Analysis of Iot Communication Technology Application under 5G Background

Qianying Liu [1,*] and Ji Liu [2]

[1]China electronics standardization institute, Beijing, 100007, China

[2]Beijing institute of aerospace testing technology, Beijing, 100074, China

Email: 1185528228@qq.com

Keywords: 5G; Internet of Things; Communication; Smart Application

Abstract: As the most advanced commercially available mobile communication technology, 5G has the characteristics of high bandwidth, high speed, and low latency. The Internet of Things technology, as a fusion application technology that combines communication and sensors, has taken root in all areas of human life. This article starts with the characteristics of 5G, analyzes and prospects the application of the Internet of Things communication technology in the context of 5G, and analyzes the characteristics of the fusion application of the two from the aspects of smart power, smart logistics, and smart home. It is expected to provide some references for related industries.

1 Digital Surveying and Mapping

With the continuous development of the Internet of Things technology, the integration of Internet of Things applications such as smart homes, smart cities, and smart road networks has been rapidly promoted. However, according to statistics, about 90% of the terminals in the world are still in the traditional operating state, operating in their own network or stand-alone form. The complete interconnection of all things has not been achieved. The essential reason is the limitation of wireless communication resources. Traditionally commonly used technologies such as zigbee, wifi or Bluetooth can only be used for small-scale networking, and it is difficult to achieve cloud interconnection. Even if wide-area mobile communication technologies such as 3G and 4G are applied, the access terminal is still limited in speed and bandwidth and cannot fully realize the interconnection of all things. In most cases, the processing center still needs to be deployed near the IoT equipment, which has lost the The meaning of cloud computing. The advent of the 5G era is expected to reactivate the vitality of the Internet of Things, and use information technology such as cloud computing, big data and edge computing to apply the Internet of Things to more fields. This article will focus on the characteristics of 5G, analyze and forecast the specific application of IoT communication technology, and hope to provide some references for related industries.

1.1 5G and Its Advantages

Since the emergence of mobile communication technology, it has experienced four generations of changes. From the first generation of analog mobile communication to GPRS digital communication, 3G mobile communication to the currently mature and popular 4G mobile communication, the speed and quality of each generation of mobile communication have There is a huge improvement. As the fifth-generation communication technology, 5G has also greatly improved compared to the original 4G. The first is the increase in communication rate. The transmission speed and bandwidth of 5G are almost a hundred times that of 4G, and the theoretical transmission rate is as high as 10Gbps. Only fiber optic communications can compete with such network speeds. Such a high transmission rate can support the transmission of massive data, and the large amount of data in the 5G era is no longer a bottleneck for wireless application systems. The second is low-latency communication. 5G networks can provide end-to-end communication latency of less than 10ms for each terminal. This means that each terminal device can enjoy extremely short information transmission delay. In cloud computing-centric IoT applications, this can greatly increase the value of IoT devices and applications.

1.2. 5G and the Internet of Things

In the field of mobile communication, 5G refers to the fifth generation mobile communication standard. From the perspective of mobile communications alone, 5G has the characteristics of high bandwidth, high speed, and low latency. But for the Internet of Things, the greatest value of 5G is to provide more devices with the basic conditions to access the network to achieve interconnection, and also to establish a high-speed information channel between the Internet of Things and cloud computing. The IoT application under the ideal 5G environment is comparable to the IoT application built by the local network.

At the same time, NB-IoT is also a key concept of the Internet of Things. NB-IoT is a narrowband Internet of Things based on cellular networks. The traditional Internet of Things is usually built through wired or wireless communication methods such as WiFi, Zigbee, Bluetooth, and 485. However, building a real-time Internet of Things system through a mobile cellular network can only be achieved in the 5G era. NB-IoT technology has made great breakthroughs in multicast, continuous mobility, and power, which can greatly help reduce the cost of IoT applications based on cellular networks, which also directly promotes wide-area The process of networking business.

In the era of the Internet of Things, the needs for interconnection between massive devices, mass device access, and low-latency task processing make the IoT system extremely sensitive to some characteristics of the network itself, such as bandwidth, delay, and transmission rate. Taking autonomous driving as an example, autonomous driving relies on a series of high-precision sensors. At the same time, it needs to be transmitted to a collaborative processing center through a high-speed and low-latency network, and the processing results are transmitted back to the autonomous driving system in real time. In this process, the delay and stability of the network are extremely high. Traditional network and mobile communication conditions are not capable of this task, and 5G communication effectively makes up for this deficiency. In addition, AR, VR, telemedicine and other applications have a greater dependence on 5G.

In short, the development of the Internet of Things depends on the promotion of 5G, and the driving force for the development of 5G also comes from a series of performance requirements of the Internet of Things.

2. The 5G-Based Iot Technology Applications

2.1. Smart Grid

In the traditional power industry, most of the distributed work such as power consumption information collection, power distribution, and power management is done manually, and for some implementation requirements that are not high, traditional mobile communication methods including GPRS and 3G can also be used. However, with the continuous development of society, the requirements for power supply in various industries are getting higher and higher. Many regions and businesses require uninterrupted power supply, which requires fault handling and switching to be completed in milliseconds. This puts forward certain requirements for the intelligent distributed power distribution system, requiring precise and careful deployment of control terminals on each branch line, and when a fault occurs, power distribution switching can be implemented for the specific fault circuit. Compared with the traditional method, the low-latency accurate IoT control can achieve precise line control at the millisecond level, reducing the impact on regional power distribution. At the same time, in the field of electricity consumption information collection, the electricity consumption information collection terminal based on the Internet of Things can collect real-time household electricity information, and power supply companies can perform effective scheduling based on these data when performing load balancing in the store, and reasonably configure the peak-use Electricity.

2.2. Smart Home

Smart home is one of the most important application forms of the Internet of Things in the civilian field, and has now become a key link in the development pattern of the country's Internet of

Things industry. With the commercialization of 5G, 5G-based smart home applications will work together with mobile communication terminals. Compared with traditional smart home applications, 5G-based smart home applications will be constructed in a de-gatewayized deployment form. According to the research on the current smart home field, although there are many smart home solutions and products on the market, they all rely on home Internet of Things gateways for networking and home broadband for communication with WAN and cloud computing centers. This gateway-centric smart home has a low communication level and Internet connectivity, and usually uses WiFi as the network connection method.The stability, quality and speed of this communication method are all limited to the performance and quality of the network module or gateway. According to statistics, about 90% of smart home products cannot be connected to the Internet due to the quality of the gateway or the complexity of home network distribution. Under the condition of 5G communication, each IoT device and component of the smart home does not need to perform a complicated configuration process, and can realize the networking after the power is turned on. In addition, a gateway is no longer necessary, and a mobile device that can connect to the central server can implement IoT control.

2.3. Smart Factory

The core of the smart factory is the application of a series of IoT sensors and controllers. With the continuous advancement of industrial digitalization, manufacturing companies' demands for smart factories are becoming clearer. As an intermediate technology that connects machines, people, and equipment, the Internet of Things device can connect key links such as people, machines, materials, methods, and rings in the factory to achieve industrial data collection and interconnection. Because industrial interconnection has great requirements for the stability and real-time nature of interconnection, 5G is an essential link for smart factories. Many large manufacturing companies have taken the lead in introducing smart factories and digital production lines. In essence, these solutions implement a set of closed-loop control. Usually, the computing and control center is deployed in the local network. The millisecond delay requirement in industrial control makes traditional 4G communication unable to meet the demand. And 5G delay characteristics of less than 5ms can make wireless control possible.

2.4. Smart Parking

NB-IoT will shine in smart parking applications in the 5G communication environment. At present, smart parking relies on a central gateway to interact with users. Car brakes, geomagnetism, and central services communicate through wired Internet and wired serial communication. The corresponding time is long, the application is complex, and the operation and maintenance costs are high. After applying the 5G-based NB-IoT, the geomagnetic sensor can transmit the parking situation of the vehicle to the central server in real time through the 5G network and push the parking situation to the user terminal. In this process, local network line deployment, local gateway construction, and local center service maintenance are omitted, which directly reduces construction and operation costs, reduces failure rates, and improves system performance. At the same time, this de-gatewayed structure can achieve convenient device access and expansion, and it can really run when powered on.

2.5. Smart Logistics

Smart logistics is an important part of e-commerce. With the continuous development of online shopping, e-commerce companies, logistics and consumers have great demands on the timeliness, security and traceability of logistics. At present, there are mature solutions for smart logistics, but due to the high operating costs, it is still not possible to really generate commercial value. Smart logistics requires that while tracking the location and progress of goods in transit, it can also share this information with the e-commerce enterprise database at any time to achieve real-time online interaction between sales and distribution. The application of the Internet of Things in the 5G environment can reduce application costs as much as possible, and realize low-cost and high-efficiency smart logistics applications.

2.6. Sharing Economy

The sharing economy is a product of the development of the Internet of Things. At present, extremely hot shared bicycles, shared cars, shared charging treasures, etc. are all development and 4G IoT applications. From the perspective of existing application scenarios, the combination of location-related LBS applications and specific offline services can spawn many similar converged economic models. And the landing of these modes requires a reliable low-latency IoT communication method to ensure. Taking car sharing as an example, when tracking, monitoring and remotely controlling a vehicle, the stability and delay of the network are the fundamental guarantees for business stability and user experience. IoT terminals that can access mobile communication networks can make shared devices more possibilities.

Conclusion

From the birth of the Internet of Things technology to the present, each upgrade is accompanied by the replacement of communication technology and sensor technology. The essence of the Internet of Things is to achieve point-to-point transmission of data collected by sensors through a communication network, and the low latency and high rate of 5G is the guarantee of the basic performance of the Internet of Things. It is not difficult to predict that with the continuous advancement of the 5G commercial process, the application scenarios of the Internet of Things such as smart grid, smart home, smart factory, smart logistics, etc. will become one by one. The Internet of Things communication technology in the 5G environment will further change human life.

References

[1]. Yin Gongxi. Discussion on the application of Internet of Things technology in the 5G era [J]. Communications World, 2019,2601: 13-14.

[2]. Yu Quan, Zhang Ping.The changing situation of the Internet of Things in the 5G era, the short video bonus and the penetration of intelligent communication [J] .Journal of Zhejiang Institute of Medial Communications, 2018,2506: 2-9 + 148.

[3]. Zuo Peiliang, Wang Jianping, Tang Tiande.A Probe into the Development of Internet of Things Applications under the Background of 5G Communication Technology [J] .Wireless Internet Technology, 2019,1604: 11-12.

[4]. Dai Chnagzheng .Analysis of 5G-based Internet of Things Applications [J] .Communications World, 2018,2512: 14-15.

[5]. Yang Dongsheng, Wang Daohao, Zhou Bowen, Chen Qiyu, Yang Zhile, Tong Guoyi, Cui Mingjian.Key Technologies and Application Prospects of Ubiquitous Electricity Internet of Things [J] .Power Generation Technology, 2019,4002: 107-114.

[6]. Zhang Jie.Discussion on the development trend of the Internet of Things based on 5G mobile communication technology [J] .Information and Computer (Theoretical Edition), 2019,10: 200-201.