Internet of Things Era under 5g Mobile Communication Technology

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Abstract: The internet of things is an important component of the new information age and also an important stage of information development. As its name implies, the internet of things is the internet where things are connected. In the mobile communication industry, starting from 2g network, it gradually develops and progresses to 3g, followed by the current 4g network. The rapid development of mobile network brings great convenience to people's life and also brings the possibility of diversification for social and economic development. In the mode of internet of things, 5g mobile communication technology has begun to be applied, and 5g is the basis of everything connected in the internet of things. This paper first introduces the connotation and characteristics of 5g mobile communication network, analyzes the connotation of the internet of things, and then discusses the integration of the internet of things and 5g mobile communication.

1. Introduction

The new generation of technological revolution is a great development of information technology, and the realization of 5g mobile communication technology has once again pushed the network information technology to a peak of development, and the internet of things is also a product of the times under this background [1]. The concept of 5g technology has attracted worldwide attention and attention since it was put forward. It transmits data at a speed of about 1g per second, which will provide more convenience for the vast number of users [2]. Compared with 4g technology, 5g mobile communication has faster data transmission speed, super-large multi-connection internet of things service, super-high reliability and ultra-low time ductility. Although 5g technology has been used locally at present, its technical mode still has some drawbacks, so it is necessary to combine 5g technology perfectly with the new mode of internet of things to achieve the desire of mutual promotion and common progress. From the perspective of development, 5g communication technology will soon enter people's lives [3]. Especially in the background of the development of internet of things, the research on 5g communication technology is of great significance.

2. The Connotation and Characteristics of 5g Network

5g network is also called “the fifth generation mobile network”. It is developed on the basis of 4g network, and its transmission speed is 100 times higher than 4g network [4]. In the past, cloud computing was used as the core of data processing mode, and the calculation and storage of a large amount of data depended on it. This processing mode does not cost other resources, and all processing processes are implemented in the cloud center of data, thus greatly saving the cost of resources. Data transmission is completed in the 28ghz ultra-high frequency range, thus greatly improving the data transmission speed. Not only has the transmission speed been greatly improved, but also the transmission distance has made a great breakthrough, which can realize data transmission within 2km and break the spatial barrier of data transmission [5]. 5g mobile communication technology will further improve the safety of mining work. Establishing the information interconnection between the mine hole and the surface can monitor the specific mining progress, as well as the distribution range and activity state of the mineral in the underground through electronic equipment. The biggest difference of 5g network technology is that it can be flexibly applied to different devices, not only computers, mobile phones and other devices, but also

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smart watches, smart home devices, trackers and other devices can use 5g network technology.

Compared with previous generations of network technology, 5G network has more optimized performance, high spectral efficiency, reliable performance and further expanded application range, including and not limited to subway, highway, car networking, etc., and can provide different users with high-definition video, virtual display and other business experiences. 5G network is an enhanced and upgraded version of 4G network, so its basic requirements are not limited to meeting the needs of wireless networks. Whether it can meet the needs of users is the key to measure the success of 5G network construction. The realization of virtualization and software has a very good control effect on data separation and has a promoting effect on the development of 5G mobile technology [6]. Different vehicles can communicate with each other so as to keep a safe distance between them, which is also of great significance for easing traffic jams. Using 5G communication technology to realize interconnection between crops and electronic equipment. Using the growth state of crops themselves to convert into electronic information and cooperating with intelligent greenhouse planting technology, the “intelligent era” of agricultural product planting is realized.

3. Internet of Things

The so-called Internet of Things, which can also be called a sensor network, is the latest development of the information industry in the new era. As long as a small chip is embedded in the object, it can connect different foods in an orderly way [7]. In the context of the interconnection of everything, machine communication, large-scale communication and mission-critical communication put forward higher requirements on the speed, stability and delay of the network. New applications such as autopilot, AR, VR and tactile Internet urgently need 5G. “Internet of Things” is an important product in the development of the information age, and is the main part of new technologies in the new era. In the actual development of the 21st century, computers and the Internet are two important elements that people cannot live and produce without. They connect “things” and information related to “things” all over the world [8]. With the comprehensive popularization of the Internet, the Internet of Things is also quietly changing people's daily life. The Internet of Things is a new type of information technology product, and its future development prospects are very optimistic. Moreover, according to the survey, the Internet of Things has been applied to security, transportation, electricity and logistics.

From the aspect of system organization, the Internet of Things is composed of three levels: application layer, perception layer and network layer. The practical application of the Internet of Things requires not only the support and participation of all walks of life, but also the strong support and guidance of the national government. The development of the Internet of Things has a certain scale, management and technology, among which the technical issues of the Internet of Things are the most important core issues. The Internet of Things is a technology system with RFID as its core, in which article identification technology, sensing technology, network communication technology, data processing and storage technology are applied. With the continuous expansion of cities and the continuous improvement of urban development, the distance between cities and the world is getting closer and closer, and the application scope of the Internet of Things is still further expanding. The emergence of 5G network can greatly promote the development of Internet of Things and provide technical support for its related performance reform.

4. Analysis on Key Technologies and Difficulties of 5g

4.1 Main Networking Characteristics of 5g Technology

The main goal of 5G mobile technology network is to enable end users to stay connected all the time. The equipment supported by 5G network is far more than smart phones. In the future, it will also support AR, VR, holographic images, driverless, telemedicine, and the ultimate interconnection of everything. If the uploaded or downloaded data is too large, the network will be blocked and interrupted. At this time, the emergence of 5G alleviates these situations, because the download

speed and transmission rate of 5G are much higher than 4G. Therefore, in 5G mobile communication technology, the use of full-band technology can effectively utilize the resources of each spectrum and improve the capacity and transmission efficiency of the system. At present, 5G full frequency band is still under study, ranging from 6 GHz to 6-100GHZ, which can greatly expand its application range in the future. 5G core network, 4G core network and LTE are mixed and collocated to form various network deployments. Option 3/3a/3x, 7/7a/7x and 4/4a are non-independent networking (NSA) architectures, Option 2 and 5 are independent networking (SA) architectures [9]. From the perspective of demand, the Internet of Things first meets the needs of identification and information reading, then transmits and shares these information through the network, and then the system management and information data analysis brought by the growth of Internet objects. The realization of 5G network cloud needs to build telecom network cloud, internal IT cloud and B2B cloud based on a unified cloud architecture. It can carry different application services while providing unified operation and operation capabilities. Based on the centralized, standardized and automated capabilities of the unified cloud architecture, richer services can be generated.

This article mainly describes the three networking modes of Option 3, 3a, and 3x: Option 3: Data is offloaded to the master station and slave stations at the PDCP layer. The PDCP layer of the user plane at the master station is responsible for PDU numbering and implementation between the master and slave stations. Data offload and aggregation functions. Option 3A: The user planes of 4G and 5G are directly connected to the core network respectively, and are based on 4G base stations only on the control plane. Option 3x: in order to avoid the LTE PDCP layer in Option 3 from encountering a processing bottleneck, it migrates the data splitting and aggregation functions to the PDCP layer of 5G base station, i.e., NR PDCP layer (Figure 1).

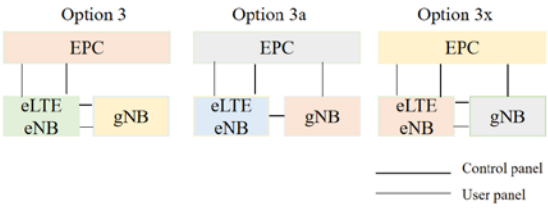

Fig.1 Option 3, 3a, 3x

5G network has high reliability. As we all know, the pseudo base station was born in the 2G era because GSM only has one-way authentication and encryption, while the mobile phone terminal cannot confirm the legitimacy of the network, resulting in the pseudo base station being able to send advertising, fraud and other information to users, thus posing a greater threat to people's property. In 5G mobile communication technology, the use of high frequency band makes high frequency millimeter wave have the advantages of higher antenna gain, miniaturization of antenna equipment, wider bandwidth, etc. People's demand on the network will also increase, so the demand on the network will also be higher and higher. Therefore, it is urgent to increase the coverage area, transmission rate and transmission quality of the network. In the future 5G era, users will not only be protected from the threat of fake base stations, but also be actively attacked. In the future, the Internet of Things market will shift towards segmentation, differentiation and customization, and the future growth may exceed expectations. All data are comprehensively analyzed to confirm whether there is a pseudo base station in the target area. At the same time, positioning technologies such as GPS and triangulation are used to lock the position of the pseudo base station, thus completely destroying the pseudo base station.

4.2 Difficulties Faced by 5g Technology At Present

At the present stage, 5G research and development can only realize the e MBB in the three visions. The other mMIT and uRLLC are still in unknown research and development fields. The coverage area of the network can be solved by adding network equipment, while the transmission rate and quality of the network can only be solved by more advanced information technology. A large number of antennas are set outside the Acer station. By using this method to widen the

outdoor space, the system capacity can also be increased. In addition, the system flexibility can be greatly improved. For the 5G experimental network at the present stage, the construction of base stations is mostly based on Option3 series of 4G core network. Currently, there is no network trial of 5G independent core network construction, and the application of core network is still in the research and development stage. If the delay cannot be controlled to a minimum value, the safety of automatic driving cannot be guaranteed. Previously, 4G communication was generally delayed between 30 and 90 ms, while 5G delay would reach less than 1 ms. The development of human economy and culture has already met the basic living and entertainment needs of human beings. How to further reform the living conditions of human beings can only be changed to the intellectualization of “de-artificialization”. The base station construction cost of 5G network is more than 3 times that of 4G network. Therefore, the construction of 5G network is difficult to realize continuous coverage of large areas like 4G network. For the time being, 5G is constructed in a way of supplementing blind 4G network.

5. Integration of 5g Mobile Communication and Internet of Things

5G mobile network is the fifth generation mobile communication technology. Its application can greatly improve the network speed of users and make data transmission show the characteristics of low energy consumption and high reliability. However, the emerging 5G multiple access technology can subvert the traditional data transmission mode, increasing the number of mobile network accesses to nearly 100 times, greatly expanding the data capacity and reducing the delay problem. 5G mobile network has also become one of the hot spots in the world. The Internet of Things will further expand its application in the future, covering agriculture, transportation, medical treatment, retail and public utilities. At present, the Internet of Things is in a blowout development. It has penetrated into medical treatment, government, learning, automobiles and other aspects. A stable and continuous coverage network, greater bandwidth and effective security mechanism are increasingly needed.

The advantage of the integration of mobile communication and the Internet of Things is that the Internet of Things can be as large as the coverage of the mobile network. From continuous network coverage to security protection, 5G mobile network can meet the requirements of the Internet of Things for basic carriers. The integration of 5G mobile communication network and the Internet of Things. The comprehensive coverage of current 4G network technology enables the Internet of Things to play the characteristics of low speed and low energy consumption. In addition, with the formation of the network security guarantee mechanism, the Internet of Things will also have security guarantees during its operation. The number of links between devices and the efficiency of data transmission are greatly improved, realizing ultra-reliable large-scale mechanical communication. On the basis of such high performance, the energy consumption of 5G devices is not only not increased, but also further reduced, even ultra-low energy consumption. The Internet of Things relies on 5G network, does not need to build a network for local areas alone, reduces the input cost of the Internet of Things, and thus speeds up the process of the Internet of Things. Ultra-dense heterogeneous network technology can be completed by increasing network equipment and expanding the coverage area of the network. In ultra-dense network, dense deployment increases the number of cell boundaries. The best choice for Internet of Things to carry is mobile communication network, which forms a self-organized network system through wireless network. Mobile communication network is the foundation of Internet of Things.

The traffic provided by 5G mobile communication will be 1,000 times or more than that of 4G network. 5G network technology is a fusion of various wireless access technologies with relatively small coverage. It is almost impossible to realize a smaller step of segmentation. Therefore, in this case, the application of dense network technology is very important. Each user does not need to build a separate contact network, they can use the existing Internet of Things system with more complete functions to achieve their own goals. The central network of 5G technology is a powerful cloud computing platform, its computing power is very strong, and it can also be connected with mobile base stations through various equipment and switch networks. The computing power,

storage capacity and actual performance of 5G central network are especially strong. The development of market economy also puts forward higher requirements for the Internet of Things. The development of the Internet of Things requires massive connections and a delay of about 1 millisecond, which cannot be realized by the current 4G network. It can be imagined that without the support of 5G technology, a large number of sensors will have to be installed in the whole car to ensure the safety of autonomous vehicles. This cost is huge and cannot be completed commercially. 5G network has high flexible performance to handle the diverse data of the Internet of Things. At the same time, the Internet of Things also provides 5G with the need to optimize effective terminal configuration. The coordinated development of 5G and the Internet of Things will certainly become the main theme of future science and technology.

6. Conclusion

The arrival of 5G mobile communication technology not only marks a further improvement in the user's network experience, but also meets the application requirements of interconnection of everything in the future. With the application of 5G mobile network, it can provide support for the flexible processing of diverse data in the Internet of Things, thus meeting the needs of different customers in the Internet of Things. E-commerce, logistics and distribution and other industries are the products of the development of communication technology. With the support of mobile networks, all industries have greatly improved their work efficiency. Therefore, under the Internet of Things mode, the research on 5G network technology is especially important. Using 5G can not only facilitate people's life and work, but also optimize network resources and create maximum value with the least resources. The rise of 5G technology and its integration with the Internet of Things have solved the short board of the Internet of Things, and will certainly make the Internet of Things move in more directions and fields.

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