Future Development Trend from 4G Mobile Communication Technology to 5G

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Abstract: The development of mobile communication technology has greatly facilitated people's life and production. In recent years, 5G technology has become a hot spot in the development of academia and communications industry. Its driving force is the explosive demand growth of mobile data, reflecting the lack of mobile communication systems. In June 2019, the Ministry of Industry and Information Technology officially issued 5G commercial licenses to China's three major operators and China Radio and Television, which means that China officially entered the 5G commercial year. This paper fully analyzes the characteristics and development status of 4G and 5G mobile communication technologies. On this basis, this paper looks forward to the future development trend of 4G mobile communication technology to 5G, and proposes the popularization of 5G, which will accelerate the popularization of cloud computing and cloud storage, and promote the rapid arrival of the 3.0 intelnet era gradually replaced 4G mobile communication technology and became the mainstream form.

1. Background of the Study

1.1 Literature review

With the rapid development of China's communication technology, 2019-2020 has become a key stage for the further development of 5G technology, and major operators have gradually improved and improved the new network communication system. Compared with 4G technology, 5G technology has superior spectrum capability and is a leader in information transmission functions such as pictures, videos and texts. In response to the growing demand for Internet speed, the development of 5G alternative 4G technology is an inevitable trend. At present, the development of 5G technology is in the initial stage, and many scholars have carried out related research around its specific application and development trend. Li Xiansong believes that 5G technology is a new type of data transmission technology with outstanding advantages in transmission stability, transmission speed and coverage. In the next few years, it is bound to replace 4G technology. On this basis, Li Xiansong analyzes the key technologies in the 5G communication concentration and discusses its future development trend (Li, 2018). Zhang Changyong pointed out that 4G mobile communication technology is based on the development of the first three generations of mobile communication technologies, providing great convenience for people to survive and produce. The fifth-generation mobile communication technology has the characteristics of more compatibility, higher speed and more anti-interference, and should be the key development direction in the future (Zhang, 2016). Zhan Ying said that the rapid development of technology provides the basis for survival and development of 4G and 5G technologies. Users can use 5G to improve network speed and get better experience (Zhan, 2018). Qin Dezhi pointed out that as the most advanced communication technology, the fifth generation mobile communication technology is the mainstream technology for communication development in the future. On this basis, Qin Dexing takes the current situation and key technologies of 5G mobile communication as the starting point to explore the future development trend of mobile communication (Qin, 2018). Deng Xiongcai pointed out that 4G technology has been widely used in most countries in the world, which has greatly improved the speed and efficiency of people's access to information. 5G technology is currently the most advanced communication network technology, which greatly improves the utilization of spectrum and can significantly affect people's lifestyle in the future (Xiong, 2019). Based on the basic

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concept of 5G, Wu Leilei introduced the main technical features of 5G technology in detail and explored its specific application scenarios (Wu, 2019). Chen Chunmei said that 5G technology as a new era of mobile communication technology will inevitably penetrate into all areas of social development, help promote the transformation and upgrading of all walks of life, and provide better services to the public (Chen, 2019).

1.2 Purpose of the study

Although 5G technology has entered a period of rapid development in China, at this stage, 5G technology is mainly a preliminary trial, and there is still a long way to go from a wide range of popularization. Moreover, the real application scenarios of 5G technology have yet to be further studied. How to further improve the 5G technology and integrate it into different fields, and the development of different technologies is the object that each country needs to focus on in the next stage. According to China's current demand planning, improve the connection between sensing equipment and communication equipment, and have the intention to improve the integrity of the system. The application of 5G communication technology features can make the network more intelligent, realize automatic adjustment and judgment, and so on. Predicting various social information and better serving human life. In this context, based on the detailed description of the characteristics and development status of 4G and 5G technologies, this paper explores the future development trend based on 4G mobile communication technology to 5G.

2. The Characteristics and Development Status of 4G Communication Technology

In the past 10 years, 4G communication technology has been greatly developed. After 2010, it has gradually been used commercially in the world. So far, the population of 4G technology has exceeded 3 billion (Xia, 2019). However, there are still two problems in the current development of 4G communication technology. The first is the market problem. Although 4G technology has greater advantages than 2G and 3G communication technology, however, due to the different levels of economic development in various regions, there are also differences in the infrastructure investment of operators. 3G products in many regions have just been introduced, and are in the stage of perfection. The transformation of 4G communication network requires a lot of money, and it is impossible to simultaneously take care of all areas. Moreover, the current Chinese market is also controversial about the issue of 4G traffic tariffs, and there is still a certain standardization and adjustment space for 4G tariffs.

Then there are technical issues. According to the ITU standard, to ensure the peak speed of 4G transmission, the broadband system must be no less than 20MHz (Han, 2017). This demanding condition puts high demands on operators. The actual situation is that the current 4G category of LET-TDD and other technologies have not reached the definition of 4G network standards. At the same time, there are big differences in the 4G products launched by major operators. Many technical problems are difficult to solve quickly, and with the emergence of 5G technology, the research focus has shifted. The further improvement of 4G technology has become a difficult point.

In theory, 4G technology is thousands of times faster than previous 3G technology transmissions, and it also has great flexibility to help users watch videos and browse web pages in real time. At the same time, 4G technology can guarantee the stability of data transmission and the clarity of picture information. The current development of 4G technology is not perfect. On the one hand, because the technology itself is not fully mature, on the other hand, its specific promotion also has problems. For example, 4G communication technology standards are difficult to unify, lacking overall international standards, and various communication systems are incompatible with each other, causing great inconvenience to users. Moreover, the supporting facilities of 4G communication technology are difficult to update, and the terminal cannot keep up with it in time. In addition, network security issues are also a thorny issue for 4G communication technologies. Specially, China's air interface security theory and countermeasures are relatively backward, such as the face of malicious voice calls and other actions, lack of relevant processing capabilities.

3. 5G Mobile Communication Technology Characteristics and Development Status

5G is a new generation of cellular mobile network communication technology after 4G system, and its goal is to further improve data transmission speed, reduce delay, increase system capacity, and save energy. Release-15 has been standardized for the first phase of 5G commercial deployment. The second phase will be completed in April 2020 and will be handed over to the International Information Alliance as a candidate for IMT-2020. According to the ITU-2020 specification, the 5G speed will reach 20Gbit/s, achieving high capacity and high bandwidth (Zhang and Liu, 2016).

Like the 4G mobile network, the 5G network is also a digital cellular network, which is characterized by the supplier coverage service area will be divided into many geographical areas. Represents the voice. The data of the image and video will be digitized on the mobile end, and converted by the converter to perform a transmission of the bit stream. In a particular cell, all 5G wireless devices travel through the transmitter, receiver, and radio waves. The transmitter and receiver allocate channels from the common frequency. When the user transfers between different cells, their mobile device will automatically switch to the antenna of the incoming cell.

Compared with 4G mobile communication technology, the data transmission rate of 5G mobile network will be much higher than 4G, and it is also higher than the current limited Internet. Also, the response speed will be faster, the network latency will be less than 1 millisecond, and this data is 30-70 milliseconds in 4G. In addition, 5G networks will no longer be limited to serving mobile devices, but will also become a provider of general home and office networks and become a competitor to limited network providers.

On June 6, 2019, China Mobile, China Unicom, China Telecom and China Radio and Television officially obtained 5G commercial licenses, which means that China entered the 5G commercial year. In September of the same year, on behalf of China's leading 5G technology company, Huawei released the “5G Application White Paper” at the World Telecommunication Exhibition of the International Telecommunication Union, looking forward to the application of 5G in many fields, and called on the global industry organizations and related organizations to be active. Collaborative standards provide a good business environment and resource guarantee for 5G commercial use.

In the development of 5G mobile communication technology, besides solving the capacity problem of 4G mobile communication technology, there are also three problems. First, in terms of linear decoupling on 3.5GHZ, it is necessary to double the number of stations on the basis of the original main urban area.Secondly, the storage pole station resources should be used as 5G technology reserve station to expand 5G coverage area. Finally, the existing digital divisions are reformed to lay the foundation for the development of 5G network.

In addition to the above problems, 5G technology needs technological innovation in the following aspects. One is to change the existing data compression density modulation mode and use 512-QAM and 1024-QAM to improve data transmission efficiency. At the same time, by changing the low frequency band of 4G mobile communication technology, 900MHZ, 1600MHZ and other frequency bands are transformed into 28GHX millimeter wave to improve the spectrum width. On this basis, the construction of large broadband multi-antenna system is strengthened. In the installation of infrastructure, the application of GaN GaN, GaAs GaAs and other new materials to improve energy efficiency and strictly control the network delay time can meet the requirements of new technologies such as the Internet of Things, UAV and so on.

4. Future Development Trend of Mobile Communication Technology Based on 4G to 5G

4.1 Accelerate the Spread of Cloud Computing and Cloud Storage

In recent years, cloud computing and cloud storage technology have developed continuously, and gradually applied to various fields. However, as a whole, due to the speed of data transmission and collection, cloud computing and cloud storage technology are not popular fast. The characteristics of 5G mobile communication, such as high speed, low latency, large capacity and high bandwidth, provide an opportunity to solve this contradiction. Because Cloud Computing mainly comes from changing the computing mode of Internet terminal devices, cloud computing becomes the

computing bearing point to cloud. The application of 5G mobile communication technology can provide precision, similarities and differences for cloud computing, and significantly improve the computing power of cloud computing. In addition, with the further implementation and development of 5G mobile communication technology, the data acquisition level of intelligent terminal equipment will be improved in human-computer interaction, which will drive the development and breakthrough of VR technology. In addition, the high level of 5G mobile communication technology will also improve the corresponding speed of cloud computing and feedback speed, as soon as possible to play the potential value of cloud computing and cloud storage, and accelerate its popularization.

4.2 Promotes the Fast Coming of Internet 3.0 Era

The advent of the Internet era has led to the further development of mobile communication technologies. In turn, advances in mobile communication technologies can drive the development of the Internet. The application and promotion of 5G technology will prompt the arrival of the Internet 3.0 era. In the era of Internet 1.0, it is mainly the integration between personal computers and network cables. It is the combination and distribution between the Internet and related peripherals. The biggest meaning is the realization of Internet access. At this stage, the network content is not rich, and the internal system structure is relatively simple. In the era of Internet 2.0, smart terminal devices are effectively popularized, and users can interact online in real time through mobile phones and tablet lights computers. This stage is also called the mobile Internet era. With the further popularization of network technology, 5G mobile communication technology will promote each other with network technology, laying a good foundation for the arrival of the Internet 3.0 era. 5G's high transmission speed and anti-interference advantages will further solve the network security problems faced by 4G mobile technology and Internet technology, and promote the promotion of network consumption and network life.

4.3 Gradually replace 4G mobile communication technology and become the mainstream form

According to the application of the current 5G technology, based on the original 4G communication technology, the 5G mobile technology network reduces the resources and information transmission capacity by dozens of times, and the 5G technology advantage is also obvious in terms of anti-interference and stability. . Although 4G mobile communication technology has not been fully promoted and optimized in some regions, it is foreseeable that with the development of 5G technology, 4G technology will be gradually replaced. 5G technology will become the mainstream development situation in the future. The application of 5G mobile communication technology can not only increase the number of networked devices, but also increase the frequency of spectrum usage, so that network security is guaranteed. It is estimated that the full application of 5G mobile communication systems will generate 50 billion Internet services every year. The high utilization rate of 5G mobile communication systems will accelerate the elimination of 4G mobile communication networks. Its high transmission rate and low latency characteristics will be used in many fields. Such as car networking and autonomous driving, surgery and even remote surgery, smart computers and so on.

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