Research on Anti Jamming Communication Transmission Computer System Based on Intelligent Beamformer

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Abstract. With the continuous improvement of communication technology, electronic communication technology has become an indispensable important technology in people's life. Although communication technology provides great convenience for the society, it also brings a lot of signal noise interference, which will affect the application of a variety of high-precision equipment signals. Therefore, the research of communication interference and anti-jamming technology is gradually deepened in China. With the development of 5g services, millimeter wave has become the future direction of spectrum development. However, 5g millimeter wave has the characteristics of fading, high rate and delay, which requires the use of beamforming architecture for signal transmission. At present, the beam of digital analog hybrid structure will be restricted in many aspects, such as hardware constraints, poor adaptive ability, etc., which will be difficult to solve by traditional optimization theory. The hybrid beam will have poor adaptive ability, which needs to maintain good performance in a variety of communication scenarios. Therefore, this paper studies a kind of intelligent beam, which is a beam forming technology of neural network. Firstly, this paper analyzes the current beamforming classification. Then, the beamforming technology of neural network is developed. Finally, this paper presents the current anti-jamming technology.

Keywords: Intelligent Beam, Anti-Jamming, Communication Transmission, Computer System

1. Introduction
In the electronic communication environment, we must improve the security and stability of electronic communication, which is the current research hotspot. Anti-interference technology needs to realize the anti infection ability of a single communication equipment [1]. Through a variety of anti-jamming technology, we can integrate the whole communication system into the anti-jamming system, which will improve the ability to distinguish and cut off the interference signal. Through the beam, we can realize the safe and unobstructed working signal. At present, beamforming can be divided into three categories: ABF, DBF and HBF [2]. Among them, ABF is a relatively simple hardware architecture, which has the advantages of low cost and low power consumption. DBF system can adjust the amplitude and phase of the signal on each antenna, which can achieve more flexible signal processing.
and power control. Therefore, DBF System is only suitable for small-scale occasions, such as antenna array. DBF System needs to configure a RF link for each antenna. With the increase of antenna number, the hardware cost and power consumption of DBF System increase obviously [3].

2. Requirements of communication industry for communication data

2.1. Data volume of communication data
The information age leads to the big explosion of data. In the process of communication, the traditional communication data volume is small, which has been unable to meet the requirements of the current stage. Therefore, we must reduce the communication time. In a communication, this will improve the efficiency of communication. Through the effective transmission of information, we can realize the exchange of data, which will realize the rapid transmission of a large number of data. At this stage, we have higher and higher requirements for the amount of communication data. However, there are some limitations in improving the amount of communication data. For example, if the amount of transmitted data is large, the communication process will be greatly disturbed, which will cause the greater probability of data loss [4].

2.2. Security of communication data
Data security is the most important in all fields, especially in military field and aviation field. Communication data means the communication between sending and receiving data. Communication data contains a lot of important information, which cannot be obtained by third parties. Therefore, in the military field, how to interfere with the transmission of enemy information and protect the communication data has become the most important direction. Therefore, the security of communication data is also a key factor to determine the success or failure of the war [5].

2.3. Integrity of communication data
The communication process is for the receiver to receive the complete information sent by the sender. Therefore, the integrity of communication data is the ultimate goal. Take the communication control of micro air vehicle as an example. In order to achieve the real-time acquisition of micro air vehicle status, we must transfer the information collected by sensors to the monitoring platform, which requires wireless communication technology. By recording, checking and comparing the acquired information, we can get the flight performance of MAV. Therefore, communication technology will become the most important key. The existing wireless communication technology has gradually become mature, and the electromagnetic wave communication technology has the problem of signal interference. In the process of communication, the control signals sent by the ground monitoring system will be disturbed, which will cause serious losses. Therefore, the integrity of communication data is particularly important [6].

2.4. Communication speed of communication process
In order to realize the fast control of the transmitter to the receiver, we need to improve the communication speed in the communication process. For example, in the remote operation of equipment, we must improve the communication speed to achieve the effect. With the increase of communication speed, the response speed of communication system will be improved. Therefore, the data exchange between the sender and the receiver will be faster, which will improve the rapid response ability of the communication system. The communication speed of the communication process, we will achieve the real-time requirements of the system [7].

3. Beamforming technology

3.1. ABF
ABF algorithm is a method to simulate beamforming by adjusting antenna signal phase by phase shifter. The hardware structure of ABF precoding algorithm has many advantages, such as simple structure, low cost and low power consumption, as shown in Figure 1.

3.2. All digital beamforming

DBF System has many advantages. DBF can adjust the amplitude and phase of each antenna at the same time, which can realize flexible signal processing and power control. Through DBF, we can achieve more detailed beam precoding, which can carry out independent precoding for each data stream. Through DBF System, we can use spatial diversity more effectively. The architecture of all digital precoding is shown in Figure 2.

3.3. Hybrid beamforming

All digital beamforming DBF precoding algorithm has the problems of high cost, high power consumption and high computational complexity. Analog beamforming ABF precoding algorithm has simple structure and low cost, but its performance is limited, which will only support the transmission of single stream data. Therefore, these two beamforming algorithms have great limitations. Therefore, hybrid beamforming can have both advantages. There are two kinds of hybrid beamforming structures, namely antenna full connection structure and antenna sub connection structure, as shown in Figure 3.
4. Beamforming system based on Neural Network
In the hybrid beamforming communication system, through the functions of digital encoder, analog encoder, channel, analog combiner and digital combiner, we can finally recover the original signal from the received signal. In the automatic encoder, encoder realizes data compression through neural network, and decoder realizes decompression through neural network. Based on the neural network automatic encoder, we can map the network to the hybrid beamforming algorithm, which will obtain the best precoder and combiner, as shown in Figure 4.

5. Anti interference technology of communication transmission
5.1. Ultra wideband technology
There are many advantages in the application of ultra wideband (UWB) technology in the field of military and natural disaster relief. UWB technology has many advantages, such as low energy consumption, high security, simple operation, good positioning and so on. In the wireless communication signal transmission, ultra wideband technology can well avoid the signal interference in the transmission process. However, UWB technology also has some defects, such as short signal duration, which will be difficult to obtain a wider bandwidth.

5.2. Virtual smart antenna
Virtual smart antenna technology can obtain better radio communication signal under the effect of multiple antennas. At the same time, the virtual smart antenna can ensure the timely and effective transmission and reception of electrical communication signals. By strengthening the information processing function of radio communication signal, we can reduce the probability of information error. Therefore, the virtual smart antenna has strong anti-jamming ability. However, virtual smart antenna technology also has many defects, such as high price. Therefore, the virtual smart antenna is mainly used in military and radar investigation, which is not widely used in civil.

5.3. Intelligent networking technology
In the process of radio signal transmission, intelligent networking technology can select the best transmission mode according to the characteristics of signal interference factors. Through the optimal allocation of resources, intelligent networking technology can adjust the wireless communication signal, which will ensure that the radio communication signal is not affected by interference factors. In this way, intelligent networking technology can improve the anti-interference ability of radio communication technology, which has been widely used in the field of radio communication.

5.4. Real time frequency selection technology
In the process of radio communication, real-time frequency selection technology can avoid interference frequency according to the requirements of signal transmission. By transmitting radio signals with low or no interference, we can optimize the transmission effect of radio signals. In the process of real-time frequency selection, radio has a great impact on the transmission anti-interference level, which will play a good anti-interference performance. Therefore, the real-time frequency selection technology can automatically switch the high-frequency channel to the low-frequency channel, which will realize the signal transmission when the radio communication system interferes. Through the real-time frequency selection technology, we can solve the interference problem in the radio transmission process.

5.5. High frequency adaptive anti jamming technology
High frequency adaptive anti-jamming technology is the joint application of real-time frequency selection technology and automatic channel switching technology. In the process of radio communication, if the communication conditions and environment change, high frequency adaptive anti-jamming technology can automatically select the optimal frequency in the communication system. Therefore, high frequency adaptive anti-jamming technology can be applied in many aspects, which is an effective method to improve the efficiency and quality of radio communication.

6. Conclusion
The anti-jamming technology of communication technology mainly realizes the screening, interception and subsequent processing of interference signals through electronic technology, which needs to pay attention to the interruption and enhancement of interference signals. By optimizing the equipment environment, we can improve the accuracy of signal transmission in the electronic communication system, which will optimize the working environment of electronic communication equipment.

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