to create “smart tourism” to provide visitors with immersive experience and improve the travel experience. For example, the United Kingdom's Western Union Authority has tested the AR/VR experience for Bath and Bristol's main tourist attractions and offered a £5 million award; the BBC, Aardman Animation and Bristol University will be working on the project's content. Tim Bowers, the mayor of the West of England, said, “Imagine a virtual Roman soldier showing you around the Roman Baths and moving 360 degrees on your phone like this, which is what 5G technology can offer.”

3.18 Application in the Military

Communication is the key to military strategy. Real-time data collection and transmission of communication network equipment is essential, and 5G technology can maximize data transmission speed. An enhanced communications network minimizes noise and delay, helping to prevent casualties in the theater. In addition, spending and resources can be more clearly understood through 5G technology; using more accurate data collection can help with future military budgets.

3.19 Application in Advertising and Marketing

5G transforms display ads into an “immersive experience” that brings content and audience closer together. According to Intel Research shows that by 2028, mobile display advertising is expected to have a global market of \$17.8 billion. 5G can help companies overcome all of the limitations they face while currently handling mobile advertising campaigns. 5G can help marketing and advertising from flat ads to moving images and movies; even creating new ad formats in VR/AR. 5G can also measure advertising performance in real time through eye tracking and biometric technology, and obtain more accurate consumer analysis and research to achieve the most sophisticated audience of its own consumers.

4. The Impact Of 5g Technology On The Public

4.1 Impact on Banking

After using 5G, the transmission speed is much faster than before, which can achieve AR and VR technology during offering service. Because of that, the UE (user experience) will be improved. For example, Banks can use AR, VR and other immersive technologies to provide new scene-based service experience, build new intelligent outlets, and innovate the interaction mode between banks and customers. What is more, it will be convenient to build the smart teller machines and simulation artificial intelligence robot service, which will offer help to the users no matter when they need help and where they are. And it will also reduce the manual labour by just using the machines.

Except for the AR and VR service 5G offered, since 5G technology has the fast speed, it will make bank service more secure. For instance, because of the fast speed 5G offer, there are more data can be transmitted, which means it can allow more encryption arithmetic to be used to ensure the secure of data. Moreover, after transmitting the huge data about all aspects of some companies, it will be more convenient for bank to supervise these companies and analyse whether bank can offer them loan or not. Furthermore, it will foster a financial credit rating system with a wider dimension and higher credibility, and completely break the current rating system's problems of strong subjectivity, poor reliability and false data, which will eliminate risk loans and protect the interest of banks.

4.2 Impact on Food

By using 5G technology, the speed of data transmission will be improved and more data can be transmitted. In terms of food industry, it means consumers can get more information about the food just by scanning the QR code, bar code or RFID code. After scanning, even all of the information of supply chain will be shown to consumers and it will clearly show the process of manufacturing food. Moreover, it will be convenient for government to supervise the process of food manufacture which will make food safety be guaranteed. As for food business, more data for them means they can obtain more information about the source of supply chain and they can choose better one to reduce the cost and obtain better product which will let them get more benefits without decreasing the demand of the food's quality.

4.3 Medical Implications

Due to the fact that 5G technology can achieve more complex function by getting more data at the same time, more high-technology can be used in medical field, which will treat the disease conveniently. For example, surgical robot can do a complex surgeon without real human, which will improve the success rate by removing technical mistake from human. What's more, tele-medicine also can be achieved. Because of that, people can obtain medical assistance without considering the distance between them and the hospital. Moreover, smart sensors also can transmit more information about people's health which will monitor people's health condition and give the timely aid.

4.4 Impact on Insurance

The centralized control of the logical network that 5G network can achieve will break the heterogeneous network and make the data transmission more efficient, which means 5G can make the process of insurance more intelligent and more individual. For instance, insurance companies can make the branch management and risk identification by introducing face recognition, remote face signing, remote VR technology and automation technology. What's more, because of 5G technology, more data can be collected and the insurance industry service content is more and more thoughtful, considerate and convenient. So it can be seen that services of customization for individual will no longer be a fantasy after obtaining the information about all aspects of individual.

4.5 Impact on Education

In the field of education, 5G's advantages of "large bandwidth, low latency and wide connection" make holographic projection, VR, AR and other technologies be welcome again, which can create an environment of "autonomous learning", enabling learners to acquire knowledge through the interaction between themselves and the information environment, instead of the traditional way of "teaching to promote learning". What is more, the stability and high speed of 5G network can support real-time transmission of high definition audio and video, so that VR/AR wearable devices can be better applied to classroom scenes, creating immersive teaching experience and helping students to have better interactive experience. Because of that, the efficiency of studying will be improved.

4.6 Impact on the Retail Industry

Because of the ability to achieve more powerful, iterative data transfer, interaction and connection capabilities, 5G can influence almost all aspects of retail industry. For example, the circulation mode that consumers connect directly to manufacturing and factories, and customize commodities to factories on demand through the Internet, which will reduce the circulation cost and make the goods cheaper, thus benefiting consumers. What's more, 5G can achieve producing according to demand by using the data collected from 5G technology. Because of that, there is no inventory pressure, slow sales, loss and waste which will let efficiency and inventory turnover efficiency be greatly improved. Moreover, by using 5G and unmanned technology, unmanned shop can come true since the system can handle problems accurately and fast by collecting data and comparing with the information in cloud database to response to different situations, just like the real shop assistants, which will liberate the workforce.

5. Conclusion

Consequently, 5G technology does not only offer the fast speed, but also has some explosion effect caused by the combination of mobile internet, smart sensor and big data technology. Because 5G can satisfy the speed demand of those derivative technologies, these technologies can be achieved and make 5G technology become more useful rather than just a high speed transmission technology. Due to that fact, the 5G technology has amounts of applications in different fields and it effects almost all aspects of people's live. In the future, the 5G technology will be maturer, which will have more applications and will influence real live more deeply.

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