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Application analysis of digital electronic technology in communication network

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Abstract

Digital electronic technology has a wide range of applications in communication networks, including digital signal processing, digital transmission technology, and satellite communication technology. However, the application of digital electronic technology also faces issues such as security, technology, and cost. To address these issues, this article analyze s the application of digital electronic technology in communication networks based on future development trends, in order to meet people's growing communication needs.

Keywords

communication network; digital electronic technology; application analysis.

1. Introduction

Communication network mainly refers to the integration of a large number of devices, protocols and technologies, which can connect various communication devices such as computers, servers and smart phones around the world. Digital electronic technology refers to the use of digital signal simulation and processing technology, the analog signal into digital signal processing, and the digital signal transmission to the destination for processing technology. Due to the particularity of communication network and digital electronic technology, their application has brought great influence to people's social, economic and cultural activities. No matter from the social progress and productivity improvement, or from the perspective of economic development, communication network and digital electronic technology are of great importance. The continuous development of communication networks and digital electronic technology has brought many important advantages, such as high-speed transmission, versatility, high-quality data transmission and real-time response. At the same time, communication networks and digital electronic technology have brought convenience to people's life and work, such as online shopping, online education, intelligent security and so on .

2. The importance of the application of digital electronic technology in the communication network

2.1. Improving the efficiency of information transmission

Digital electronic technology adopts digital data representation method and digital signal transmission mode, so that the information is not easy to be interfered with and distorted in the transmission process, and improves the efficiency of information transmission. In addition, digital electronic technology can optimize and compensate the channel, ensure the quality of information transmission, reduce the error rate, delay and energy consumption of the

communication network, and provide technical support for information exchange and sharing.

2.2. Enrich the forms of communication services

Digital electronic technology is widely used in communication networks, transforming traditional communication services into digital and intelligent services, enabling integrated transmission, processing and storage of multimedia information such as voice, image and data, and further enriching and expanding the forms and modes of communication services. Digital information has promoted the formation of digital services, such as digital television, online shopping, etc., providing users with more convenient and diversified communication experiences.

2.3. Promoting Industrial Development

The mature commercialization of digital electronic technology has promoted the development of the communication network industry in the direction of digitalization, intelligence and networking, and all links of the industrial chain have grown rapidly. The continuous progress of digital electronic technology is also affecting new application fields, such as smart cities, smart homes, and intelligent transportation. The development and application of these fields will further expand the application range of digital electronic technology and drive the rapid development of related industries.

2.4. Improve people's living standards

The application of digital electronic technology in communication networks makes communication services more popular and convenient, people can obtain information anytime and anywhere, strengthen information exchange and interaction, and make people's lives more free. With the popularization and application of digital electronic technology, the cost and threshold for people to participate in social networks are getting lower and lower, meeting people's diversified information needs and improving people's lives

Quality and happiness.

3. Problems in the use of digital electronic technology in communication networks

Although the application of digital electronic technology in communication network has many advantages and development prospects, there are also some challenges and problems.

First, the security problem. With the popularization of communication networks and the increasing amount of data, network security has become a major problem in the application of digital electronic technology. There are endless threats to network security such as hacker attacks, viruses and malicious software.

Second, the speed of data transmission. Although digital electronic technology can greatly improve the communication speed, in certain network environments and network congestion, data transmission speed will still be limited and affected.

Third, data quality and capacity. Although the data transmission speed in the communication network has been improved, it has brought about problems such as the increase of data volume and the decline of data quality, so it is necessary to further optimize the application algorithm and technical system.

Fourth, technical standards. The standardization of the application of digital electronic

technology needs to be further improved, and the interoperability between different software and hardware platforms is poor

It has affected the popularization and promotion of the application of digital electronic technology

Decimal number	8421BCD	Odd check code	8421BCD	Even check code
	Message bit	Check	bit	Check bit
0	0000	1	0000	0
1	0001	0	0001	1
2	0010	0	0010	1
3	0011	1	0011	0
4	0100	0	0100	1
5	0101	1	0101	0
6	0110	1	0110	0
7	0111	0	0111	1
8	1000	0	1000	1
9	1001	1	1001	0

4. The application of digital electronic technology in communication network

4.1. Binary Coding

Binary coding of digital electronics is a very important technique in communication networks (see Table 1) to convert information into a series of digital signals for transmission, storage and processing in digital devices. Binary coding is the encoding method of using binary bits (0 and 1) to represent information, which has the advantages of easy implementation, high efficiency, reliability and scalability. In communication networks, binary coding is mainly used in the fields of digital communication and data storage. In digital communication, binary coding can convert analog signals into digital signals for transmission and processing in digital devices. For example, digital media such as digital audio and video are transmitted and stored via binary coding. In addition, the digital signals used in digital telecommunication networks are also binary

Table 1 Binary coding

Decimal number	8421BCD	Odd check code	8421BCD	Even check code
	Message bit	Check	bit	Check bit
0	0000	1	0000	0
1	0001	0	0001	1
2	0010	0	0010	1
3	0011	1	0011	0
4	0100	0	0100	1
5	0101	1	0101	0
6	0110	1	0110	0
7	0111	0	0111	1
8	1000	0	1000	1
9	1001	1	1001	0

Base coding. In the field of data storage, binary coding is the conversion of information such as text, images, audio, video, etc. into digital signals for storage and processing in computer hardware. The binary encoding of digital electronic technology is widely used in communication networks, making digital communication and data storage more efficient, reliable and convenient.

4.2. Digital Signal Conversion

In communication networks, digital signal conversion in digital electronics technology is a very important technology, which can convert analog signals into digital signals for transmission, storage and processing in digital devices. Digital signal conversion mainly includes two types: analog-to- digital conversion and digital-to-analog conversion.

Analog-to-digital conversion is the process of converting continuous analog signal into discrete digital signal, that is, sampling, quantizing and coding analog signal to obtain digital signal. Sampling refers to sampling analog signals at a certain interval of time; Quantization is to convert the amplitude value of the sampled signal into a limited set of digital codes; Encoding is to convert the digital quantization value into the corresponding binary code. After analog-to-digital conversion, digital signals can be used for digital communication and digital storage. Analog-to-digital conversion is the process of restoring a digital signal to a continuous analog signal. The process of digital -to- analog conversion is to first carry out low-pass filtering on the digital signal, then carry out pulse width modulation, analog and other processes, and finally get the analog signal output close to the original analog signal. Digital signal conversion is widely used in communication networks, such as digital audio and video transmission and storage, data acquisition and control and other fields. Because digital signal has the advantages of high efficiency, reliability, space saving, easy processing and

transmission, digital signal conversion technology has been widely used and developed in communication networks. With the continuous upgrading and expansion of communication networks, digital signal conversion technology will continue to play an important role in promoting the further development of digital communication technology.

4.3. Digital Signal Processing

Digital signal processing is a key field in digital electronics that processes the information in digital signals and optimizes its quality, scalability and performance to meet the needs of different applications. In communication networks, digital messages Signal processing has very important applications, which can be used in digital audio and video, digital communication, wireless communication and so on.

Digital signal processing mainly includes digital signal filtering, digital signal transformation, digital signal processing a total of 3 aspects. Among them, digital signal filtering is the digital signal is transferred to the digital filter for processing, filtering out noise and other interference, so as to improve the quality of data. The digital filter can be realized through software algorithm or hardware circuit. Digital signal conversion is to convert the digital signal from time domain, space domain or analog domain to frequency domain or wavelet domain, so as to realize fast data processing and more accurate data analysis. Digital signal processing is to calculate the digital signal operations, such as filtering, transformation, modulation, demodulation, compression and codec, etc., to achieve a variety of signal processing and data analysis. Digital signal processing tools include the combination of embedded microprocessors and digital signal processing technologies. These processors are widely used in communications, radar, image processing, sound processing, etc. Digital signal processing is widely used in communication networks, for example, through digital signal processing technology can improve the speed of signal and data transmission, reduce transmission delay and wireless communication barriers. In addition, digital signal processing can be used in the compression and decompression of digital audio and video, speech enhancement, audio noise reduction, image processing and other fields.

4.4. Network data transmission

Network data transmission is one of the important application fields of digital electronic technology in communication network. In the digital communication system, network data transmission refers to the transmission of digital information to another place through different data transmission media, such as cable, optical fiber, satellite, etc. Network data transmission is usually divided into two categories: serial transmission and parallel transmission. Serial transmission refers to the transmission of data bit by bit, the transmission speed is slow, but can be transmitted over a long distance. In order to improve the communication speed, the communication system usually adopts the parallel transmission mode, that is, the transmission of multiple data at the same time. Parallel transmission speed is fast, but the transmission distance is relatively short. In digital communication system, digital electronic technology is widely used in network data transmission. Among them, data compression technology is more common. Data compression can improve transmission speed and bandwidth utilization by reducing the amount of data transmitted. Digital signal processing technology is also a key technology in network data transmission. This technology uses digital filters and converters to remove noise and interference in communication media and improve the quality of data transmission. Optical fiber is one of the widely used transmission media in the digital communication system. Through modulation technology, digital signals can be converted into optical signals and transmit ted in optical fibers. The data

transmission rate in optical fibers is very high and can be transmitted over long distances. The use of optical fiber can improve the confidentiality and security of data during transmission. With the rapid development of emerging technologies such as the Internet of Things and 5G, wireless communication technology is being used more and more widely in digital electronics. Digital signal processing technology is widely used in wireless communication systems, making the data transmission speed and transmission distance have been greatly improved.

5. The future development trend of the application of digital electronic technology in communication network

With the rapid development of the digital economy, the digital electronic technology required for communication networks is constantly innovating and developing. The development trend of the application of digital electronic technology in the communication network in the future will be mainly reflected in four aspects.

First, the popularization and application of Internet of Things technology. The Internet of Things will become an important part of the information process of human society. In the future, the application fields of the Internet of Things will gradually expand to include robots, smart homes, self-driving cars and so on. The application of digital electronic technology in the Internet of Things needs to realize the interconnection of devices and data, as well as the management and processing of large-scale data.

Second, the rapid rise of emerging digital technologies. With the application of emerging technologies such as mobile Internet, cloud computing, artificial intelligence, blockchain and 5G, the application trend of digital electronic technology in communication networks will also change. In the future, digital electronic technology will be integrated with other technologies to form a more intelligent, efficient, secure and reliable communication network system.

Third, digital security technologies will continue to be upgraded. Security has always been a key issue in the development of the digital economy. In the future, the application trend of digital electronic technology in communication network will mainly be reflected in the continuous upgrading and improvement of digital security technology. Digital electronic technology needs to strengthen the technical research on network attack monitoring, data privacy protection, identity authentication and authorization management, so as to improve the network security performance and protect the privacy of users.

Fourth, the upgrading and promotion of digital transformation. In the future, the application trend of digital electronic technology in communication networks will mainly be reflected in the upgrading and promotion of digital transformation. Digital transformation can improve the production efficiency, management efficiency and service quality of enterprises. The application of digital electronic technology in communication networks will gradually expand to manufacturing, medical care, finance, logistics and education

The field.

6. Epilogue

With the continuous development of digital electronic technology, its application in the communication network will be more and more widely used, which will greatly promote the development of communication technology. Only by constantly improving the application of digital electronic technology can we achieve more efficient, intelligent and convenient

communication network services and promote the sustainable and healthy development of digital economy.

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