

Analysis of Current Status and Development Strategies for Radio and Television Wireless Transmission (Postprint)

Authors: Langlang Cuomu

Date: 2023-10-08T00:00:00+00:00

Abstract

Against the backdrop of rapidly evolving science and technology, information technology has been extensively applied across various domains, particularly within the radio and television industry, thereby delivering faster and clearer information to the public and substantially advancing the development of radio and television wireless transmission technology. With the advent of the digital era, China's radio and television sector is poised to achieve leapfrog breakthroughs in its future evolution, heralding a new developmental phase. Radio and television wireless transmission technology has consequently emerged as a key focus of societal attention, rendering the transition from wired to wireless broadcasting an urgent challenge for industry practitioners. This paper examines the current state of radio and television wireless transmission and proposes several exploratory development strategies for reference by relevant stakeholders.

Full Text

Abstract

Against the backdrop of rapid scientific and technological advancement, information technology has been widely applied across various domains, particularly in the radio and television industry, where it provides faster and clearer information to the public while advancing wireless transmission technology. As the digital era unfolds, China's radio and television industry is poised for breakthrough development and will usher in a new stage of growth. Wireless transmission technology has become a focal point of attention across society, making the transition from wired to wireless broadcasting an urgent challenge for practitioners. This paper analyzes the current status of radio and television wireless

transmission and tentatively proposes several development strategies for reference.

Keywords: radio and television wireless transmission; current status; development strategies

Classification Number: TN83

Document Code: A

Article ID: 1671-0134(2017)09-113-02

DOI: 10.19483/j.cnki.11-4653/n.2017.09.042

1.1 Development Status

Numerous challenges exist in the development of radio and television wireless transmission technology, manifesting primarily in two aspects. First, the dilemma between economic benefits and social welfare. Wireless transmission technology occupies a crucial position in radio and television information transmission and possesses strong resistance to natural disasters. As wireless broadcasting represents a significant public welfare undertaking, government departments must prioritize its development ideologically. However, in practice, satisfactory social and economic benefits have not been achieved, hindering the development of wireless analog television and constraining digital television advancement. Second, market competition and operational issues. Following the marketization of cable television operations, broadcasting departments have pursued 良性发展 of cable broadcasting, leaving wireless broadcasting in a state of suspension or semi-suspension, which severely impacts its development. Currently, residents in numerous Chinese towns and cities have largely adopted cable access, with even remote areas installing satellite receivers, yet wireless coverage remains relatively low, further affecting wireless broadcasting development.

2. Development Strategies for Radio and Television Wireless Transmission Technology

Radio and television wireless transmission technology, provided by the government, offers broad coverage, low cost, and convenience. It encompasses various technical aspects, including electronics, computer technology, communications, and software engineering, aiming to better serve urban and rural populations. This technology offers several key advantages: (1) Effective emergency response. Technical safety incidents, sabotage, and natural disasters can cause broadcasting accidents, but these events are often unpredictable and significantly impact broadcast quality. Wireless transmission technology can effectively mitigate road collapses, floods, rainstorms, and typhoons, while preventing human operational errors, equipment failures, improper line connections, and unscientific system configurations, thereby avoiding emergencies and broadcast accidents. (2) Enhanced signal security and stability. Wireless transmis-

sion technology can continuously emit high-frequency electromagnetic waves, ensuring sustained and automatic program playback, improving stability and picture clarity—particularly for television programs—and better satisfying audience demands. With the development of communication network technology, wireless transmission demonstrates stronger anti-interference capabilities and broader network coverage compared to traditional signal transmission technologies, thereby improving signal security and stability. (3) Reduced personnel workload. As an important means of relaxation and entertainment, radio and television play a vital role in enriching people's lives and spiritual fulfillment. Consequently, broadcasters have intensified program development, offering 24-hour continuous broadcasting, which increases workload and difficulty for practitioners and creates potential operational errors. Wireless transmission technology ensures program quality through its monitorability, high intelligence, and efficiency, reducing work difficulty, minimizing workload, optimizing broadcast quality, preventing oversights, and promoting healthy industry development.

2.1 Strengthening the Development of Space-Time Radio Technology

Space-time radio technology represents a scientific approach that primarily utilizes MIMO-MU technology to innovate wireless signal transmission. Originally employed in military operations for wave filtering and spatial positioning, it features multi-user, multi-output, and multi-input capabilities and finds extensive application in communications and information disciplines. Currently, space-time radio technology is widely used in networks to effectively leverage spatial resources, optimize and integrate wireless signal information through automated processing, improve spatial resource utilization, and enhance radio and television wireless transmission technology. China should actively develop application measures for space-time radio technology, utilizing radio and television information wireless transmission technology to rationally exploit spatial resources and promote their efficient utilization.

2.2 Improving Wireless Transmission Monitoring Systems

Digitalization will become a future societal trend, necessitating technological upgrades and transformations to achieve digital social development. Improvements must be made in equipment daily management, equipment detection, and wireless device control to better perfect radio and television wireless transmission technology. Only by perfecting these aspects and organically combining these methods can wireless transmission systems be intelligently managed and monitored, advancing the digitalization of the broadcasting industry.

2.3 Increasing the Installation Height of Overhead Optical Cables

As the prerequisite and foundation for radio and television signal transmission, overhead optical cables play an indispensable role and constitute an important guarantee for signal transmission. To ensure signal transmission stability and security, the installation height of overhead optical cables can be appropriately

increased to expand signal coverage, accelerate the development of overhead optical cables, and improve broadcast quality.

2.6 Strengthening Talent Cultivation

The rapid development of radio and television wireless transmission technology imposes higher requirements on practitioners' comprehensive qualities and professional skills, while also demanding that transmission equipment possess high technological content for effective maintenance and operation, maximizing equipment functionality. Therefore, broadcasting departments must actively cultivate professional technical talent, implementing training and education programs for practitioners, or enhance practical project training. By combining theory with practice, personnel quality and skill levels can be improved, building a highly competent workforce that provides strong talent support for industry development.

With the rapid development of information technology, radio and television technology is gradually being covered by digital technology, enabling the industry to develop toward informatization and digitalization. This facilitates the construction of high-quality signal coverage networks, achieves comprehensive intelligent objectives, and better satisfies public cultural service requirements. Radio and television wireless transmission, as an advanced scientific technology, can automatically detect operational status, automatically control machine switches, automatically repair equipment failures, and allows personnel to send remote control and monitoring commands via computers, thereby further improving broadcasting efficiency and public service quality, providing users with efficient and high-quality services, and realizing healthy industry development.

First, the application of calibration technology. Some developing countries employ calibration technology in radio and television wireless transmission equipment, replacing manual operations with machinery. This eliminates the need for human intervention in transmitter startup and automatically regulates transmitter performance to maintain optimal working conditions. Calibration systems can also scientifically correct and control issues arising during transmitter operation, such as functional failures caused by malfunctions, aging equipment, and heat generation from electric currents, thereby improving transmission quality and ensuring normal maintenance operations. In summary, the application of calibration technology in wireless transmitters helps ensure radio and television transmission quality, reduces personnel workload, and maximizes economic benefits.

Second, the application of virtual instrument technology. Radio and television wireless transmission utilizes electromagnetic waves for signal transmission, making it difficult to monitor signal transmission levels and quality. Traditional monitoring technologies employ field strength meters for single-point manual measurements to assess actual signal transmission conditions. This approach cannot accurately measure or statistically analyze signals, resulting in measure-

ment deviations and preventing scientific evaluation of wireless signal transmission work, thereby hindering technological development. China has achieved certain results in virtual instrument technology research, organically combining GPIB and LabVIEW to develop wireless transmission signal detection system software that uses computers for data acquisition, processing, calculation, and result transmission, further improving signal transmission quality.

2.5 Focusing on Maintenance of Transmission Equipment

Radio and television wireless signal transmission depends on transmission equipment as its prerequisite condition, necessitating daily equipment inspection and maintenance, careful handling of rust prevention and lightning protection. Lightning protection should be implemented using lightning rods and lightning conductors, with strict monitoring of antenna and lightning grid functions to enable timely problem detection and resolution. When conducting rust prevention work on antennas and lightning grids, staff can utilize protective covering technology, electrochemical protection technology, and corrosion inhibitor technology. Notably, equipment rust increases grounding line resistance and compromises lightning protection functionality. Therefore, in specific operations, the characteristics of metallic zinc should be appropriately utilized to prevent steel equipment rust and achieve optimal results. During rainy seasons such as spring and summer, broadcasting staff should pour salt water on wireless transmission lightning protection equipment to prevent rust. After spring and summer, staff should use multimeters and other tools to thoroughly inspect lightning protection equipment grounding points, record resistance at each point, and promptly identify and resolve issues to ensure normal and safe equipment operation.

3. Conclusion

As information technology develops rapidly, radio and television technology is gradually being superseded by digital technology, enabling the industry to advance toward informatization and digitalization. This facilitates the construction of high-quality signal coverage networks, achieves comprehensive intelligence objectives, and better satisfies public cultural service requirements. Radio and television wireless transmission, as an advanced scientific technology, can automatically detect operational status, automatically control machine switches, automatically repair equipment failures, and allows personnel to send remote control and monitoring commands via computers, thereby further improving broadcasting efficiency and public service quality, providing users with efficient and high-quality services, and realizing healthy industry development.

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(Author Affiliation: Monitoring Station of Tibet Press, Publication, Radio, Film and Television Bureau)

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