Analysis of the Impact of Wireless Communication Technology on Broadcast Television Satellite Communication (Postprint)

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Abstract

In broadcast television satellite communications, radio communication technology constitutes a critical safeguard. Grounded in the current development of broadcast television satellite communications and integrated with the application characteristics of radio communication technology, this work identifies broadcast television communication interference, conducts an in-depth analysis of the influence of radio communication technology on broadcast television satellite communications, delineates future development trends of radio communication technology, and fundamentally advances the development of the broadcast television industry. This paper primarily discusses and explores the impact of radio communication technology on broadcast television satellite communications for reference.

Full Text

Preamble

Analysis of the Impact of Radio Communication Technology on Broadcasting and Television Satellite Communications

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Abstract: Radio communication technology serves as a critical guarantee in broadcasting and television satellite communications. Based on the current development of broadcasting and television satellite communications, combined with the application characteristics of radio communication technology, this paper identifies interference factors in broadcasting and television communications, deeply analyzes the impact of radio communication technology on broadcasting and television satellite communications, and clarifies future development trends

of radio communication technology to fundamentally promote the development of the broadcasting and television industry. This article primarily discusses and explores the influence of radio communication technology on broadcasting and television satellite communications for reference.

Keywords: radio; communication technology; broadcasting and television; satellite communication; influencing role

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The rapid development of the modern economy has provided financial guarantees for domestic scientific research, enabling the promotion and application of high-tech technologies and advancing the development of radio communication technology. After the widespread adoption of 4G network technology, China has entered the 5G network era, gradually narrowing the gap with developed countries in wireless technology. The continuous deepening of information construction has accelerated the development of satellite communication system technology. Satellite communication systems can enhance signal coverage capabilities and increase wireless signal strength. Therefore, in-depth analysis of the impact of radio communication technology on broadcasting and television satellite communications helps to understand the current development status of broadcasting and television satellite communications, and we hope this can serve as a reference for relevant personnel.

Although current communication services are still based on 3G technology, wireless communication technology requires continuous improvement and refinement. Particularly, the application of satellite communication technology in 3G systems must achieve perfect integration when connecting with international mobile communication systems. In the mature development of mobile communication technology, a trend toward quadruple-network convergence has emerged. In the communication industry, 3G technical standards and specifications have formed efficient protocols that are applied in daily life. However, technological applications also have limitations, such as the lack of globally unified standards. The voice communication services of 3G technology still operate in circuit-switching mode, making signal transmission highly susceptible to interference, which significantly hinders the development of 3G communication technology.

1. Current Status of Radio Communication Technology

In the development of social civilization, information dissemination represents an important marker. The maturation of wireless communication technology has laid a solid foundation for information dissemination and provides technical guarantees. Therefore, applying wireless communication technology helps improve social production and quality of life, enabling people to obtain high-quality information through diversified channels. This not only allows them to grasp the latest information and news but also enriches information resources. During modern technological development, network information resources and network communication technology have exerted tremendously positive influences on people' s lives. However, communication technology also has shortcomings and defects that must be addressed and optimized in future development. For network integrated transmission, the focus is on optimizing the allocation of information resources to ensure they remain in optimal condition.

With the emergence of 4G mobile networks, signal transmission and reception have independent communication paths, enabling real-time positioning and tracking, which enhances the seamless connectivity of mobile networks. 4G technology offers high information transmission rates and strong quality stability. Compared with 3G networks, 4G mobile networks have different structures and more interfaces, forming a public platform through multi-interface transmission with strong flexibility, ensuring users are free from restrictions during use. Various countries are dedicated to researching 4G communication and have achieved significant results. 4G communication technology offers notable advantages, including high spectrum utilization, high openness, and combined fixed/mobile capabilities, leading to its widespread promotion. 4G network technology can also integrate with other wireless access systems to fully demonstrate the mobility, security, and service quality advantages of 4G communication.

5G communication technology represents the fifth generation of mobile communication technology and has become the latest communication technology, capable of accelerating data transmission speeds and eliminating spatial limitations. For 5G communication technology, the main stages involve key technology testing, technical solution verification, and system validation. Satellite communication technology serves as an emergency communication technology that can effectively function in special environments such as disaster relief. With the maturation of wireless communication systems, satellite communication technology has also advanced. The combination of satellite communication and ground service transmission networks can achieve complementary advantages, not only improving coverage but also ensuring the speed and quality of information transmission.

2. Characteristics of Radio Communication Technology

The development of wireless communication technology has undergone multiple eras, evolving through 2G, 3G, and 4G communication generations, during

which people have enjoyed high-quality communication services. When applying broadcasting and television satellites, we must base our approach on current development status, comprehensively expand the types of user access terminals, enable people to obtain massive information resources, and fundamentally promote the development of the broadcasting and television industry. Currently, people's demand for information diversification has increased, and triple-network convergence has become an information technology development trend, providing society with high-quality information resources. Since China' s telecommunications industry is in a period of transformation and development, to fully adapt to environmental changes, satellite communication technology must be utilized to promote the innovative development of information technology and realize the role and value of information resources.

3. Interference Factors in Broadcasting and Television Satellite Communications

3.1 Intermodulation Interference

During the development of communication technology, amplifier components in communication systems exhibit nonlinear characteristics. When operating within the system, this can easily cause signal mixing problems and create interference signals that overlap with received signal frequencies. In this context, the signals received by users include both useful signals and interference signals, resulting in significant interference effects.

3.2 Weak Signals

Typically, weak signals are caused by common components in front-end equipment. Component damage and faults affect the level values of different channel users, such as power supply and mixer failures. When such problems occur, the first step should be to check plugs and welding areas while continuously monitoring level signals with a field strength meter to propose scientific solutions and ensure level values meet expected requirements.

3.3 Human Factors

Based on long-term experience, China' s broadcasting and television communication satellite systems face malicious intrusion and sabotage across a wide range, offering numerous interference methods. Currently, common interference includes the application of high-power narrowband transmission signals that interfere with the business frequencies of broadcasting and television satellite communication systems, resulting in weak data signals received by users. Additionally, when transmitted signals share the same parameters and frequencies as broadcasting and television satellite communication system services and contain large amounts of illegal information, users may receive unlawful information because their reception parameters cannot be changed.

4. Impact of Radio Communication Technology on Broadcasting and Television Satellite Communications

From the perspective of broadcasting and television satellite communications, to comprehensively address system operation interference factors and problems, we must deeply explore radio communication technology, combine it with the development needs of the broadcasting and television industry, and understand the influencing factors in satellite communication development. The innovative development of scientific and technological levels has continuously improved information technology. In the 5G era, the development of radio communication technology can guide the entire communication industry. This technology possesses communication advantages that can demonstrate efficient functionality and applicability while integrating satellite communication and radio communication services. Furthermore, as international exchanges become increasingly frequent, correspondingly increasing international economic communication and cultural exchange, communication technology not only positively impacts broadcasting and television satellite communications but also demonstrates high value in historical development.

4.1 Realizing Communication Modernization

In various natural disasters, satellite communication technology has been widely applied. By combining ground network services, we can expand data transmission capacity, accelerate information transmission speed, and comprehensively maintain the security and efficiency of information transmission. Moreover, ground network services and satellite technology can achieve complementary advantages, and the scientific utilization of technical resources enables optimized allocation of various resources. In this new context, integrating communication satellite technology and ground network services can promote the intelligent development of network technology, correspondingly expanding and innovating radio communication systems. To accelerate the pace of 5G era development, operators should transform traditional development concepts, fully exert the role and value of technology, provide technical support, increase capital investment, and achieve modernization and intelligent development goals as soon as possible.

4.2 Achieving Comprehensive Application

During the promotion of radio communication technology, satellite space segment communication faces numerous problems. In the new era, to fully meet the requirements of broadcasting and television satellite communications, we must not only clarify the development direction of technology but also efficiently integrate into modern communication information development according to our own characteristics, optimize information infrastructure, comprehensively strengthen information communication capabilities, and demonstrate the application value of satellite communication systems. This approach helps improve radio communication technology levels, generates positive impacts in multiple

fields, comprehensively promotes the development of the broadcasting and television industry, and meets residents' application needs. Based on current development status, the development directions of satellite communication technology are as follows: First, scientifically configure and apply resources across different scopes. Second, effectively connect regional information to achieve resource sharing. Third, provide large-capacity network broadband for both mobile and fixed states. Fourth, continuously expand satellite communication systems by leveraging the diversity and richness of ground network services. Fifth, adopt hybrid communication business models during port connection operations to comprehensively improve information data positioning levels. Sixth, demonstrate the application value of satellite communication to ensure the immediacy and efficiency of information network data transmission.

4.3 Clarifying the Positive Impact of Communication and Network Technology

Communication technology and network technology have broad development prospects and have become future development trends. Broadcasting and television media must correctly analyze communication and network technology and apply these technologies to broadcasting and television development. Applying communication and network technology in broadcasting and television can enhance market competitiveness and improve economic benefits for broadcasting and television enterprises. Integrating communication and network technology can also change traditional broadcasting modes, innovate broadcasting and television program transmission methods, and ensure the timeliness of broadcasting and television development.

4.4 Internet Technology Supervision

Through current situation analysis, both network technology and communication technology exhibit advantages and disadvantages. When broadcasting and television media integrate these two technologies, they should first strengthen supervision and management of the network environment to prevent criminals from invading broadcasting and television media databases and stealing relevant data for illegal propaganda. Maintaining social development order and establishing a high-quality network environment requires broadcasting and television media to scientifically supervise and review their own network systems to ensure network television and radio programs meet legal requirements. When sharing and rebroadcasting programs, they must obtain approval from competent authorities to ensure program quality.

4.5 Technical Transformation and Innovation

In development practice, we should focus on updating and applying earth interference technology, anti-transponder fault technology, anti-space interference technology, and anti-satellite drift technology. While ensuring broadcasting and television satellite signal transmission, we should reduce negative impacts

caused by natural environments, comprehensively ensure the stability of the broadcasting and television satellite signal transmission environment, adopt scientific measures to reduce security risks, and prevent criminals from stealing satellite transponder data.

4.6 Optimizing Satellite Communication Security Systems

When managing satellite communication security, we should focus on supervising and managing transponders to prevent criminals from damaging broadcasting and television satellite equipment. When satellite sabotage is discovered, it must be dealt with seriously. Additionally, we should enhance the professional capabilities and comprehensive qualities of satellite personnel, establish scientific management systems to stimulate their work enthusiasm and initiative, and carefully divide work functions to avoid adverse effects caused by operational errors. For employees with poor work attitudes and low initiative, an incentive mechanism should be established linking performance to benefits to strengthen their sense of responsibility.

4.7 Application of High-Efficiency Data Lines

Satellite transmission provides high-quality business services for the market. Focusing on improving user-end transmission characteristics can be applied to all satellite system frequency bands. The key to optimization lies in providing user terminals with small capacity and high integrity, along with data rates featuring fixed user functions. Operating through the same frequency band and different frequency bands can enhance the transmission capacity and reliability of space segment services, further strengthening satellite competitiveness. Improving payloads, such as on-board digital technology, antenna technology, and satellite reconfiguration technology, while also enhancing traveling wave tube amplifiers and data relay performance, is essential. By analyzing satellite facility networks, focusing on gateway performance improvements helps enhance processing capabilities during transmission and reception while reducing costs. For L-band and S-band mobile services, we should ensure next-generation mobile terminals can be applied to satellite backbone networks, communication networks, and ground backbone network communications, focusing on analyzing and researching the integration of satellite nodes and ground relays. Combining existing communication technology with next-generation mobile networks and using IP technology as the dominant technology in mobile networks can achieve multi-channel development of satellite communication and efficiently integrate ground service categories.

5. Future Development Prospects of Broadcasting and Television Satellite Communications

In the new development period, comprehensively improving risk prevention and resolution capabilities for broadcasting and television represents an important

measure for implementing China' s cybersecurity strategy. As China' s development environment has undergone tremendous changes, domestic analysis reveals that new media environment communication technology application innovations and diverse social opinions can significantly impact mainstream ideology. From an international perspective, international-level public opinion is becoming increasingly intense, requiring comprehensive adherence to sustainable development strategies and in-depth exploration of radio communication technology to clarify its impact on broadcasting and television satellite communication development. Since communication technology is in a transformation and development stage, the 5G era presents new requirements for technological development while providing innovation opportunities. 5G communication technology is developing toward ultra-high speed and ultra-large scale, enabling real-time connections and anytime application with strong security guarantees. Based on broadcasting and television industry development experience, future development trends of communication technology mainly manifest in the following aspects: high-speed mobile communication systems, large-scale multiple-input multiple-output systems, intelligent communication systems, on-demand dedicated communication systems, and the application of blockchain and quantum computing in the communication field. In future development, 5G technology will significantly impact global informatization levels and decisively influence social and economic development speeds. Researchers should focus on developing radio communication technology and conduct experiments based on market development needs and technical challenges.

In future development, technical personnel should also comprehensively address the challenges in broadcasting and television satellite communications to achieve high-quality development goals. In summary, during rapid social and economic development, social production and living standards have correspondingly improved. Applying wireless communication technology in the broadcasting and television satellite communication field helps diversify lifestyles and enables efficient and stable development of broadcasting and television. To ensure wireless communication technology meets the requirements of the times, we should deeply analyze and research wireless communication technology, ensure its synchronization with economic development, and promote the sustainable development of the broadcasting and television industry. By analyzing the current status of radio communication technology, elaborating its characteristics, deeply analyzing interference factors in broadcasting and television satellite communication systems, proposing the impact of radio communication technology on broadcasting and television satellite communications, and forecasting the future development of the broadcasting and television satellite communication industry, we hope to provide valuable references for industry development.

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Note: Figure translations are in progress. See original paper for figures.