A Brief Discussion on the Importance of Television Station Hard Disk Broadcasting Systems in Safe Broadcasting (Postprint)

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Abstract

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Full Text

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This paper, based on the author' s practical work experience, elaborates on how to maximize the security of hard disk broadcasting systems in safe broadcasting from several aspects, including system design, system security, equipment maintenance, and network security.

Keywords: TV station; hard disk broadcasting system; safe broadcasting

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With the development and maturation of digital network transmission technologies, TV stations face increasingly stringent requirements for broadcasting security. Currently, Chongqing Beibei Radio and Television Station employs the Sobey Air dual-channel broadcasting system—a highly professional and typical server-based hard disk broadcasting solution that supports digital HD/SD program broadcasting. The system architecture provides a secure, reliable, and flexible intelligent master control framework using embedded digital SD-SDI signals to accommodate diverse signal scheduling and distribution needs. The hardware and software employ advanced, scientific, and reliable technologies with strong compatibility and scalability, offering flexible configuration, easy operation, emergency readiness, and convenient maintenance. However, a secure broadcasting architecture alone does not guarantee safe broadcasting. Achieving

true safe broadcasting requires comprehensive staff training, diligent daily equipment maintenance, and well-formulated emergency response protocols. This paper analyzes relevant issues through the lens of the Sobey Air dual-channel broadcasting system implemented at Chongqing Beibei Radio and Television Station.

1. Working Principle of Hard Disk Broadcasting Systems

The dual-channel broadcasting subsystem seamlessly integrates with the program production system, achieving true networking, digitization, and workflow optimization for program production and broadcasting. This architecture efficiently supports SD broadcasting for two channels. The broadcasting system comprises broadcasting database servers, broadcasting network management servers, broadcasting MPC migration/up/down conversion servers, MSV broadcasting servers, broadcast control computers, scheduling workstations, upload workstations, and review workstations. A complete broadcasting system should also include an advertising management system, material detection system, secondary storage array, black burst generator, switcher, distribution amplifier, keyer, character generator, up/down converter, frame synchronizer, and other components. The core equipment—the video broadcasting server—utilizes Sobey's MegaServer media server. Four broadcasting servers equipped with four SD cards form the primary and backup broadcasting servers for two channels. This superior design ensures reliable 24/7 continuous broadcasting, delivering a cost-effective, highly stable system with simple maintenance and convenient operation.

2.1 System Security

The hard disk broadcasting system employs two database servers in a mutual primary-backup configuration to enhance operational security. Two background compositing workstations also operate in mutual primary-backup mode to ensure background processing safety. Data is distributed to various subsystems through message queuing. The editing system implements unified user rights management: all staff members have unique accounts and passwords, with different permission levels assigned according to their roles to safeguard system security.

2.2 Audio-Video Control in Program Broadcasting

The audio-video quality in hard disk broadcasting systems directly affects final program output. Effective audio-video control represents a critical factor in broadcasting quality, demonstrating the stringent requirements for AV control in these systems. Professional editing personnel must use non-linear editing system software to effectively schedule and process all programs for broadcast, with final review conducted before transmission to ensure optimal AV quality, enabling viewers to enjoy first-rate audio-video programs.

2.3 Interference from Broadcasting Software and Other Applications

When operating hard disk broadcasting systems, ensuring broadcasting security requires careful attention to interference from other software. Most current hard disk broadcasting systems run on Windows server operating systems, which maintain compatibility with various applications—meaning the broadcasting system can run multiple programs simultaneously, such as antivirus software. However, these applications may conflict with broadcasting software, causing server blue screens or system crashes that seriously threaten normal program broadcasting and potentially cause broadcasting accidents if mishandled. Therefore, during normal operation, hard disk broadcasting systems must uninstall all unrelated software (including antivirus programs) to prevent abnormal pop-up windows, content errors, system blue screens, and other issues, thereby ensuring stable system operation.

2.4 Staff Security and Confidentiality

All system users are assigned unique accounts and passwords, with different permission levels allocated according to their hierarchical roles to ensure system security.

2.5 Power Supply Stability for Hard Disk Broadcasting Systems

To guarantee safe broadcasting, hard disk broadcasting systems typically employ dual-circuit power supplies with large-capacity UPS systems. If one power circuit fails, the other can maintain safe power delivery. When both circuits fail, the UPS system provides emergency power. However, UPS only offers temporary emergency power, not long-term outage protection, necessitating a high-power diesel generator for extended blackout scenarios.

3.1 Importance of Regular Maintenance Management

Hard disk broadcasting systems bear the critical responsibility of daily program production and 24/7 safe broadcasting. System failures can disrupt production of important news, special programs, and advertisements, potentially causing loss of daily materials and precious historical archives, resulting in broadcasting safety incidents. Therefore, maintenance and management of hard disk broadcasting systems are crucial for healthy, stable, safe, and efficient network operation.

3.2 Regular Maintenance Content

Maintenance primarily includes environmental management, fault diagnosis and resolution, backup system components, equipment management, and virus pre-

vention.

First, the machine room environment must meet standards. Since core components of the hard disk broadcasting system are housed in the machine room, environmental humidity must meet national standards with precision air conditioning maintaining stable temperatures. Additionally, management regulations and position responsibilities should be established, with dedicated personnel conducting regular equipment inspections.

Second, staff must promptly diagnose and resolve faults discovered during regular inspections. The process involves analyzing the probable fault direction, organizing symptom information, collecting daily logs from servers, and using professional diagnostic tools for system testing until resolution.

Third, backup critical system components of the same type—such as chassis boards, hard drives, and network cards—to ensure rapid fault elimination using backup components when hardware failures occur, guaranteeing normal program broadcasting.

Fourth, systematic equipment management is essential. Network topology diagrams must be prominently displayed in the machine room for convenient maintenance reference. Equipment inventory lists should be compiled separately to facilitate standardized maintenance, and broadcasting system operation emergency manuals are indispensable.

Fifth, virus prevention is paramount. Computer terminals, as the user-facing nodes in the broadcasting system network, experience frequent operation. TV stations must strengthen terminal security through the following technical and management measures:

(1) All broadcasting system computer terminals are managed through local security policies that restrict installation of all software except specified programs.

(2) All computer terminals have CD/DVD and floppy drives removed with USB interfaces disabled to prevent unauthorized file copying.

(3) A ferry system facilitates file exchange between internal production systems and external systems.

3.3 Establishing Effective Emergency Response Plans

Since both hardware and software in hard disk broadcasting systems are electronic products, comprehensive security and stability cannot be guaranteed—unexpected situations may occur at any time. This requires establishing effective early warning mechanisms based on system characteristics. For instance, when emergencies arise, operators must effectively execute emergency plans such as timely console switching to ensure prompt problem resolution, maintain program broadcasting quality, and minimize broadcasting accidents.

4. Key Elements for Achieving Safe Broadcasting

Prevention is the key to success. To truly achieve safe broadcasting, several requirements must be met: First, the broadcasting system plan must be reasonably designed. Second, system functions should be simple, practical, and user-friendly. Third, dedicated daily maintenance protocols must be established to improve server stability and operational efficiency. Finally, specialized emergency measures must be available, enabling staff to formulate correct on-site emergency responses, with enhanced system training and regular emergency drills to facilitate knowledge transfer.

All capabilities of hard disk broadcasting systems serve the mission of safe broadcasting. Numerous factors affect their stable and secure operation, requiring practitioners to continuously summarize experiences, improve system management and maintenance, and enhance security and reliability to meet the high standards demanded for safe broadcasting.

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