Research of Media Technology Development with Programmed Thinking in 5G Era

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Abstract. In a society with highly developed information and communication capabilities in the 5G era, the traditional way of thinking has been unable to meet the digitalization requirements of efficient and feasible. Therefore, we propose a digitalization method to solve practical problems, which is called programmed thinking. In this way, we can imagine each problem as a combination of multiple functions, so that these functions can be determined according to the overall rationality of the requirements of the data content exchange, as well as the overall scheme design. Because this method is implemented in the form of modularization through the overall requirement analysis, even if there is an exception, it is also no need to redesign the entire requirement or function, only need to replace and modify the abnormal part of the method function, so as to achieve the effect of rapid response, switch at any time and simple upgrade.

Keywords: Communication of 5G, Media Technology, Programmed Thinking

1. Introduction
In ancient times, almost all information transmission could not go beyond the physiological limits of human and animal. In today's society, although the development of science and technology makes communication no longer distant, in essence, the goal of communication is still dominated by people, and ultimately, people still need to make judgments for the information content. Because there is a limit to human's ability to process information, we once again become the bottleneck of communication. On the other hand, 5G can make use of the ability of "Massive Access" to let the device feedback autonomously, and realize the " Things Oriented Communication" that hardly requires human involvement in processing and analysis[1].

2. Technology methods of 5G
Based on the characteristics of technical indicators and application scenarios, 5G application can be divided into three directions: Enhanced Mobile Broadband (eMBB), Massive Machine Type Communication (mMTC) and Ultra Reliable & Low Latency Communication (uRLLC). These three directions can respectively satisfy the use of the current mobile services, covering the IoT services with low power consumption in a wide area, and suitable for high-speed mobile services and businesses with high requirements on time accuracy, such as high-speed railway line communication, unmanned driving and remote surgery[2].
2.1. Opening up new resources
Due to the congestion of channel resources, the new generation of mobile communication uses higher frequency electromagnetic wave as its communication carrier. Although the new electromagnetic distribution is more wide band, but due to the nature of the carrier wavelength, led to the attenuation of penetration ability is not strong, too fast, need to set up more base stations in the area of the unit of communication facilities to cover the 5G network effectively, this need in both technical and economic aspects must have a certain accumulation to widely popularize and apply [3]. At present, commercial 5G network deployment can be divided into two frequency bands sub-6 band (450MHz～6GHz) and millimeter-wave band (24GHz～52GHz)[4], as shown in Fig.1.

![Fig.1 The Contested Territories of the 5G Spectrum](image)

2.2. Cloud computing assistive technologies
The new concept with high hopes in 5G technology is called "Mobile Edge Computing (MEC)", which was first defined in 2016 and developed mainly as an auxiliary technology for cloud computing[5]. Since an astronomical amount of data in the IoT will be collected to the cloud for intelligent processing, although 5G mobile network is no longer the bottleneck of data transmission, the constantly expanding terminal equipment will make the processing capacity of the cloud too limited. Therefore, intelligent computing and storage capabilities are endowed to network edge nodes close to terminal devices or data sources in 5G network to disperse computing to computing devices
closer to each other. The differences from the traditional structure as shown in Fig. 2. This method can not only reduce computing cost, reduce response time and improve system performance, but also drive the development of edge equipment industry.

2.3. Rational allocation of network resources
Among other technologies, there is another shining star: “Network Slicing Technique”. When people upgrade a technology, the first consideration is not how to improve the performance greatly, but whether they can find a way to maximize the utilization of resources based on the existing basis. Like Hoffmann Encoding for lossless data compression, the amount of data transmitted can be reduced by counting letter usage drastically.

After entering the 4G Era, with the Software Defined Network (SDN) and Network Functions Virtualization (NFV) technology unceasing development and perfection. Multiple virtual logical networks can be segmented in the same communication line, so as to intelligently and quickly provide independent network environment for devices and requirements at different levels in the IoT society\[2\]. Then, according to the actual needs, different supporting performance, management methods, service content and billing standards are provided to make it achieve the real network resource optimization. For the overall concept of the network slicing technique, please refer to Fig.3.

![Fig.3 Network Slicing Technique](image_url)

In addition, the “Networking Technology" that consider for cost and quality, and the "Large-scale Antenna Array" that provides guarantee for high speed etc. They are all indispensable advanced technologies in the 5G field.

3. Programmed thinking is the key to hierarchical communication
Due to the maturity of 5G technology, in the near future, people will live in a society where "information is at their heart and everything is at their fingertips". During this period, the industrialization of digital and the digitization of industry will be the only way for the whole society to transform to digital economy.

3.1. The needs for programmed thinking
Parts of 5G's communication functions are guided by the way of thinking in the information industry, so that its functions can be improved and its realization can be simplified. In the future digital economy society, everything in the world can be transformed into a string of symbols in the databases. Therefore, it is the most appropriate solution to treat these digital contents with the way of thinking in the information industry.

The programmed thinking mentioned here does not describe the way to collect process and reuse information in accordance with a fixed process strictly. Instead, we should consider the development, iteration and reuse of media in the 5G era in the thinking of programmers, with rigorous logic, in-depth analysis and structural control.
Now that everything will be converted into a string of symbols in a database, thinking about this complex, messy, abstract information in the traditional way will leave people with a lot of problems. In the face of digital things, the processing way can also be transformed into one after another objects and data structures in the computer for operation.

For data structure, it discussed how to deal with the problem of mapping from logical structure to physical structure. In the application of 5G, we will discuss how to use programmed thinking to fuse the generation of requirements and method of application with the logic of data. In balance, we're going to start at the top requirements and go all the way to the underlying technology and try to think programmatically. Therefore, at the same time, we need to make every link of the whole process have the five properties of the computer algorithm: finite, deterministic, feasible, input and output, and also achieve the four goals: correctness, readability, robustness and efficiency[6].

3.2. The presentation mode of programmed thinking
When we consider practical problems with programmed thinking, we should think of practical problems as quasi-mathematical problems. The concrete problem is abstracted, assumed and simplified, so as to establish a mathematical model that can solve the problem effectively. At the same time, the function should be differentiated, that is, the solution of the problem should be layered and sliced, and decomposed into several small functions according to specific functions. Only in this way can the coupling between functions be reduced greatly and the relative independence be maximized. Then, in order to make the whole problem have a good structure, we also need to determine the content of data exchange between functions, and finally make the functions of each part modularized, so as to facilitate the future update and replacement. The process of programmed thinking is shown in Fig.4.

![Fig.4 The Process of Programmed Thinking](image)

The extension of programmed thinking is complementary to the internet thinking. The former discusses the methodology for solving concrete problems, while the latter emphasizes a new way of thinking based on business models. Using internet thinking to direct the overall mode, and then using programmed thinking to divide the execution of the mode, to decouple the internal level and function, through this process can make adjustment timely in the case of problems, replace or modify the "assembly parts" with problems. Thus, the function promote each other with dynamic mode and static mode constantly, and it is forming a virtuous cycle.

4. Exploration of 5G application
How to make full use of 5G, a new and advanced technology, is an issue that requires deep thinking and repeated attempts to constantly explore the real needs of users. At the present stage, 4G communication capacity can basically meet most of the life scenarios in our impression. If we blindly wait for the changes brought by 5G, I'm afraid that operators and national finance will experience a long and bleak situation, so it is difficult to maintain. Therefore, we should take the initiative to explore the application demand, innovative content and services of 5G.
4.1. 5G changes business
Although 4G communication capacity has been able to meet people's daily life, it is still unable to meet the scale of commercial transmission due to the limited transmission capacity. Therefore, the application of 5G in the energy industry, manufacturing industry, public security and other businesses is more urgent[7].

4.2. 5G changes lives
Although people's demand for 5G is not as urgent as that for business applications at the current stage of life, operators need mass consumers to maintain the early stage business of 5G[8]. Therefore, it is a necessary condition to maintain 5G communication living space to find a solution quickly that can be accepted by consumers and be willing to consume for it. So, in the field of daily services, entertainment, shopping, living and personality recognition, the development of short and medium term technologies will be carried out on a large scale[9].

4.3. 5G changes every industry
Through online classes during the epidemic, we learned that a series of problems, such as loneliness, boredom and difficulty in communication, were also revealed correspondingly. Therefore, the use of 5G in the education industry to improve the interactive experience and communication effect is the current development direction that can be seen. In addition, the changes and benefits brought by 5G in other industries in the society also cannot be underestimated, such as industry, agriculture, transportation, medical treatment, economic management and design art.

5. Conclusion
At the end of the article, we also cannot avoid the problems and risks brought by 5G technology. The biggest problem is that people from all walks of life have high expectations for 5G. Whether it can provide the average customer with a quality application and make the business user experience a series of promised technical content. There are also risks associated with privacy and rural-urban differences. Therefore, for this kind of advanced new technology, we should use scientific and reasonable methods to pursue the overall evolution and development in the continuous trial and verification. We need to start with a method that leads to rapid development steadily and ultimately to progressive dynamic balance.

Acknowledgments
This research was partly supported by the Education program of the Ministry of Education by Xtong Group under grant (No.76c75fa-ed4f-4086-9ab5-e446831e6622), the Xiamen Overseas Scholar Projects (No. XRS2016-314), and the High-level Talents Projects of Xiamen University of Technology (No.YKJ17011R).

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