ChinaRxiv

AI translation · View original & related papers at
chinarxiv.org/items/chinaxiv-202310.02710

Digital and Network Technologies for Broadcast Center Playout Control Systems (Postprint)

Authors: Si Hongbin

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

Abstract

With the evolution of the times and in accordance with the relevant requirements of the State Administration of Radio and Television, radio stations have accelerated the process of in-house digitization and networking. However, in future development, how radio stations can achieve true digitization and networking remains a critical challenge that must be addressed. This paper primarily focuses on the broadcast center control system and provides a brief analysis of digital and networking technologies.

Full Text

Preamble

Digital and Networked Technology of Broadcast Center Control Systems

Abstract: With the evolution of the times and in accordance with relevant requirements from the State Administration of Radio and Television, radio stations have accelerated their internal digitalization and networking processes. However, achieving true digitalization and networking remains a critical challenge that radio stations must address in future development. This paper provides a brief exploration of digital and networked technologies centered on broadcast control systems.

Keywords: radio station; broadcast control transmission digitalization; networked technology
Classification Code: G202
Document Code: A
Article ID: 1671-0134(2017)05-111-03
DOI: 10.19483/j.cnki.11-4653/n.2017.05.040
Author: Si Hongbin

When designing broadcast center control systems, the following principles should be adhered to: advancement, scalability, economy, and ease of management. With the advent of the network information age, digital and networked technologies have developed rapidly, bringing significant changes to the broadcasting industry. These advances have substantially improved program acquisition, production, and dissemination efficiency, while also greatly enhancing program broadcast quality and security. As times change and develop, digitalization and networking represent inevitable trends for radio stations. The following sections provide a brief analysis of the digital and networked technologies for broadcast center control systems.

1.2 System Architecture

In broadcast control systems, the core systems primarily consist of two components [1]: the switching system and the audio signal transmission system, which handle the majority of control tasks including signal transmission, detection, and monitoring. By fully utilizing networked master control systems, a new conceptual framework can be established with the AOIP audio transmission protocol at its core, employing switches, PCs, and Ethernet as media, with routers serving as system interfaces, as shown in Figure 1 [Figure 1: see original paper].

System Principle: In radio station studios, input signals pass through a distributor into the digital matrix system. This matrix system achieves signal distribution and effectively accomplishes free switching of broadcast tasks, connecting multiple functional systems [2] such as monitoring, audio fill, and slow recording. Consequently, operators can utilize WEB browsers to achieve system control.

1.4 Software Module Structure

The broadcast center control system designed in this paper mainly includes the following software modules: audio fill, audio matrix, audio monitoring, and audio slow recording. The main functions are: achieving program broadcast switching and distribution; receiving program signal sources from superior station front-end rooms; employing bypass bridging for broadcast channels that can obtain signals from both studios and the matrix while enabling emergency broadcasting to ensure sufficient flexibility; and implementing unified network management to achieve linkage among various devices such as matrix systems, audio level monitors, and switchers.

The software modules mainly include [3]: master management station, advertisement management station, review workflow, and program broadcast workflow. The following analyzes two of these modules.

2.1.1 Master Management Station Workflow

In the system, the master management station workflow is a key procedure that specifically includes: first, user type settings; second, program and template operations. Administrators can perform relevant operations using dedicated passwords.

2.1.2 Broadcast Program Broadcasting System Workflow

This system is designed for program hosts, who can achieve timed playback and live broadcasting through relevant operations. The interface contains an all-day program schedule that hosts use to understand daily broadcast programs. In this column, programs are pre-arranged and difficult to modify. The lower left corner of the interface contains advertisement schedules and fixed-point programs. Fixed-point programs have the advantage of priority broadcast level, allowing programs to interrupt advertisements at any time during broadcast and enabling active broadcasting. The upper right corner features a shortcut key bar, allowing hosts to play music at will during program playback, significantly improving program broadcast efficiency.

2.2 System Database Design

The rationality of database structure has a crucial impact on program stability. The broadcast control system database charts are mainly divided into: first, the audio matrix module database table; second, the recording station data table. In the audio matrix module data table, the main design fields include: input audio, naming, port ID, number of screen groups, etc.

3.1.1 Advanced Nature

Each radio station has its own advantageous characteristics. When selecting solutions, it is essential to choose those that match one's specific circumstances. In the development of radio broadcast control systems, digitalization and networking are the solutions. The selection of core equipment leaves room for future development.

3.1.2 Security

The critical status of broadcast control systems necessitates security and reliability. High-reliability designs must be adopted for key components, such as dual power supply configurations. Backup signal sources and redundant paths should be selectable to disperse system risks.

3.1.3 Strong Operability

When designing master control, it must be capable of handling complex environments, allocating signal switching and distribution requirements, and provid-

ing rapid response to special failures. Additionally, the master control system should feature strong operability, complete monitoring capabilities, and automatic/manual strategies.

3.2 Main Functions

The audio network system typically includes the following equipment: switches, disk array cabinets, and servers, along with management workstations, production workstations, and broadcast workstations. The audio network system primarily uses gigabit Ethernet as its backbone. For security backup, dual-server hot backup is employed, while RAID5 is used for array cabinets to ensure audio signal data security.

4. Issues Requiring Attention in Radio Station Digitalization and Networking

Management models must align with technology. In the history of radio station development, the application of digitalization and networking holds significant importance. Technological progress itself indirectly requires corresponding development in technical management to adapt. Under the premise of ensuring security, economic costs and benefits should be calculated from a management economics perspective to improve efficiency, increase equipment contribution rates, and enable radio stations to enhance their economic benefits while improving social effects. The phenomenon of high-end equipment idleness should be prevented, and the effective utilization of software and hardware equipment should be strengthened. In the digital transformation of radio stations, efforts should be made to achieve: integrated production and broadcasting, resource informatization, and humanized operation. During development, radio stations should leverage their program content advantages, take corresponding measures to enhance their competitiveness, and enable their content advantages to be realized through technical means. Additionally, the emergence of internet radio brings both challenges and significant development opportunities to radio stations.

5. Key Technology Analysis

After establishing a data information return platform, data exchange between the office network and broadcast network becomes extremely important. Ensuring the security of these data returns is a critical issue. This system mainly utilizes new data transmission methods to address this problem. The new transmission method is what we know as the data bridge. The data bridge acts as a transfer agent between internal and external networks within the system, positioned between internal and external networks with corresponding software controls to enable data conversion. In this exchange and transmission mode, no other network protocols are used in the server connection between internal and external networks; instead, dedicated data interfaces are used to enable access.

During specific data transmission, the data bridge must judge data legality and structure to ensure legal data transfer and virus-free data.

The data bridge process is roughly as follows: at the request server end, data is effectively extracted according to specific user requests, then queued by time sequence, waiting for processing. The data bridge then transfers the content from the request queue to the system's internal network. The server in the system internal network receives these queues and reads the data. After data reading is completed, data can be transmitted for processing to the application server. According to automatic settings, transmission files are transferred to designated locations, and databases are filled according to actual needs.

This system has many functions: first, it can collect signals from all station studios; second, transmission function. Additionally, it can perform multi-node monitoring of various channel broadcast workflows, comprehensively monitor some key equipment, and achieve alarm and fault handling.

6. Conclusion

With changing times and development, the continuous advancement of networked technology and digital technology has driven the further development of radio stations. The new broadcast control system operates stably, produces good broadcast signal quality, greatly improves radio station work efficiency, solves adverse factors such as station paralysis, and has good application prospects.

(Continued from page 106)

3.4 Cloud Storage Enables Audio Program Sharing

Cloud storage systems can provide unified data storage, data management, indexing, calling, and various intelligent services for broadcast media resource sharing and data exchange systems, facilitating use and resource sharing by editors and journalists from various channels. It reduces waiting time for uploading and downloading audio materials, improves audio material storage and retrieval efficiency, and significantly enhances overall system stability. An easy-to-manage, randomly expandable, efficiently utilized, safe, and reliable cloud storage system represents the development direction for radio station audio storage.

3.5 Cloud Storage Enables Audio Program Distribution Across Different Channels

Using cloud storage technology can build a massive audio program database for radio stations, complete program content digitization and centralized storage, highly concentrate various program resources of the station, achieve co-

construction and sharing of programs across channels, and integrate web broadcast, audio, video, images, mobile multimedia, and other resources to achieve multi-channel publishing of program content and diversified operations of radio station programs.

3.6 Using Cloud Storage to Establish User Payment Platforms

Cloud storage technology builds a customer service platform in the radio station's collection, editing, and broadcasting system, provides paid programs according to customer needs, continuously accumulates new audiences, forms new industries, opens profit channels for radio stations, and promotes the healthy development of broadcasting.

4. Conclusion

Cloud storage technology is the most promising storage technology for the broadcasting industry. It accelerates internal resource integration, sharing, and optimization of radio stations, enables radio stations to gradually achieve cloud-based audio program storage, and brings advanced technologies such as cloud storage virtualization, dynamic program delivery, random expansion of storage resources, and unified allocation of system facilities into full play. It reduces local server pressure, shortens editors' and journalists' waiting time for uploading and downloading, and improves storage and retrieval efficiency. The widespread application of cloud storage in the radio and television industry will receive responses from broadcasting practitioners.

References: [1] Wen Yang. Digital and Networked Technology of Broadcast Center Control Systems [J]. Radio and Television Information, 2015(11): 32-33.
[2] Wei Ping, Fang Jun. Analysis of Digital and Networked Broadcast Control Systems and Issues for Radio Stations [J]. China New Technologies and Products, 2011(12): 16-17.
[3] Shou Zhenan. Building a New Generation Digital and Networked Radio Station Broadcast Control System [J]. China Digital Cable TV, 2010(04): 493-495.
(Author's affiliation: Henan People's Radio Station)

Cloud Storage References: [1] Tang Jian. Analysis and Application Research of Cloud Storage Systems [J]. Computer Knowledge and Technology, 2009, 5(20): 13-14.
[2] Wang Lingjun. Cloud Computing: A 21st Century Business Platform [M]. Beijing: Electronics Industry Press, 2008.
[3] Zou Hengming. The Mind of Computers: Philosophical Principles of Operating Systems [M]. Beijing: Mechanical Industry Press, 2004.
[4] Feng Dan. Research and Progress on Key Network Storage Technologies [J]. Mobile Communications, 2009(6): 35-39.
(Author's affiliation: Tianjin Radio and Television Station)

ChinaRxiv 中X

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

Source: ChinaXiv — Machine translation. Verify with original.