

Design Concepts for Automation and Integrated Monitoring Platform for Radio and Television Transmission Stations (Postprint)

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Abstract

With the rapid development of China's economy, the radio and television broadcasting industry has achieved notable progress, playing a vital role in advancing the nation's cultural undertakings. The construction of automation and integrated supervision platforms for radio and television transmission stations presents considerable challenges, yet holds significant value for promoting the development of China's radio and television broadcasting industry. Therefore, investigating the conceptual framework for building such platforms is of great importance. This paper analyzes the construction approaches for automation and integrated supervision platforms for radio and television transmission stations, thereby establishing a foundation for fostering the healthy development of China's broadcasting industry.

Full Text

Abstract

With China's rapid economic development, the radio and television industry has achieved significant progress, playing a vital role in advancing the nation's cultural undertakings. The construction of automation and integrated supervision platforms for radio and television transmission stations, though challenging, holds substantial value for further industry development. This paper analyzes the construction framework for such platforms, providing a foundation for promoting the healthy growth of China's broadcasting industry.

Keywords: Radio and television; Transmission stations; Automated supervision platform; Construction framework

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Introduction

The rapid development of network information technology has led to higher demands for radio and television programs. Providing high-quality broadcast content to the public has become a primary societal concern, necessitating significant improvements in broadcasting technology. Enhancing automation at transmission stations represents the most fundamental aspect of this technological upgrade [1]. This paper first examines the systematization of radio and television transmission stations, then elaborates on the importance of automation, and finally explores recommendations for automated and integrated supervision platforms.

Automation management at transmission stations primarily consists of three components: a comprehensive station management information system, an environmental monitoring system, and a broadcast monitoring system. Each component oversees distinct automation domains while enabling comparative analysis of detection results [3]. The comprehensive station management information system employs network technology to fulfill service functions and platform management, with subordinate television transmission stations as its primary service objects. Its objective is to ensure stable service desk operations by collecting, analyzing, and integrating station information data to control overall transmitter operations, identify existing problems, and monitor station-wide functioning. The broadcast monitoring system primarily serves station transmission signals, enabling real-time monitoring by broadcast room personnel to accurately determine signal strength and transmission trends. Additionally, automated signal quality monitoring subsystems can detect signal quality and transmit monitoring data to the integrated supervision platform for comprehensive analysis, facilitating collaborative monitoring between staff and automated detection to ensure quality assurance. The environmental monitoring system serves as an effective method for hardware detection across television transmission stations, monitoring not only equipment room conditions but also real-time video surveillance and patrol inspections throughout the station. Together, these three components enable automated station supervision and management, establishing a solid foundation for supervision quality and efficiency.

1. Systematization of Radio and Television Transmission Stations

Integrated supervision platforms, network transmission systems, and automated management systems constitute the core components of radio and television transmission station automation. This section analyzes these three modules.

1.1 Integrated Supervision Platform

The integrated supervision platform comprises two main layers: the service layer and the application layer. The application layer encompasses various management and monitoring applications that enable intelligent system information management, system dispatch management, and system maintenance management. These applications monitor the actual conditions of transmission stations, triggering alarms when issues arise in any segment. They also evaluate signal coverage and compile program statistics to ensure normal station operations [2]. The service layer primarily consists of data storage units, database structures, and communication servers, which play a crucial role in maintaining stable back-end system operations.

1.2 Network Transmission System

The network transmission system is built upon communication links and specialized networking facilities, with ADSL and dedicated communication networks enabling VPN-exclusive communications for the system. When constructing the network transmission system, special attention should be paid to incorporating dedicated firewall structures to ensure network stability and security. Additionally, to reduce construction costs, the system's routers can be utilized for module sharing, thereby improving resource utilization efficiency.

1.3 Automated Management System

As the core of the radio and television transmission station system, the automated management system occupies a critical position. It reduces manual operations through centralized management system control of the entire transmission station, enabling real-time monitoring of all transmitters. Staff can access information data at any time and employ intelligent modules for analysis, ensuring transmitter stability [4]. In summary, constructing automated systems for radio and television transmission stations can effectively reduce resource consumption while improving operational effectiveness and quality.

2. Importance of Automation at Radio and Television Transmission Stations

Traditionally, transmission station equipment relied on manual operation, where human error could directly impact system performance. Furthermore, less experienced operators often proved incapable of effectively resolving equipment issues when they arose. Manual operations also imposed limitations on equipment monitoring and management, directly affecting station operations and creating potential safety hazards. To ensure stable station operation, increasing automation levels and constructing unified supervision platforms are essential for improving overall quality and establishing a foundation for enhanced operational standards. During platform construction, particular emphasis should be

placed on scalability, comprehensiveness, convenience, and security. The automation platform also enables remote control, diagnosis, and maintenance of critical system equipment, allowing technicians to maintain remote site equipment through the platform.

3. Central Management System

The central management system of the automated and integrated supervision platform significantly enhances transmission station operational quality. It enables real-time station control, integrated data management, and intelligent equipment maintenance analysis while preserving monitoring and broadcast data. This section analyzes the system's functions.

3.1 Dispatch Management

The dispatch management function includes three key capabilities: (1) Dispatch instructions, which provide task and operation schedule management functions, transmitting task instructions to transmission stations through the data processing center; (2) Schedule modification, which receives program operation data charts returned from various transmission stations and accesses detailed program information to facilitate schedule adjustments; and (3) Dispatch statistics, which establishes databases for daily dispatch task operation charts and program details to support statistical analysis.

3.2 Operation and Maintenance Management

Operation and maintenance management encompasses four functions: (1) Data reception, which automatically receives various broadcast data uploaded from transmission stations, including daily reports, monthly broadcast reports, and abnormal condition alarms, storing relevant data in appropriate databases; (2) Data query, which enables searching by transmission station name, program segment, start time, and other criteria, including combined condition queries and playback obstacle time period information; (3) Data processing, which handles all broadcast and alarm data; and (4) Data analysis, which analyzes and statistically presents program stop-broadcast rates, safe broadcast conditions, and fault information in graphical and tabular formats.

3.3 Broadcast Monitoring

Broadcast monitoring includes five capabilities: (1) Return program storage, which automatically stores programs returned from designated transmission stations to disk arrays; (2) Real-time listening and viewing, enabling the central data processing workstation to monitor, view, and record program signals from any transmitter input or output; (3) Real-time alarming, which receives alarm information returned from the broadcast transmission station management system and provides alerts through voice, text, and SMS; (4) Broadcast information query, which enables searching by transmission station information and

playback of real-time audio-video programs requiring monitoring; and (5) Network management, which displays panoramic electronic maps of transmission station geographic distribution and comprehensively shows station operation status through system topology diagrams.

4. Recommendations for Television Transmission Station Automation and Integrated Supervision Platforms

Constructing automation and integrated supervision platforms for radio and television transmission stations presents considerable challenges, with broad geographical coverage imposing high technical requirements. Therefore, the construction process should prioritize quality over speed. The initial framework should be established first, followed by further expansion. Platform construction should proceed in two main parts, with functions refined subsequently. By establishing a central management system, data from various regional radio and television transmission towers can be obtained and monitored in real time, enabling prompt effective solutions when station failures occur. Automated station management should be implemented based on multiple subsystems in a systematic and targeted manner, with functionality as the primary focus. Human operation should be eliminated in this process, avoiding blind exaggeration of any platform stage's role. Instead, expansion should proceed according to actual conditions to lay the foundation for integrated management and enable automated processing across the entire platform, minimizing actual staff participation while maximizing signal detection and remote monitoring to provide quality radio and television programs for users.

In conclusion, constructing automation and integrated supervision platforms for radio and television transmission stations is crucial for delivering high-quality broadcast programs to the public. This process should particularly emphasize the networking, automation, and informatization levels of transmission stations. Wireless coverage monitoring should be continuously strengthened, shifting from traditional effect monitoring to a combination of operational monitoring and effect monitoring. Establishing an integrated, full-process supervision platform provides the foundation for automated and integrated radio and television transmission station supervision, ensuring the healthy development of China's broadcasting industry.

References

- [1] Liu Jiguang, Miao Bo, Li Xiaoming, Zhao He. Thoughts on the Construction of Automation and Integrated Supervision Platforms for Radio and Television Transmission Stations [J]. Radio and Television Technology, 2011, 38(05): 111-112+114-115.
- [2] Liu Jiguang, Miao Bo, Li Xiaoming, Zhao He. Thoughts on the Construction of Automation and Integrated Supervision Platforms for Radio and Television Transmission Stations [J]. Radio and Television Technology, 2011, 38(06): 111-

115.

[3] Umar Mamut. Design and Implementation of an Automated Signal Detection System for Wireless Radio and Television Transmission Stations [J]. Electronic Production, 2015(04): 146.

[4] Dong Hao. Research on the Design of Automated Signal Detection Systems for Wireless Radio and Television Transmission Stations [J]. Heilongjiang Science and Technology Information, 2017(14): 44-45.

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