On the Current Status and Development Trends of Broadcast Television Transmission: Postprint

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Abstract

Transmission technology encompasses both wired and wireless modes, with wireless transmission technology offering distinct advantages over its wired counterpart. Characterized by lower costs and enhanced operability, wireless transmission represents an optimized evolution from wired systems. These innovations have rendered wireless transmission technology increasingly free from technical constraints. Currently, wireless broadcast transmission technology has been deployed across most regions of our country, extending its benefits even to remote rural areas. The ongoing reform and development of rural wireless transmission technology in recent years have enabled populations in increasingly widespread regions to access clear television programming and broadcast information. This paper primarily analyzes the current operational status of wireless television transmission and projects future developments in this technology, aiming to provide valuable references for researchers and developers in the field of wireless transmission technology.

Full Text

Preamble

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A Brief Discussion on the Current Status and Development Trends of Wireless Television Transmission

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Driven by economic growth, people' s quality of life has improved, leading to expanded material demands. Among daily entertainment activities, watching radio and television is extremely popular, prompting higher expectations for clarity, operability, and functionality. Simultaneously, the development of network technology and the rapid dissemination of information via the internet pose significant challenges to the promotion of radio and television broadcasting. How to address these challenges directly affects the survival of radio and television in the future network era. Therefore, strengthening research and development of wireless transmission technology and using it to guide radio and television toward digitalization holds considerable practical significance.

1. Characteristics of Wireless Television Transmission Technology

As society develops toward intelligent lifestyles, wireless television transmission technology has emerged as a key enabler. The rapid pace of change has created pressure for radio and television development, requiring immediate reform to facilitate real-time content updates—demanding new capabilities from broadcasting professionals. The intelligent advantages of wireless television transmission technology effectively address this challenge. First, the technology offers high security, ensuring stable and safe information transmission that guarantees program fluidity and clarity. Second, it demonstrates relative stability; after years of reform and updates, wireless television transmission technology has matured considerably, substantially advancing the radio and television industry.

2. Challenges Facing Wireless Broadcasting

2.1 Operational Confusion in Market Competition

Under China' s socialist market economy, industry competition has intensified, presenting challenges for wireless radio and television. Cable television promotion began around 1980, when local broadcasting departments, seeking stable development, weakened their focus on wireless television, believing it would have negative effects. This hindered wireless radio and television promotion and prevented their value from being realized. Consequently, wireless transmission technology began to be marginalized by the market as a traditional broadcasting model that could not meet audience needs. By the late 20th century, cable television had become commonplace in households, while remote areas adopted satellite receivers. Wireless coverage shrank year by year, causing wireless broadcasting development to stagnate.

2.2 The Dilemma Between Social Welfare and Economic Benefits

Wireless radio and television offer multiple advantages, particularly strong disaster resistance that cable television cannot match. Moreover, wireless television serves as a crucial channel for political discourse and national public opinion guidance. As a public welfare undertaking built by government departments, wireless radio and television development directly affects policy implementation for public services. However, analysis of current implementation reveals that the industry remains underdeveloped, with insufficient social and economic returns. In August 2006, the national mandatory standard for terrestrial digital television DMB-TH was officially approved and implemented on August 1, 2007. Since then, the market position of wireless analog television has weakened, with slow development in recent years.

3. Development Strategies for Wireless Radio and Television Transmission

With the evolution of triple-network convergence, the expanding scale of cable television has created invisible pressure on wireless television. This section discusses potential development paths.

3.1 Fully Utilize Radio Frequency Resources to Build a Wireless Television Internet

To achieve rapid development under triple-network convergence, wireless radio and television must foster innovation, analyze current trends, and leverage inherent advantages. Radio spectrum is a finite, non-renewable resource—68% of frequencies below 1 GHz are allocated to the broadcasting and television system. Maximizing the value of these limited resources can unlock unlimited market potential, enhance economic benefits, and fully realize resource value. As cable networks advance toward triple-network convergence, telecommunications and Unicom have begun using wired/3G networks to transmit television programs, while China Mobile has partnered with China Broadcasting Mobile. Spectrum allocation will become stricter, and frequency applications more challenging, compelling the broadcasting system to accelerate utilization of wireless frequency resources and build a wireless television internet through triple-network convergence. This approach not only promotes healthy growth of the information industry but also transforms the existing television landscape and standardizes television manufacturers.

3.2 Increase Wireless Ratings Through Wireless Television Internet Construction

People have lost interest in traditional wireless networks, meaning wireless broadcasting must build a new internet to maintain its audience and attract users to public welfare networks. Using cost advantages of wireless internet can alleviate national financial pressure on industry investment. This maintains

market position while helping build a positive national image and ensuring comprehensive implementation of both public welfare and economic functions. As wireless radio and television internet serves national propaganda purposes, security reinforcement is essential. Construction should innovate based on existing wireless transmission stations to build backbone networks, maximizing fiber optic, microwave, and satellite access while following the principle of "high quality without interruption, economical yet secure." On this foundation, small-cell technology should be widely deployed to popularize wireless radio and television for public convenience.

3.3 Secure Government Support and Investment to Expand Social Benefits

Wireless radio and television transmission technology construction is a vital national public welfare undertaking requiring indispensable government support. Only through strengthened government construction can public welfare development be ensured. The February 2009 "Notice of the General Office of the State Council on Further Improving Radio and Television Coverage in Rural Areas in the New Era" explicitly identified rural cultural construction as an urgent priority, requiring extensive radio and television coverage in rural areas. The project aimed to enable rural residents in Weinan to freely access four sets each of central, provincial, and municipal wireless radio and television programs, requiring over 90% coverage in rural areas. In May 2010, expert research approved the project. After departmental review in August, the Weinan Municipal Bureau of Culture, Radio, Film, and Television launched construction and organized equipment procurement. By March 2011, all equipment arrived as contracted. After installation and testing, the project exceeded targets within three months, achieving extensive wireless radio and television coverage in Weinan, generating both economic and social benefits.

4. Implementation Measures

4.1 Improve Technical Training Programs and Implement Management Systems

Wireless transmission requires specialized technical expertise and must rely on relevant science and technology. Key measures include: (1) strengthening technical training for broadcasting staff to enhance professional knowledge and technical capabilities; (2) designing diverse activities for experience exchange; (3) hiring professional instructors for internal training or sending outstanding staff to advanced enterprises for technical exchange; (4) improving internal management by perfecting systems including technical management and performance incentives, strengthening supervision, conducting regular maintenance to prevent equipment failures; and (5) promptly understanding and implementing higher-level policy requirements.

4.2 Accelerate Terrestrial Digital Television Construction

Using direct broadcast satellite technology for radio and television transmission eliminates geographical constraints, allowing people in remote areas to enjoy broadcasting services. Improved information dissemination efficiency also facilitates national policy communication, promotes public participation, and enables understanding of regional economic development, broadening social services. Therefore, policies from the State Administration of Radio and Television regarding digitalization must be thoroughly implemented to accelerate digital television development, improve supporting infrastructure, adjust management strategies, ensure stable equipment operation, and ultimately achieve digital broadcasting construction.

4.3 Accelerate Mobile Multimedia Broadcasting Development

With continuous technological updates, radio and television face new opportunities. Mobile multimedia has brought new vitality to the industry. In mobile multimedia formats, information transmission via satellite ensures smooth delivery. This can advance systematic development of the radio and television system. Leveraging mobile multimedia technology optimizes information dissemination efficiency, reduces transmission costs, enables traditional media innovation, and improves network operation efficiency and quality. Simultaneously, operational service quality for information dissemination must be prioritized.

This paper aims to foster China' s unique innovative society and promote harmonious environment construction, thereby providing richer and more positive spiritual and cultural life. Emphasizing technology utilization and combining advanced science to achieve R&D innovation in wireless transmission technology will drive deep reform of China' s wireless television industry, promote wireless television, and guide broadcasting toward the data era. Only this can ensure stable development and effective breakthroughs for China' s wireless television industry.

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