On the Postprint of Safe Broadcasting for Radio and Television

Authors: Yu Hongbing

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

Abstract

With the rapid development of China's radio and television industry, a relatively comprehensive coverage network has been basically established nationwide, characterized by the parallel development of radio and television, the integration of central and local levels, the combination of wireless, cable, and satellite technologies, and multiple forms and layers. Radio and television, through their rich and diverse programs, are playing an increasingly extensive role in social, political, economic, and cultural domains. Against this backdrop, the safe broadcasting of radio and television has become particularly imperative. This paper analyzes and explores the current status, existing problems, and corresponding countermeasures for safe broadcasting of radio and television in China.

Full Text

Abstract

With the rapid development of China's radio and television industry, the country has essentially established a relatively comprehensive broadcasting network that integrates radio and television, combines central and local levels, and employs wireless, cable, and satellite technologies in diverse forms and multiple layers. Radio and television programs, rich and varied, play an increasingly extensive role in society, politics, economy, and culture. Against this backdrop, the safe broadcasting of radio and television has become particularly urgent. This paper analyzes and explores the current status, existing problems, and corresponding countermeasures for safe broadcasting in China.

Keywords: radio and television; safe broadcasting; countermeasures
Classification: TN948.1
Document code: A
Article ID: 1671-0134(2018)09-070-03

DOI: 10.19483/j.cnki.11-4653/n.2018.09.027
By Yu Hongbing

Introduction

Radio and television serve as a crucial link between governments at all levels and the public, as well as an important source of information for the people. Broadcasting systems are characterized by numerous devices, complex processes, and extensive manual operations, making them vulnerable to attacks by hostile forces. Consequently, safe broadcasting faces significant challenges, affecting not only program quality but also carrying major political implications. Therefore, as broadcasting technology professionals, it is necessary to deeply examine the issues in safe broadcasting and propose corresponding countermeasures.

With extensive coverage and a broad audience, radio and television not only enrich people' s cultural life and promote socialist spiritual civilization but also fulfill media oversight functions and serve as a vital platform for the Party and state' s ideological, cultural, and policy dissemination. As a major modern communication carrier, any erroneous or unsafe content during transmission can cause significant political consequences and severely undermine social stability. Moreover, broadcasting stands at the forefront of ideological struggle. Since 2002, the broadcasting system has faced unprecedented challenges, with malicious actors disrupting programs via cable, wireless, and satellite transmission. In response, robust technical preventive measures have been implemented to ensure safe broadcasting.

Definition of Safe Broadcasting

Safe broadcasting of radio and television typically encompasses the following aspects: First, broadcast content must be positive and wholesome, aligned with the Party' s propaganda orientation, ensuring smooth implementation of policies, maintaining social stability, and safeguarding national security. Second, content integrity and stability must be maintained throughout transmission, without interruptions or tampering. Third, technical safety must be ensured for all production and transmission equipment. Given the multitude of devices, processes, and operators in broadcasting systems, any equipment failure or operational error can cause accidents. During signal transmission, wireless signals face challenges from weather changes, natural disasters, and physical obstacles like tall buildings and mountains; overhead or buried cables risk being severed by vehicles or construction machinery; microwave and satellite transmissions may be disrupted by heavy rain, hail, or solar interference. Fourth, public security within and around broadcasting facilities must be maintained to prevent sabotage, with qualified fire protection systems and disaster response capabilities to create a reliable environment for safe broadcasting.

Current Status of Broadcasting Safety in China

With China' s rapid socioeconomic development, the broadcasting industry has experienced extraordinary growth, and safe broadcasting capabilities have gradually improved. There are increasingly more critical security periods for important conferences, major events, and significant occurrences, with stricter administrative oversight and higher requirements from local cultural and broadcasting authorities. In response, broadcasting departments at all levels have increased investment, improved safety management systems, and enhanced technical support, significantly elevating safety standards. A nationwide command and early warning system for safe broadcasting has been established, characterized by strong leadership and rapid response.

For example, early warning and scheduling for CCTV' s *Xinwen Lianbo* (News Broadcast) duration represents a notable achievement. Normally thirty minutes, local stations schedule their own programs after 7:30 PM. However, when important domestic and international conferences or events extend the broadcast beyond 30 minutes, local stations face difficulties in complete relay. To address this, monitoring centers issue early warnings upon notification from CCTV, displaying alerts on warning screens to inform stations of extended durations, effectively preventing incomplete relay incidents. This represents a positive development.

Nevertheless, despite advanced preventive technologies, various broadcast errors and accidents continue to occur frequently nationwide. For instance, a provincial TV station experienced a complete shutdown when the UPS input switch tripped without alarm in either the main distribution room or broadcast studio, only discovered when batteries depleted. Another case involved an educational TV station' s Ku-band earth station where the main high-power amplifier failed at 21:15 on January 12, 2008. The network management system couldn' t switch to the backup, and manual switching proved ineffective until the main amplifier was shut down. Investigation revealed a major configuration flaw with incompatible network management, modulators, and switches. In another incident, hackers infiltrated a provincial TV station' s entertainment channel server, altering databases to fraudulently claim prizes worth tens of thousands of yuan until discovered through a winner' s inquiry. Additionally, a broadcast unit' s duty officer turned off the information warning screen, causing early warning message delivery failure and resulting in broadcast accidents. These incidents serve as alarming reminders requiring deep reflection and improvement.

Problems and Root Causes

Personnel Issues

Accident statistics from broadcasting stations nationwide indicate that human-factor incidents occur most frequently, manifesting in two aspects: sense of responsibility and competence. Managers must recognize the critical importance of the human element in safe broadcasting. Even the most advanced equipment

and systems require human operation, making individual professional quality directly related to broadcast safety quality.

Numerous major accidents result from operational errors, attributable to weak sense of responsibility, poor safety awareness, low political and ethical standards, or management' s failure to cultivate necessary political, overall situation, and responsibility consciousness among staff. Competence poses a major challenge as broadcasting equipment and systems continuously upgrade, with related accidents common nationwide. Safe broadcasting is highly technical, requiring solid technical expertise and proficient operational skills. Some stations have lax recruitment standards, inadequate pre-employment training and assessment, and insufficient mentoring during initial employment periods, leaving staff unprepared for their positions.

Management Issues

Broadcasting units often fail to develop appropriate regulations based on actual conditions, enforce rules strictly, or implement procedures properly. Equipment maintenance lacks clear division of labor and individual accountability, with ambiguous job responsibilities creating gaps and blind spots. Increased automation and changes in operation and maintenance models have led to neglect of manual operation contingency plans and drills, insufficient supervision during maintenance, and critical errors such as unsupervised important operations without verification, all contributing to accident risks.

In daily operation management, besides institutional loopholes, weak supervision, and unclear responsibilities, objective factors include increasing program volume, continuous equipment updates, and expanding, dispersed systems with numerous management links, making rapid integrated response difficult. Management lacks interconnected contingency preparation and overall emergency coordination.

Equipment and Infrastructure Issues

Single-source, limited funding for infrastructure is a major cause of equipment aging and difficult system upgrades. In underdeveloped regions with low fiscal revenue, expensive broadcasting equipment cannot be procured, forcing continued use of old equipment without spare parts. Budget constraints during upgrades lead to incompatible hardware and software, creating technical defects. Aging auxiliary facilities like power supply, antenna feed systems, and grounding networks in some stations frequently cause accidents such as tower collapses.

System Performance and Technical Risks

With the advancement of digitalization, networking, and intelligence, new systems offer enhanced capabilities but also introduce imperfections and vulnerabilities. Unreasonable software and hardware configurations, hardware failures

causing system software loss, and prolonged interruptions have occurred, along with hacking attacks on TV station servers and websites. As digital equipment forms a powerful integrated system, individual device failures can trigger system-wide accidents. Uncoordinated software control and manual emergency response, coupled with outdated management methods ill-suited for new technologies, create difficulties in emergency handling while new management systems remain underdeveloped.

Countermeasures and Recommendations

Developing a High-Quality Workforce

Strengthen ideological and professional ethics education to cultivate correct worldviews, values, and moral standards among staff, enhancing their political, overall situation, and responsibility consciousness while promoting dedication and selfless contribution to establish a solid foundation for safe broadcasting tasks. Regularly organize professional training to improve expertise. As safe broadcasting is highly technical and equipment continuously upgrades, we must strengthen learning of new technologies and knowledge to solve problems. Implement training assessments and certification to ensure staff possess solid technical competence and proficient operational skills, reducing human-caused accidents.

Strengthening Management Systems

Broadcasting units should formulate regulations based on actual conditions, covering studio access management, prohibited activities, shift handover procedures, monitoring systems, maintenance protocols, and technical documentation management. Without strict implementation, safety measures exist only on paper. Accidents due to lax enforcement are common, requiring managers to cultivate compliance as a professional habit through various means.

Given the numerous links and large-scale systems involved, single-department efforts are insufficient. Managers must clarify inter-departmental relationships, define job responsibilities, improve command structures, and enhance collaborative capabilities. During critical security periods, emergency plans should be developed with comprehensive system inspection, testing, and hazard identification. Coordinate with power suppliers, transmission line operators, equipment manufacturers, and system integrators in advance to support safe broadcasting.

Increasing Infrastructure Investment

Actively seek support from local government budgets. Broadcasting departments should formulate development plans based on industry planning, technology policies, and standards to provide scientific justification for budget allocation, while maintaining communication with relevant authorities to address practical difficulties and ensure timely funding. Practice financial prudence by

using funds efficiently and leveraging media advantages through advertising and other revenue-generating activities to diversify funding sources.

Technical Safeguards

Redundant Backup Systems As digital broadcasting systems are vulnerable to single-point failures causing total system paralysis, it is essential to establish independent primary and backup video servers using a dual-machine hot standby configuration. The primary and backup servers must be completely independent without shared components (accident cases show that shared storage between primary and backup servers caused simultaneous interruption when storage failed, rendering the backup system ineffective). This configuration ensures that a failure in one server does not affect the other, preventing simultaneous interruption of both primary and backup signals and avoiding prolonged outages.

Balancing Automation and Manual Control In digital broadcasting, system software manages automatic playback, including inspection, diagnosis, and alarms. However, software can malfunction. Given the continuous and irreparable nature of television broadcasting, manual intervention is essential. The transition from automatic to manual control should be simplified, with staff fully proficient in manual operation techniques and effective emergency handling procedures. Broadcast switchers and switches should feature both manual and automatic modes, equipped with jumper panels and power-off bypass functions, with primary and backup signals sourced from different switching equipment.

Tape-Based Emergency Playback Systems When black screens occur due to inherent material defects in hard disk programs, even dual-machine hot standby may be ineffective. In such cases, tape-based playback systems can provide emergency broadcasting.

Enhancing Network Security As different departments use various input methods—sometimes USB drives, sometimes broadband networks—security risks such as viruses are inevitable. Installing antivirus software on primary and backup broadcast servers conflicts with broadcasting software. Therefore, physical isolation is adopted through local area networks with strict management prohibiting external storage devices. Individual accounts and access permissions are established to prevent unauthorized file access, maximizing network security.

Conclusion

From program production and signal transmission to broadcasting, the system is extremely large-scale, involving numerous devices, processes, and operations. Any equipment failure or human error can cause accidents. This paper provides a preliminary discussion of issues prone to causing accidents in broadcasting

systems and corresponding countermeasures. Safe broadcasting tolerates no negligence; it requires a modest and prudent attitude, practical efforts, and continuous exploration of more scientific management concepts and more effective preventive measures to address emergencies.

References

[1] Li Haiping. Discussion on Management Issues of Safe Broadcasting in China [J]. Digital Communication World, 2016(1): 60-62.
[2] Zhao Haipeng, Kang Junkai, Yang Tai. Problems and Challenges Faced by Safe Broadcasting [J]. Cable TV Technology, 2017(4): 61-62.
[3] Pan Zhexin. Training Materials for Safe Broadcasting Management in National Broadcasting Systems [G].

(Author' s affiliation: Broadcasting Department, Shanghai Chongming District News Media Center)

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