Discussion on Technical Maintenance and Management Strategies for Secure Broadcasting in Radio and Television - Postprint

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Abstract

With the continuous development of China' s social economy, the field of radio and television has ushered in new development opportunities and challenges against this backdrop. To address the problems existing in the development process of the radio and television field, it is necessary to optimize safe broadcasting technologies for radio and television, and to manage and maintain these technologies, thereby ensuring safe broadcasting and promoting the development of the radio and television industry. This paper analyzes the fundamentals of safe broadcasting for radio and television, investigates the primary factors affecting safe broadcasting as well as technical maintenance issues, and proposes corresponding countermeasures to enhance radio and television maintenance management, providing a reference basis for promoting the development of China' s radio and television industry.

Full Text

Discussion on Maintenance and Management Strategies for Broadcast Television Safe Transmission Technology

Abstract

With the continuous development of China' s social economy, the broadcasting and television sector has encountered new opportunities and challenges. To address existing problems in its development, it is essential to optimize safe broadcast transmission technology and strengthen its management and maintenance, thereby ensuring secure broadcasting and promoting the industry' s advancement. This paper analyzes the fundamentals of safe broadcast television transmission, explores the primary factors affecting it and the challenges in technical maintenance, and proposes corresponding countermeasures to improve

maintenance management, providing a reference for promoting the development of China' s broadcasting and television industry.

Keywords: technical maintenance; broadcast television; safe transmission; management

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1. Factors Affecting Safe Broadcast Television Transmission

Safe broadcast television transmission refers to the stable operation of broadcasting platforms, enabling the secure and reliable uninterrupted transmission of massive data and signals from source to terminal without tampering or interference. Under these conditions, users can effectively receive correct guidance and values, ensuring that broadcast content leads to reliable and healthy lifestyles. Analysis reveals that factors affecting the safe operation of broadcast television programs and platforms mainly include the following:

1.1 Human Factors Human factors encompass several critical issues, including weak awareness of safe broadcasting, inadequate safety management rules, and problematic work standards. These issues are directly related to the absence of clear responsibility systems and low rigor in work standards. Additionally, problems arise from business transaction impacts, imbalanced maintenance support, and issues caused during technical project construction. Malicious acts such as equipment theft and facility damage also constitute significant human factors affecting safe transmission.

1.2 Equipment Factors Broadcasting and television system platforms contain diverse and sophisticated equipment. During operation, equipment failures may cause transmission disruptions. Key equipment and facilities requiring attention include broadcast stations, network transmission systems, optical transceivers, set-top boxes, wireless routers, televisions, and supporting systems such as power supply, fire protection, and temperature control systems. These devices are crucial not only for broadcast quality but also for constraining the future development of broadcasting and television.

1.3 Information Factors Information factors are closely related to practical significance. For broadcast television systems to operate normally and correctly, broadcast content must meet relevant requirements, containing material that serves public needs and promotes positive values. Programs should be ideologically healthy, rich in form, and structurally innovative, avoiding vulgarity and the dissemination of erroneous ideas. System reception and presentation must also emphasize security—distinct from content or technical security, this refers to technical-level security where signals can only be transmitted through authorized devices. This process involves security protocols and terms; signals must be transmitted through compliant devices to be considered secure. Simultaneously, signals should only be received by devices meeting security protocols,

working together to achieve broadcasting objectives while ensuring overall process security. User access to media-transmitted information requires controllable transmission and reception endpoints, preventing illegal devices from stealing signals for unauthorized broadcasting or insertion, ensuring content remains unaltered, legal, and legitimate, with IP-related information flowing freely without interruption.

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2. Characteristics and Challenges of Broadcast Television Maintenance Management

2.1 Characteristics of Broadcast Television Technology Maintenance Management Broadcast television technology maintenance management exhibits several key characteristics. First, broadcast times have gradually shortened while program channels have multiplied. In the early stages of China' s broadcast television development, program varieties were relatively limited, yet daily broadcast time reached three hours. However, with the emergence of satellite broadcasting and cable television, frequency utilization has increased significantly, with many broadcasters now offering hundreds of channels featuring round-the-clock broadcasting. Second, transmission and broadcast control systems have become increasingly complex, with broadcast stations housing large-scale audio conversion and synchronization equipment. Information transmission primarily relies on satellite and other communication systems that compress and encode broadcast information into new transmission media. These systems enable real-time monitoring of the entire information source process to prevent interference such as unauthorized insertion, thereby protecting receiver-end signals. Meanwhile, the expanding application of intelligent technology, artificial intelligence, and Internet technology has promoted broadcasting development, forming broadband data networks and mobile Internet platforms. This evolution demonstrates that broadcast television is gradually moving toward intelligent broadcasting.

2.2 Challenges in Technology Maintenance Management First, broadcast television technology and maintenance management mechanisms lack compatibility. While continuous scientific and technological development has improved China' s safe broadcast transmission technology, current maintenance management mechanisms remain inadequate, particularly regarding monitoring systems. The internal monitoring system lacks completeness, failing to meet the intelligent demands of broadcast television and reducing the overall effectiveness of safe broadcast scheduling. Second, broadcast television personnel lack innovative consciousness. Current operational management remains in traditional modes that cannot effectively integrate with modern technology, thereby restricting industry development. Third, broadcast television covers extensive areas, requiring substantial equipment as an operational foundation. However, insufficient investment during development has left equipment in some remote

areas aging, and prolonged overload operation directly impacts safe broadcasting. Fourth, new technologies possess strong advanced characteristics, requiring in-depth research for full application in safe broadcast processes. However, current staff understanding of these technologies remains superficial, preventing clear comprehension of operational features and creating a knowledge gap.

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3. Strategies for Improving Safe Broadcast Transmission

3.1 Optimizing Technology Maintenance Management Systems Establishing technology maintenance management systems forms the foundation for ensuring safe broadcast transmission. Such systems enable tiered management of safe broadcast operations, ensuring orderly management of all workflow stages. Personnel must establish maintenance management systems during broadcasting, transmission, and reception phases to guarantee reasonable signal transmission at each stage. During system development, staff must thoroughly understand safe broadcast transmission technology to ensure systems align with technical characteristics, thereby enhancing comprehensiveness and standardization. Additionally, clear responsibilities for all broadcast television personnel must be defined, with systems effectively implemented in daily operations to ensure stable and sustainable industry development. Personnel must also conduct regular equipment maintenance and record all maintenance activities, labeling repaired and inspected equipment while continuously monitoring operational status to prevent damage. Furthermore, during system development, policies must align with broadcast television technology, with timely updates and revisions when system upgrades occur to maintain rationality and effectiveness.

3.2 Strengthening Talent Team Construction Current broadcast television technology is diversifying, requiring personnel to continuously learn advanced maintenance technologies and explore management knowledge aligned with industry development. From a technical perspective, staff should actively communicate with equipment manufacturers to fully understand modern system development trends, integrating advanced technologies with broadcast television systems through continuous research on safe transmission technology. This ensures maintenance management systems meet contemporary demands and establishes a technically capable broadcast television workforce providing quality services. During talent development, training programs must be targeted, as technical personnel form the foundation for safe broadcasting. Training should encompass network, broadcast television, and media technologies, enabling staff to understand industry development patterns while enhancing their management, learning, and transformation capabilities to promote future development.

3.3 Optimizing System Platform Construction Constructing safe broadcast transmission systems involves extensive content and substantial equipment costs, leaving some regional platforms underdeveloped. To address this, person-

nel should optimize transmission and reception systems while continuously improving broadcast networks and connecting with mobile and telecommunications operators to achieve scaled development. Additionally, increased attention must be paid to broadcast systems and optical cable trunk lines to ensure rational and standardized facility construction. Equipment procurement processes should be refined to ensure devices possess automatic switching functions, thereby enhancing safe transmission technology. Personnel must also prioritize machine room layout, avoiding placement in old buildings where electromagnetic signals may suffer interference. System support software must be secured and reliable, with firewalls and isolation devices protecting broadcast networks. Systems should be inspected regularly, with vulnerabilities addressed promptly to deepen data management and establish management mechanisms ensuring stable and secure information system operation. Furthermore, access permissions must be established within systems and managed by dedicated personnel to optimize overall system performance.

3.4 Enhancing Monitoring and Alert Systems Personnel must continuously study advanced technologies and, after mastering their characteristics, fully apply them to broadcast monitoring systems to supervise audio, video, and text signals. If signal degradation is detected, the system should automatically trigger alarms to alert duty personnel for immediate inspection and problem resolution. Additionally, monitoring systems should be established based on machine room and broadcast platform characteristics to ensure effective control over internal conditions and achieve comprehensive system protection.

3.5 Strengthening Safe Broadcast Management Safe broadcast transmission is critically important, and technical maintenance management personnel must assume management responsibilities, effectively apply broadcast television technology, and implement the "zero-second stop" goal to ensure stable and secure system operation. Management departments at all levels must implement responsibility systems, clearly defining departmental duties while conducting ideological education and supervision activities. Work performance should be regularly inspected, particularly during holidays and special events, to prevent safe broadcast disruptions. Technical maintenance personnel must continuously strengthen their safe broadcast awareness, and enterprises should establish 24-hour duty systems to ensure continuous system monitoring and effective task completion. Broadcast content management significantly impacts safe transmission; therefore, review systems must be established and implemented to ensure content accuracy and security, preventing broadcast errors. During troubleshooting, personnel must detail every aspect of safe broadcast transmission, ensuring each stage receives effective monitoring with dedicated staff responsible for broadcast tasks to eliminate potential hazards. Regular equipment and system inspections must be conducted to maintain stable operation. Enterprises should develop emergency response plans for broadcast systems and conduct repeated drills to identify and correct vulnerabilities, thereby improv-

ing plan feasibility. Performance evaluation systems should be established to manage personnel effectively, rewarding outstanding employees to enhance motivation and ensure safe broadcast transmission. Machine rooms and network stations constitute critical areas; therefore, inspectors must review these zones regularly, checking external personnel before granting access. Additionally, increased attention to broadcast equipment protection should be combined with strengthened cooperation with urban construction, neighborhood committees, and public security departments to form a social joint defense mechanism. Protection regulations for broadcast facilities should be established and publicized, with regular optical cable trunk line patrols and active communication with construction and planning departments to improve system patrol effectiveness. If external interference or system damage occurs during safe broadcast operations, timely reporting is essential to prevent deterioration.

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