Postprint: Construction of the Digital Audio Automatic Broadcasting System for Ninghai Radio Station

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

Abstract

This paper mainly elaborates on the digital audio automatic broadcasting system of Ninghai Radio Station, and explores and analyzes its construction and development based on digitalization, networking, and automation.

Full Text

Preamble

Construction of Ninghai Radio Station's Digital Audio Automatic Broadcasting System

Abstract: This paper elaborates on the digital audio automatic broadcasting system implemented at Ninghai Radio Station, exploring its construction and development based on principles of digitization, networking, and automation.

Keywords: digital; automatic audio broadcasting

Classification Code: G202

Document Code: A

Article ID: 1671-0134(2017)07-090-02

DOI: 10.19483/j.cnki.11-4653/n.2017.07.029

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1. Construction Principles for County-Level Radio Digital Audio Automatic Broadcasting Systems

Audio workstations have become widely adopted in practice, offering relatively high cost-effectiveness, simple operation, and excellent editing capabilities. While configuring such systems is generally straightforward, professional implementations must adhere to fundamental principles. These principles are as follows:

First, the principle of safety and reliability. This is the primary and overarching principle throughout system construction, ensuring data security and stability under all conditions. Even when system failures occur, protective measures must be available. Both hardware and software should incorporate fault-tolerant capabilities to guarantee system stability.

Second, the principle of high quality. This represents the fundamental objective of the entire system. During construction, channel specifications must meet Grade A standards or higher to effectively satisfy data transmission requirements.

Third, the principle of economic efficiency. System construction must ensure optimal performance-to-cost ratios, avoiding excessive capital investment.

Fourth, the principle of scalability. The system must possess compatibility and extensibility, enabling seamless integration with other systems. Beyond meeting immediate needs, the system should support station expansion and smooth upgrades.

2. Construction of Ninghai Radio's Digital Audio Automatic Broadcasting System

Digital audio production, compression, and transmission configurations are generally standardized, though software configurations vary. The director's booth contains relatively minimal equipment, primarily including a THS3A telephone bridge, director's remote control box, three telephones, HiVi M200 monitor speakers, VX442 and PCX11+ sound cards. The sound cards primarily function for data reading, enabling retrieval of songs and music from the data center while also providing access to entire program schedules. The Sonifex S2 series digital broadcast mixing console features multi-channel input/output signals, PFL/cue fader-start automatic monitoring mute, and channel EQ functionality. The automatic monitoring mute function eliminates speaker output when a microphone fader is raised, preventing howling and resonance that can occur if monitor volume is left on—avoiding both startling audio feedback and potential speaker damage. This function represents another critical safety feature. Input channels include optional gram input amplifiers, and two main/backup stereo audio buses with output selection capabilities. The broadcast studio employs a DY3000 digital audio delay device capable of delays up to approximately 85 seconds in 1-second intervals, featuring 2-second error correction, cough protection,

and bypass modes. The device passes signal directly when powered off, offering precision that ensures broadcast safety while simplifying operations. The THS3A telephone bridge connects to the director's booth via the host remote control box and can interface with external telephones through control modules.

2.4 Scheduling Station and Management Station

The scheduling and management stations share similar configurations with the slow recording station, differing primarily in their installed software—the Prolink scheduling software and management software, respectively. The scheduling station serves two main functions: first, providing administrators with permissions for broadcast program template scheduling, including template creation, modification, and deletion, as well as program list creation, recreation, and rescheduling; second, enabling program scheduling operations, allowing authorized personnel to query, schedule, modify, and delete programs. The management station provides administrators with permissions for database file backup, deletion, and restoration.

2.6 Central Control Room

The central control room houses primary equipment including servers, slow recording stations, audio distributors, modulators, optical transceivers, tuners, switchers, patch panels, monitors, keyboard-mouse trays, and two televisions. The server operates on the Win2000ADV OS with SQLSERVER software for database restoration and backup. The two televisions enable direct visual monitoring of broadcast signal levels, facilitating prompt response to anomalies. Tuners receive RF signals from upstream stations, while audio distributors amplify and allocate signals from the mixing console—one path to modulators for transmission to the television room and distribution via cable TV lines, another path to slow recording stations for recording, a third path to optical transceivers for delivery to FM transmitters, and additional feeds to monitoring televisions for visual signal level observation and to provide signal sources for the station's website. The keyboard-mouse tray allows technicians to operate both servers and recording stations through a single keyboard-mouse set via switching controls. The patch panel enables signal routing and switching.

The slow recording station operates on the WIN2000 ADV OS with Prolink slow recording software and VX442 sound cards, capable of simultaneously recording 16 stereo audio channels continuously for 24 hours. Each channel's recording schedule can be independently configured across seven days, with real-time volume level bars providing clear, intuitive display. The system supports network-based real-time monitoring of any input signal, non-linear recording query and download, log query and printing, and stop-broadcast alarm functionality. When signal interruption is detected, audible alarms activate with customizable alert tones for each channel, enabling duty personnel to rapidly identify fault points. An optional automatic music fill module activates when signal interruption occurs. Department managers, technical operators, program

editors, and advertising clients can utilize the slow recording station to systematically monitor broadcast programs and advertisements, enabling systematic design, analysis, and management of overall programming. In practice, the system effectively performs four-channel slow recording, recording replay, stop-broadcast detection and alarm, and recording monitoring functions, while integrating with audio workstations to satisfy recording requirements and maximize overall system effectiveness.

3. Conclusion

The construction of Ninghai Radio Station's digital audio automatic broadcasting system is based on actual development needs, integrating current conditions and future development directions through scientific design. By continuously optimizing and improving equipment on the existing foundation, the system promotes intelligent, digital, and information-based development.

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