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Research on the Application of Electronic Technology in Communication Engineering in the Era of Big Data

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Abstract: ***With the advent of the big data era, electronic technology has become an indispensable part of the field of communication engineering. With the wide application of Internet technology and the deepening of digital transformation, big data has gradually penetrated into all aspects of social life. Communication engineering is the foundation for achieving big data transmission. With the development of electronic technology, people can obtain a large amount of data through various means, providing valuable references for the development of various industries. The analysis and mining of big data can better understand the needs of users, so as to optimize and improve the performance of the Internet. Based on this, the article analyzes the background and significance of the big data era, briefly describes the relationship between electronic technology and communication engineering in the big data era, and explores the application of electronic technology in communication engineering in the big data era.***

Keywords: The era of big data, Electronic technology, Communication engineering, Application**.**

1. Introduction

With the advent of the big data era, the application of electronic technology in communication engineering has brought new opportunities and challenges. On the one hand, big data technology provides strong support for the development of communication engineering towards intelligence and automation; On the other hand, how to efficiently process and analyze large amounts of data to ensure its security and privacy is also an urgent issue that needs to be addressed. With the development of technology and the expansion of application scenarios, the application of big data in the field of communication will become increasingly widespread[1-3].

2. The Background and Significance of the Big Data Era

2.1 Characteristics and Challenges of the Big Data Era

Firstly, the biggest challenge faced in the era of big data is how to effectively store and manage large amounts of data. In the field of communication, all kinds of information data, such as user communication records, Internet performance, and device operation status, are growing explosively, which brings new challenges to data storage and management. Secondly, the diversification of big data has brought new challenges to the analysis and mining of big data. In communication engineering, in addition to structured data, there are also unstructured data such as text, images, audio, etc., which requires processing of various data. Finally, the era of big data has put forward higher requirements for the rapid processing of data. In the context of big data, traditional data processing methods are no longer able to meet the real-time requirements. In order to address this challenge, communication engineering has put forward higher requirements for fast and efficient data processing[4].

2.2 The Current Application Status of Big Data in Communication Engineering

Big data has been increasingly applied in the field of communication, injecting new vitality and opportunities into the development of communication engineering. The optimization of communication Internet has played a great role in promoting. Through the analysis and mining of big data, the performance optimization, resource planning and fault prediction of the communication Internet can be carried out, so as to improve the operation efficiency and stability of the communication Internet. Secondly, big data has shown great application prospects in the intelligent management of information business. By analyzing user behavior, precise marketing to customers can be achieved, and the quality of enterprise management can be managed, thereby bringing more business opportunities and better services to telecommunications operators. Finally, big data is of great significance for the security and protection of information. Security situational awareness and threat detection in the era of big data can more comprehensively and timely protect the security of information systems [5].

3. Overview of Electronic Technology and Communication Engineering

3.1 Electronic Technology

Electronic technology is an interdisciplinary field that involves circuit theory, analog and digital signal processing, information communication, semiconductors, microprocessors, and many other disciplines. Its content includes the design, production, use, and maintenance of electronic devices. Electronic technology is the cornerstone of future high-tech development, and its application research can be divided into three parts: model establishment, algorithm research, and device design. Model establishment is achieved through numerical modeling, which enables analysis and simulation of the model. Algorithm research is based on modeling and analyzing electronic systems, and optimizing system indicators through mathematical calculations and computer simulations. Device design is the process of establishing a complete circuit model from theory to practice,

from simulation to reality, using physical methods based on the establishment of mathematical models and algorithm analysis [6-7].

Through research on the application of electronic technology, it has been found that electronic technology plays a crucial role in various fields of social life. The main function is to collect, process, and display information. Electronic technology has been widely applied in fields such as power, communication, and construction. In the field of power engineering, automatic power control of AC motors is an important research topic, with the main purpose of reducing energy consumption and improving resource utilization by variable frequency speed regulation of AC motors. In the construction industry, electronic technology has been increasingly applied, among which the most commonly used are 3D printing, drones, etc., which can help people better understand the construction process and reduce construction costs. In communication engineering, the most commonly used are mobile communication engineering and internet technology, which can ensure the speed and accuracy of information, making information exchange faster, more convenient, secure, and reliable. At the same time, with the continuous improvement of electronic technology, the lifecycle of communication products is also being extended, thereby improving the cost-effectiveness of communication products [8-9].

3.2 Communication Engineering

Communication engineering is a discipline aimed at achieving efficient long-distance communication. Its main function is to transmit information and process it, achieving communication across time and space. As an emerging discipline, communication engineering holds a pivotal position in the modern information society. The communication process includes signal processing and transmission, analog and digital communication, wired and wireless communication, fiber optic communication, satellite communication, communication protocols and standards. Communication is the cornerstone of today's information society, and the continuous development and innovation of technology will drive communication engineering towards high efficiency, high intelligence, and high reliability. To achieve significant development in China's information technology industry, a stable development process is needed. The transformation and development of communication engineering require not only its own optimization, innovation, and transformation, but also electronic technology as the driving force. Simply put, the growth and development of communication engineering require both internal and external driving forces, and electronic technology is a great driving force[10-13].

3.3 The Application Value of Electronic Technology in Communication Engineering

In the era of big data, the integration of electronic technology and communication engineering has enormous application value. Firstly, electronic technology can provide support for high-speed data transmission. By adopting advanced modulation, demodulation, fiber optic communication, wireless communication and other technologies, high-speed and stable data transmission can be achieved to meet the processing and distribution needs of large amounts of data. Secondly, electronic technology can improve the intelligence level of communication networks. In order to meet the growing demands of data processing and transmission, communication engineering needs to have higher intelligence and adaptive capabilities. With the continuous development of electronic technology, communication engineering can adopt more advanced intelligent algorithms and Internet self-organization technology to intelligently manage, optimize scheduling, optimize resource allocation and improve the efficiency of the Internet. In this case, electronic technology can also achieve multi-dimensional data transmission and processing. The era of big data has put forward diversified and multidimensional requirements for data processing. In addition to traditional data such as text and sound, it also needs to process various types of data, such as images, videos, sensors, etc. With the development of electronic technology, various means of data compression, encoding, multimedia transmission, etc. have been widely used.

Adopting to achieve effective transmission and processing of multidimensional data [14]. Finally, electronic technology is an important means of ensuring the security of communication networks. The security and privacy of data are particularly important. In order to ensure the security and reliability of information, electronic technology can provide higher encryption technology, authentication technology, secure transmission protocols, etc. for the development of communication engineering.

4. The Application of Electronic Technology in Communication Engineering in the Era of Big Data

4.1 Packet Analysis and Traffic Management

Firstly, real-time analysis of data packets is a crucial issue in packet analysis. In the era of big data, a large number of data packets contain important information. Through real-time monitoring and analysis of data packets, we can better understand the business status, quality of service and exceptions of the Internet. Through the analysis of data packets, bottlenecks, errors and abnormal services in the Internet can be quickly found, and corresponding adjustments and optimization can be made. At the same time, through the analysis of data packets, we can effectively find the potential security risks and attack methods that may exist in the Internet, which has important guiding significance for the security protection of the Internet. The real-time analysis of messages can help communication engineers monitor and maintain the communication network, thus improving the performance and security of the Internet. Secondly, traffic adjustment and optimization are important applications of traffic management. The traffic of communication networks is dynamically changing and requires timely adjustment and optimization of business according to customer requirements. By analyzing and monitoring traffic data, the traffic characteristics of each region and time period are identified, and corresponding traffic adjustment and optimization strategies are proposed [15]. Finally, threat detection and protection are important components of packet analysis and traffic management. In the face of increasingly serious Internet security threats, advanced

packet analysis technology is needed to detect and prevent them. Through the analysis of the relevant parameters and characteristics in the data packet, the possible Internet attacks and abnormal behaviors can be detected and identified in real time. The big data analysis method is used to establish an intelligent Internet threat detection system, monitor and predict data packets in the Internet in real time, and take corresponding security countermeasures. Through the analysis of data packets, the monitoring and response of Internet security risks can be realized, and the security and stability of communication Internet can be improved.

4.2 Spectrum Allocation and Frequency Planning

Firstly, in the era of big data, utilizing electronic technology for spectrum monitoring and allocation is crucial. In wireless communication systems, spectrum resources play a very important role. How to allocate and manage spectrum resources reasonably has become an important issue in the current field of wireless communication. With the support of big data technology, it is possible to monitor and analyze the usage status of frequency in real time. By collecting and analyzing data on the utilization rate, channel quality, interference, and other aspects of each frequency band, dynamically adjusting spectrum resource allocation can improve spectrum utilization. Big data can also be used to predict spectrum resources, plan spectrum allocation in advance, and develop emergency plans to meet future communication needs and solve spectrum allocation challenges in different application scenarios. Secondly, in the era of big data, adopting electronic technology for intelligent frequency planning is an important method. For wireless communication systems, reasonable frequency planning is of great significance in improving coverage and enhancing communication capacity [16]. Big data technology can analyze the usage of wireless channels, antenna distribution, user density, etc., in order to achieve intelligent frequency planning. In the era of big data, utilizing electronic technology to allocate spectrum resources is of great significance. Through big data analysis technology, dynamic sharing and management of spectrum resources have been achieved.

4.3 Big Data Driven Internet Fault Diagnosis and Prediction

The application of big data provides a new way for the diagnosis and prediction of Internet failures. Using big data for Internet fault diagnosis and prediction can achieve rapid positioning and prediction of communication Internet faults, and improve Internet maintenance efficiency and troubleshooting ability. Internet fault diagnosis technology in the age of big data can quickly locate and diagnose Internet faults by analyzing a large amount of Internet data. Through real-time monitoring and analysis of Internet equipment status, connection quality and other data, it can detect abnormal conditions in the Internet, quickly locate the location and cause of the failure, and provide data support for the rapid repair of Internet failures. At the same time, Internet fault prediction in the era of big data can predict possible future errors by analyzing historical error data, thus effectively reducing the harm of Internet errors.

4.4 Big Data Application in Communication Internet Resource Management and Optimization

How to effectively manage and optimize Internet resources is a hot issue in the current communication field. Big data can conduct in-depth mining of various resources in the communication Internet, find out the reasons for their inefficient use, and make optimal planning and configuration for them, so as to reduce Internet operation costs and improve the overall performance of the Internet. At the same time, big data technology can dynamically plan and manage Internet resources, and dynamically configure and adjust Internet load and user demand, so as to intelligently manage and optimize Internet resources. Therefore, based on big data, research on the management and optimization methods of communication internet based on big data will provide important theoretical basis and technical support for the development of communication engineering in the future [17].

4.5 Performance Monitoring and Analysis of Communication Internet based on Big Data

The performance monitoring and analysis of the communication Internet in the era of big data can obtain a large amount of Internet data, conduct real-time monitoring and analysis, and detect anomalies and bottlenecks in the Internet in a timely manner, providing important data support for the optimal design of the Internet. In addition, using big data to monitor and analyze the performance of the communication Internet can forecast. Through the mining and analysis of historical data, we can predict the future Internet performance, so as to better guide the optimization of the Internet. Therefore, using big data to monitor and analyze Internet performance is the key to achieving Internet performance optimization. In order to solve the problem of communication Internet performance monitoring and analysis in the era of big data, it is necessary to rely on core technologies such as big data collection, storage, processing and analysis [18]. Firstly, by utilizing electronic technology, it is possible to efficiently obtain a large amount of data from communication networks, such as device status, business, performance, etc. Secondly, establish a highly reliable and scalable data storage system to provide guarantees for the storage and rapid access of large-scale data. In addition, processing and analyzing massive amounts of data to obtain useful information. Finally, through in-depth analysis and mining of Internet performance data, the causes and laws of the problems are found.

5. Conclusion

In summary, with the rapid development of technologies such as 5G, the Internet of Things, and cloud computing, electronic technology will inevitably be applied on a larger scale and at a deeper level in the field of communication. At the same time, the advent of the big data era has greatly promoted the processing and analysis capabilities of electronic technology, which will provide more intelligent, efficient, and secure information services for mobile communication, promoting the sustainable development and innovation of the communication industry.

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