

## Development and Issues in Broadcast Center Technology: Postprint

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### Abstract

With the development of science and technology and societal progress, people's lifestyles have gradually transformed, placing higher demands on traditional broadcasting. Consequently, the functions of broadcasting have slowly evolved, progressively developing toward diversification, pluralization, and networking. As the core of radio stations, broadcast center technology will inevitably advance toward modernization; however, the development process will inevitably encounter various urgent problems requiring solutions. This article briefly analyzes the current development of broadcast center technology and examines its existing issues, aiming to provide references for in-depth industry research on broadcast center technology.

### Full Text

## Research · Technology and Art: Development and Existing Problems of Broadcast Center Technology

### ChinaXiv Cooperative Journal

**Abstract:** With the advancement of science and technology and the progress of society, people's lifestyles have gradually changed, placing higher demands on traditional broadcasting. Consequently, the functions of broadcasting have slowly evolved, moving toward diversification, pluralization, and networking. As the core of radio stations, broadcast center technology will inevitably develop toward modernization. However, various urgent problems inevitably arise during this development process. This article briefly analyzes the current development of broadcast center technology and examines its existing problems, aiming to provide references for in-depth research on broadcast center technology within the industry.

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Radio broadcasting is a traditional yet extremely important mass media. Even in this modern information age, it still maintains powerful influence. With the progress of the times, China's radio broadcast center technology has become increasingly mature, developing toward digitalization, networking, and intelligence. However, constrained by various factors, the development of broadcast center technology has been seriously hindered, affecting the further development of the broadcasting industry.

## **1. Development of Broadcast Center Technology**

### **1.1 Digitalization, Networking, and Intelligentization**

Whether looking at international broadcasting counterparts or domestic radio stations, broadcast center technology is moving toward digitalization and networking, with in-house production and broadcasting following suit. On one hand, most radio stations have adopted digital and networked production and broadcasting consoles, with audio equipment featuring standard interfaces. This eliminates the need for rewiring or major renovations—only corresponding changes at the broadcast front-end are required to achieve digital, networked, and intelligent program broadcasting. On the other hand, this approach is not limited by in-house frequencies, columns, or programs, and can even break through inter-station boundaries. Through broadcast program sharing platforms, various program productions and multimedia information can be shared, achieving comprehensive sharing of resources, programs, and information. This fully leverages broadcasting's advantages of speed, strong timeliness, and large information capacity, completely overturning the traditional operational model where each radio station worked in isolation. Moreover, after years of development and transformation, China's radio stations at all levels have initially established a digital, networked, and intelligent program production and broadcasting system: the audio production and broadcasting system is a fully digital broadcasting system with digital production and broadcasting consoles at its core; the program production and storage system is a networked system with audio workstations at its core, laying a solid foundation for further interconnection and sharing of programs and resources.

### **1.2 High-Quality Surround Sound Broadcasting Gaining Popularity**

Surround sound refers to the reproduction of sound sources from different directions in the original signal during music playback, giving listeners a sense of being surrounded by sound. In other words, surround sound can create an immersive experience for listeners. Surround sound is also a form of stereo sound—ordinary stereo is equivalent to a plane, while surround sound is equivalent to

a spherical surface, requiring at least three channels with listeners positioned at the center of sound sources. China's surround sound radio broadcasting is still in the experimental stage. The first station to broadcast in surround sound was "Pop 1057 Channel," which began broadcasting in January 2004 to an audience of over 20 million. It implemented surround sound simulation broadcasting while maintaining the original broadcast architecture and receiving equipment. Although compatible with existing stereo systems, the surround sound effect was suboptimal. China National Radio began experimental surround sound broadcasting in the summer of 2008 and compared the effects of compatible systems versus digital format surround sound. The results showed that digital format surround sound was significantly better. This demonstrates that achieving good surround sound effects and high-quality music requires digitalization. Swedish Radio introduced DTS-format 5.1 multi-channel encoded audio file transmission to its website in 2001. Although this service was not publicly advertised, it was highly sought after by audiophiles. Despite the large file sizes, they did not hinder downloads. Statistics show these audio files have been downloaded over one million times since 2001, with 40% coming from outside Sweden [1]. The public response far exceeded expectations. After broadcasting recordings and programs in DTS-format 6.1 channels in February 2003, the broadcast sound quality was widely praised by listeners. This shows that high-quality surround sound broadcasting is increasingly pursued by audiences. Currently, China is gradually introducing surround sound compatible design, and many recording studios have implemented surround sound program recording, such as CCTV, TV Drama Production Center, and Zhejiang Radio and Television Center [2].

### **1.3 Network Multimedia Broadcasting Becoming the Mainstream Trend**

Due to frequency and transmission power limitations, traditional broadcasting has significant limitations for listeners—once heard, it cannot be searched or retained. With the development and maturation of network technology, searching and saving text, audio, images, or video via the internet has become very simple. Using the internet for multimedia broadcasting or expanding related extended services is also very common, offering low cost, quick results, and easy updating and transmission. Through network multimedia broadcasting, audiences can listen synchronously or asynchronously via downloading; they can not only hear audio but also view related images and videos; they can receive content both fixedly and mobilely. With the development of network technology, people can now achieve real-time reception using just a mobile phone. Additionally, features such as on-demand, saving, and searching enhance personalized services. In this era of rapidly developing digital multimedia technology, broadcasting will inevitably develop toward networking and high quality, while listening will develop toward globalization, comprehensiveness, and all-weather availability.

#### 1.4 Diversified and Targeted Services of Traditional Broadcasting

With social and economic development, people's pace of life is accelerating and quality of life is improving. People not only demand high-quality material life but also high-quality spiritual life. For broadcasting—a medium that enriches spiritual life—people are no longer satisfied with passive listening but increasingly value information's practicality, timeliness, and accuracy. To meet the needs of listeners from all walks of life, major radio stations have begun segmenting the market, creating many specialized broadcasts such as traffic radio, music radio, automotive radio, supermarket information radio, etc., to satisfy different audience needs [3]. Simultaneously, using mobile communication technology to improve traditional broadcasting enables listeners to receive not only audio but also synchronized text, images, charts, video, and other information to meet the demands of fast-paced life, such as DAB, DRM, HD RADIO, mobile broadcasting, etc. [4]. Furthermore, broadcasting interactivity is increasingly enhanced, with radio stations paying more attention to communication and interaction with audiences, emphasizing two-way selection to create personalized services for audiences.

## 2. Existing Problems

### 2.1 Network Security Issues

The production and broadcasting network is the dominant network in broadcasting, controlling the entire program process including recording, management, scheduling, and broadcasting. With continuous development and maturation of science and technology, the network functions of the production and broadcasting network are constantly improving, with increasing reliability and security. According to relevant statistics, radio stations at municipal level and above in China have all established and completed installation of automated broadcasting systems. The development of production and broadcasting networks has effectively improved program production efficiency, transformed traditional broadcast program production methods and processes, optimized radio station program resources, and thereby improved broadcast program quality. However, the production and broadcasting network itself has certain security issues. Network system security directly affects the normal conduct of various program production operations at radio stations, while network framework security is an important prerequisite for normal program broadcasting. To ensure in-house data security and safe program broadcasting, network security must be guaranteed through various technical means to strengthen network system maintenance, supplemented by other network security systems.

### 2.2 Secure Internal-External Network Transmission Issues

For security considerations, automated broadcasting networks used by various radio stations are in-house local area networks (LANs). From a physical connection perspective, LANs are independent from external networks and not

connected to the internet, providing relatively high security [5]. However, with the widespread application of network technology and digital technology, radio station journalists can now use the internet to transmit audio and video programs collected in the field in real time. As demands for information timeliness continue to increase, most journalists choose to use the internet to transmit recorded materials from outside the station to inside. Due to LAN limitations, editors cannot directly send received programs to the broadcasting network but must conduct secondary re-recording before they can be used for broadcasting. This not only affects the timeliness of materials but also reduces their utilization efficiency to some extent. However, if both internal and external station networks are connected to the internet, information security cannot be guaranteed. How to achieve secure and efficient information exchange on the basis of the internet has become an important issue facing radio stations at all levels in China and is also an urgent problem that needs to be solved for the development of China's broadcasting industry.

### 2.3 Program Copyright Protection Issues

With the rapid development of the broadcasting industry, cooperation between various radio stations in China continues to strengthen. To fully utilize resources, program exchange and sharing between stations are increasing. However, with the development of digital technology and network technology, various pirated audio and video files are emerging endlessly, making program and work copyright management and protection increasingly important. Radio stations are also facing program copyright protection issues. To standardize the national radio station program trading market and achieve win-win outcomes for program content creators, program disseminators, and consumers, radio stations at all levels and related research institutions have conducted in-depth research, exploring digital copyright management and protection issues for radio program content disseminated through traditional and new media. Relevant departments are also researching this issue and formulating a series of national and industry standards for radio program content copyright management and protection. Additionally, various encryption technologies are gradually being promoted in radio stations at all levels, such as digital watermarking technology and digital fingerprinting technology.

## 3. Conclusion

In summary, the 21st century is an era of informatization and networking, with rapid technological development and emerging new technologies, new media, and information dissemination methods. People's information needs are also undergoing earth-shaking changes, with more and more people demanding personalized and intimate services. As broadcasting professionals in this era, we must not lose sight of this theme in our daily work, recognizing that traditional broadcasting can no longer adapt to modern development and audience demands. The broadcasting industry will inevitably develop toward diversifi-

cation, pluralization, high quality, and internal-external integration. What we need to do is analyze and solve the problems encountered during development to promote the further development of the broadcasting industry.

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

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