

Research on Anti-Jamming Technology of Ultrashort Wave Radio Communication Based on Working Process

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Abstract: with the Continuous Development of Science and Technology, Ultrashort Wave Anti-Jamming Technology Has Been Widely Used in the Field of Radio Communication, Greatly Improving the Quality of Radio Communication. Radio Communication Technology is Used in Many Industries in Our Country. through the Spread of Radio Communication Characteristics, It Has Become the Main Development Direction of Communication in the Future. in the Military Field, Ultrashort Wave Wireless Point Communication Technology Can Well Meet the Operational Requirements of Troops with High Mobility and Simple Construction and Operation. There Are Many Frequency-Used Devices in Daily Production, So the Ultra-Short Wave Wireless Communication Technology is Affected by the Surrounding Electromagnetic Wave Environment in the Actual Application Process, and Corresponding Interference Problems Occur. This Article Mainly Analyzes the Working Process of the Anti-Jamming Technology of Ultra-Short Wave Radio Communication as an Entry Point, So as to Lay the Foundation for the Use of Radio Communication Technology, So as to Ensure the Application Efficiency of China's Radio Communication Technology.

1. Introduction

The Rapid Development of Electronic Information Technology Makes the Use of Communication Equipment in Our Daily Life More and More Extensive, Bringing Great Convenience to People's Life [1]. At Present, Radio Communication Technology is Used in Many Industries in Our Country. through the Spread of Radio Communication Characteristics, It Has Become the Main Development Direction of Future Communication [2]. Today, with This Trend of Globalization, Communication Technology Has Become a Link Connecting the World. No Matter Where You Are on the Earth, We Can Get in Touch with Each Other [3]. the Application of Ultra-Short Wave Wireless Communication Technology Has Promoted the Development of the Communication Industry and Met People's Increasing Communication Needs. There Are Many Frequency Devices in Daily Production, So Ultrashort Wave Wireless Communication Technology Will Be Affected by the Surrounding Electromagnetic Wave Environment in the Actual Application Process, Resulting in Corresponding Interference Problems [4]. in Actual Use, the Frequency of Information Transmitted by Ultrashort Wave Radio Station is Relatively Stable, So It is More Likely to Be Acquired by the Other Party [5]. It is Important to Scientifically Apply Ultrashort Wave Radio Communication Anti-Jamming Technology, Which is of Substantial Significance to Solve Practical Interference Problems [6]. with the Change and Development of the Times, Ultrashort Wave Communication is Bound to Develop Towards Digitalization and Stronger Anti-Jamming Capability. Therefore, We Must Apply Anti-Jamming Technology to It, So as to Further Enhance Its Application Effect.

With the Continuous Development of Information Technology and Electronic Technology, It Has Promoted the Further Development of Anti-Jamming Technology for Military Communication Equipment, and Various New Technologies Have Emerged One after Another, Providing Technical Support for the Application of Anti-Jamming Technology for Communication Equipment [7]. in Addition to the Increasingly Close Ties between Countries, Information and Communication Technologies Are Also Deepening in Various Fields. China's Information, Electronic Technology

and Other Industries Are Developing Rapidly, and Communication and Information Integration among Various Industries Are Further Progressing [8]. Ultrashort Wave Wireless Point Communication Technology Plays an Important Role in Both Military and Civil Fields, Especially in the Military Field, This Communication Method Can Be Well Adapted to the Operational Requirements of Troops with High Mobility Requirements and Simple Construction and Operation [9]. in Wireless Communication, Due to the Wide Range of Influence, It Will Bring Certain Influence to the Application of Radio Communication Technology [10]. This Has Seriously Affected the Transmission and Reception of Signals and Brought Adverse Effects to People's Daily Use. Therefore, It is More Important to Solve Some Disturbing Problems in Time [11]. This Paper Mainly Analyzes the Development Trend of Ultra-Short Wave Radio Communication Anti-Jamming Technology as a Breakthrough Point, Thus Laying a Foundation for the Application of Radio Communication Technology, in Order to Ensure the Application Efficiency of Radio Communication Technology in Our Country.

2. Analysis of Interference Sources and Anti-Jamming Techniques in Ultrashort Wave Radio Communication

2.1 Interference Source Analysis

Interference Sources of Ultrashort Wave Radio Communication Come from Many Aspects, among Which Co-Channel Interference is the Most Prominent Type of Interference Source, Which is Commonly Referred to as Co-Channel Interference. for a Long Time Since the Birth of Ultrashort Wave Radio Station, Its Information Transmission Works At a Certain Fixed Frequency and is Easily Intercepted or Interfered by the Enemy. in Frequency Hopping Communication, Security is Closely Related to the Speed of Hopping. the Faster the Hopping Speed is, the More Difficult It Will Be for the Enemy to Acquire, Which Will Make the Security Performance Better. Ultrashort Wave Radio Station Has Strong Stability and Will Ensure the Frequency of Information during the Process of Information Transmission. Therefore, Information Intercepted by Intelligence Will Often Occur When It is Applied in Wartime. the Application Speed of Frequency Hopping Communication is the Direct Factor That Leads to the Anti-Jamming Performance of Ultrashort Wave Radio. the Smaller the Hopping Speed, the Less Reliable the Security Will Be. When Multiple Stations Operate At the Same Frequency, These Signals of the Same Frequency Will Enter the Receiver Together. If There is No Agreement between Stations in the Following Aspects, the Problem of Co-Frequency Interference Will Occur.

2.2 Anti-Jamming Technology

In order to effectively deal with the interference problem of ultrashort wave radio communication, scientific application of anti-interference technology is needed, so as to improve the quality level of ultrashort wave radio communication. No matter what the interference is, the interference can be resisted as long as the jump speed is sufficient, which requires that the power must be large enough. Even if some signals are interfered when signals are sent out, the idle channel can still receive and send signals without being affected. Based on the good anti-jamming capability of idle channels, it has been proposed to combine idle channels with frequency hopping technology so as to develop equipment with stronger anti-jamming capability [12]. The prominent advantages of frequency hopping communication technology in anti-jamming communication make it widely used in communication equipment and become the main anti-jamming technology of ultrashort wave communication equipment. After the short wave signal is emitted by the antenna, it can travel from hundreds of kilometers to tens of thousands of kilometers through multiple reflections of the ionosphere, and there is no obstacle in the sky. No matter what kind of interference, only the other party's frequency and its own frequency are in one signal, and its power will affect it when it reaches enough.

During communication, the idle channel can select the best signal from all signals for communication, and in the process of communication, if interference occurs, the idle channel can

automatically eliminate the interference. The experimental simulation takes into account the two factors of the total bandwidth income and the system collision probability of the spectrum allocation system, and makes simulation analysis on them, and compares the two methods of fuzzy spectrum allocation and random allocation. Specific parameter setting data are shown in Table 1.

Table 1 Simulation Parameter Settings

Parameter	Parameter value
Number of cognitive users	10
Number of free frequency bands	10
Distance	0-20km
Channel bandwidth	220KHz
Mobility	0-80km/h
Discount factor	1.2
Initial weight	2
Learning rate	0.8

From the perspective of anti-jamming communication, frequency hopping communication relies on random hopping of carrier frequency to avoid interference, and excludes interference from receiving channels to achieve the purpose of anti-jamming and avoid direction finding and interference of enemy stations. Routing protocol is an important component of distributed network, which is of great significance to realize efficient and reliable multi-hop communication. The spectrum resources used in traditional networks are relatively fixed. However, due to the use of dynamic spectrum resources in cognitive radio networks, the design of routing protocols encounters new challenges and problems. It is necessary to study routing protocols suitable for working in cognitive radio networks according to the characteristics of cognitive radio networks. Figure 1 is a measured result of spectrum utilization.

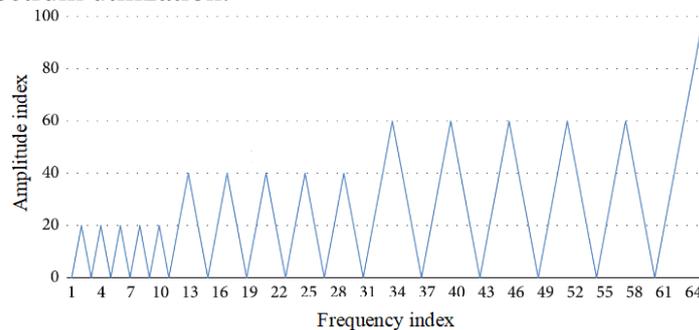


Fig.1 Actual Measurement Results of Spectrum Utilization

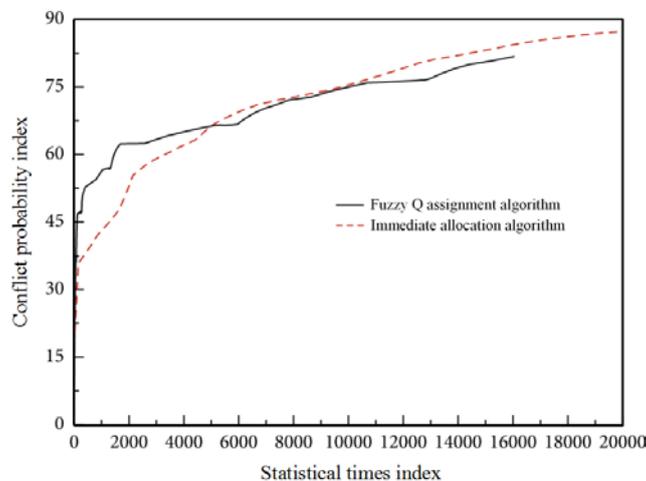


Fig.2 Simulation Results of Cognitive User Access Conflict Probability

Interference in frequency hopping signals will only affect the acceptance of accurate information, while frequency hopping signals will change due to carrier frequency speed. Perceptual radio is a new type of intelligent wireless communication technology based on software radio. It can sense the

characteristics of the surrounding environment and automatically adjust some transmission and reception parameters of its equipment. Idle frequency bands and cognitive users are randomly generated in the base station range, and the probability of each authorized user corresponding to the idle frequency band obeys Poisson distribution. When the idle frequency band is allocated and not occupied, the simulation results are shown in Figure 2.

3. Application of New Anti-Jamming Technology of Ultrashort Wave Radio

When radio communication technology was just developed in the past, the design at that time was mainly aimed at some specific uses without considering the future use. This has led to many incompatibilities and other problems. For frequency hopping communication, the performance of ultrashort wave radio anti-jamming equipment is affected by the hopping speed. The higher the hopping speed, the better the safety performance. In this information age, communication equipment is used more and more in our daily life. As a result, radio frequencies will become very crowded and interference will inevitably occur between adjacent channels. If only from the anti-interference point of view, FM communication actually relies on the random frequency transformation to avoid the interference of the enemy to the fixed frequency, and the external interference shortwave is excluded from the current information channel, thus avoiding the external interference and detection.

No matter what kind of interference, only when the spectrum of the other party is within the same signal as that of the other party and the power required is large enough can interference be generated. In order to deal with tracking interference, people always hope to shorten the residence time of frequency hopping signals as much as possible so as to make reconnaissance receivers unavailable, which requires the hopping speed of frequency hopping system to be as fast as possible. The essence of idle channel work is the signals generated in the process of radio station work, among which the communication with stronger signals can be selected to automatically prevent interference of some wave bands. For tracking interference within a certain instantaneous bandwidth of frequency hopping signals, it is only possible to affect the correct reception of this instantaneous useful signal [13]. However, the carrier frequency of useful signals in frequency hopping communication changes pseudo-randomly at a certain speed, so the influence of such interference can be greatly weakened. For those interferences in the frequency hopping signal, it is only possible to affect the correct reception in the correct signal, and the carrier frequency of the frequency hopping signal can jump pseudo-randomly at a certain speed, which can also weaken the interference signal of the enemy. If new technologies are to be put into use, they mainly rely on multi-input and multi-output technologies. Because the signals are scattered among multiple antennas for receiving and outputting, the range of the signals can be increased, even if some signals are interfered, communication can still be maintained smoothly in the transmission process, and most signals can be transmitted smoothly.

4. Conclusion

In order to improve the communication quality, people apply many advanced radio anti-jamming technologies to it, which can ensure data transmission and improve the effect of ultrashort wave radio communication. This paper briefly discusses the development trend of anti-jamming technology in radio communication. When anti-interference treatment is carried out on the radio communication system, the anti-interference technology of ultrashort wave can be combined to fully show the shortcomings of the existing radio communication technology, so as to conduct a comprehensive study on the radio communication system. Ultrashort wave wireless point communication plays an important role in both military and civil fields. Especially in the military field, it can well meet the needs of the battlefield environment. Through simple construction and operation, it can realize communication and ensure the transmission of battlefield command information. The research of anti-jamming technology is based on new conditions and new environment, and the requirements put forward will have certain differences. The reasonable

application of anti-interference technology can make the application of radio communication more extensive, which brings great convenience to the practical application of the public. With the continuous development of science and technology, ultrashort wave radio anti-jamming technology is bound to develop in a new direction.

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