An Analysis of Radio and Television Broadcasting Technology Development in the Digital Network Era (Postprint)

Authors: Wang Yubo

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Abstract

Against the backdrop of comprehensive scientific and technological development in China, the broadcast television industry has witnessed further advancement. In particular, the elevated development level of the current broadcast television industry has facilitated more extensive application of digital technology within this sector. As pivotal components of the current broadcast television industry, networking and digitization have gradually emerged as mainstream development trends for the industry' s future. Internet television represents a significant product of the current information age, exerting certain influences and impacts on traditional broadcast television dissemination while resulting in a notable decline in television viewership. The integration of broadcast television technology and network technology constitutes an irreversible primary direction. In light of this, this paper examines the development of broadcast television technology in the network-digitization era, aiming to provide more scientific work guidance for industry practitioners.

Full Text

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An Analysis of Broadcasting Technology Development in the Digital Network Era

Abstract: Against the backdrop of comprehensive scientific and technological development in China, the broadcasting industry has achieved further progress. In particular, the advancement of the broadcasting industry has led to more extensive application of digital technology in this sector. As a key component of the current broadcasting industry, networking and digitization have gradually become the mainstream development trends for the future. Internet television,

an important product of the information age, has not only impacted traditional broadcasting but also significantly reduced television audiences, making the integration of broadcasting technology and network technology an irreversible direction. Based on this, this paper examines the development of broadcasting technology in the digital network era, aiming to provide more scientific guidance for practitioners.

Keywords: network; digital era; broadcasting technology

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Author: Wang Yubo

1. Development History of Network Digital Broadcasting Technology

Initially, Chinese television programs primarily relied on time-sampling methods for full-frequency analog-to-digital conversion, enabling the transmission of television images. To more effectively enhance user audio-visual experiences in practice, amplitude modulation transmission methods were also frequently employed [1]. Against the backdrop of current information technology development, IT has achieved effective integration with various industries in society, and analog signals used previously have gradually been replaced by digital signals. This endows digital signals with stronger transmission efficiency and can effectively improve system stability and anti-interference capabilities in current information dissemination processes. Presently, digital and network technologies have become key focus areas in China' s broadcasting industry development, making digital applications an inevitable important development trend for the future.

Research on the development of the broadcasting industry reveals that network technology has brought new development opportunities and conditions to this sector. Therefore, against the backdrop of rapid broadcasting industry development, appropriately integrating network information technology is essential. Due to limitations in its own technological development, the broadcasting industry' s audience base has gradually decreased, making the integration of network digital technology and broadcasting technology the main direction for future development. Based on this, comprehensively analyzing the technical advantages and characteristics of broadcasting, fully absorbing network technology strengths, and integrating broadcasting technology with network technology can not only provide more effective assistance for broadcasting industry development but also accurately grasp the "Internet Plus" era requirements during the development process. However, how to integrate broadcasting technology and network technology in this new era context remains the most pressing issue facing current industry development. It can be said that comprehensive research

on the digital network development of broadcasting has profound implications for China' s broadcasting industry development. The following sections will provide a detailed examination of this issue.

2. Current Development Status of Network Digital Broadcasting Technology

Against the backdrop of comprehensive development in China' s broadcasting industry, network digital technology has gradually replaced traditional signal analog technology, even transforming the entire information dissemination model. Current development of China' s broadcasting industry focuses on two main aspects: First, the networking trend of the broadcasting industry [2]. The development of China' s broadcasting industry has been increasingly influenced by network technology, achieving the requirement of full coverage of broadcasting networks. Network information media has become the most widely used information dissemination tool for people, and particularly against the backdrop of stable IT development, the steady development of the broadcasting industry has also brought significant progress to China' s Internet television. Second, in the digital construction process, digital signals have gradually replaced traditional analog signal transmission, finding extensive application in broadcasting stations across various regions.

3. Main Technologies and Functional Advantages of Network Digital Broadcasting Technology

3.1 Improving Information Dissemination Efficiency

In the process of information dissemination, network digital broadcasting technology possesses inherent advantages unattainable by traditional signal analog technology. This is not only because the network' s digital transmission method demonstrates more significant information transmission capabilities, but also because of its high transmission quality and strong shareability [3]. With robust scientific and technological support and advanced equipment in current network digital broadcasting technology, more comprehensive advantages can be demonstrated in technology application. Furthermore, digital network television information transmission methods do not experience magnetic interference with surrounding electronic devices and systems, exhibiting strong independence and better satisfying public demand for information sharing.

3.2 Achieving Reasonable Control of Operational Costs

Analysis of traditional broadcasting programs reveals that program broadcasting is difficult to separate from staff involvement, and only through collaborative efforts from various aspects can program broadcast quality be improved. Under the influence of Internet television, the audience base of traditional broadcasting has shown a gradual decline, yet program broadcasting costs remain difficult to

control effectively [4]. In this context, integrating broadcasting technology with network digital technology can effectively achieve high-level sharing of information resources. Broadcasting stations only need to upload pre-edited programs in advance to enable distribution across multiple platforms, eliminating the need for real-time editing. This approach can effectively control operational costs while expanding broadcasting coverage, significantly and positively impacting industry competitive advantage enhancement.

3.3 Transforming Audience Experience Methods

Compared with other technical approaches, the effective integration of broadcasting technology and network digital technology will more significantly expand the original development space of television broadcasting, effectively facilitating the timeliness of information data dissemination. This not only assists audience groups in accessing information channels but also provides the public with more diversified choices. Additionally, the effective combination of the two technologies ensures that audience groups of different ages can better select broadcast content according to their own needs and experiences. Through reasonable content selection, traditional issues of poor audio quality or video resolution can be improved, providing audiences with superior audio-visual experiences and comprehensively enhancing audience satisfaction with broadcasting services [5].

3.4 Promoting the Advantages of Network Dissemination Platforms

Against the backdrop of rapid network technology development in China, the efficient and convenient Internet has gradually become a focus of attention, not only providing convenience for people' s lives but also enabling them to acquire knowledge through the Internet in relaxed learning or working environments. For a long time, broadcasting programs have been an important component of public spiritual entertainment and a crucial means for people to obtain external information. Therefore, to better satisfy public spiritual and cultural needs, it is necessary to strengthen the construction and optimization of Internet sharing platforms, thereby breaking through time and space limitations. For current industry development, shared network platforms can also significantly promote the development of the broadcasting industry and effectively advance public spiritual entertainment needs.

4. Strategies for Improving Network Digital Broadcasting Technology Development Level

4.1 Strengthening the Construction of Comprehensive Network Service Systems

Through analysis of current digital network broadcasting development, network service is not only a main component of industry development but also a key research focus for technical personnel [6]. However, research on current network service terminals in China reveals that many network systems still suffer from

incompatibility issues. Therefore, the most critical task is to unify network technology standards, thereby strengthening adjustments to current service models during the process of establishing comprehensive network services and better integrating effective information into network systems. This approach can not only significantly control network information usage costs but also substantially improve work efficiency, providing greater development space for the integration of computer networks and broadcasting networks, thereby enhancing the development level of China' s broadcasting industry.

4.2 Effectively Integrating Network Information Resources

The combination of computer network and broadcasting technology has significantly promoted the development of traditional network broadcasting. To improve information service efficiency, traditional network broadcasting information service media must also achieve scientific expansion of new media businesses during the comprehensive development of information technology and Internet technology. Only by reasonably mining information resources in cyberspace can various information resources be effectively integrated, thereby increasing various value-added data service businesses during in-depth information processing [7]. In practice, the scope of broadcasting cooperation should be actively expanded to formulate more distinctive development pathways based on actual public needs. This approach promotes and guides the integration of broadcasting industry and enterprises, guiding the broadcasting industry with more advanced technologies during continuous technical standard updates, thereby providing effective assistance for industry diversification.

4.3 Improving Television Program Broadcast Quality

Although current Internet technology development has, to some extent, promoted research and application of network technology in China' s broadcasting industry, achieving improvements in television program quality and content enrichment, certain limitations still exist in actual development [8]. Especially against the backdrop of continuous social and economic development, societal demands for broadcasting programs are becoming increasingly stringent. At present, China' s broadcasting programs mainly involve 4K and 8K resolutions, with numerous high-quality audio programs and channels increasingly becoming the preferred choice for audiences. However, many broadcasting programs still remain at the 720P resolution stage. Even though relevant departments have strengthened promotion of 4K set-top boxes, effective promotion of 4K content sources remains unachievable, failing to meet basic public television demands. In this context, for the broadcasting industry to achieve more comprehensive development, it must strengthen the integration of network technology and digital technology. The integration should not be limited merely to enriching set-top box types but requires continuous exploration and innovation to achieve effective development of co-construction and sharing. For instance, practical work could strengthen cooperation with major video websites, such as partnerships with

iQiyi, Mango TV, etc., coordinating copyright relationships to develop more scientific and reasonable video resources, thereby providing users with superior viewing experiences. Meanwhile, we must recognize that, influenced by technical levels, the digital integration between broadcasting technology and network digital technology is a goal difficult to achieve in the short term. Therefore, personnel must objectively attempt more integration methods and approaches to ensure complementary development of technical advantages between the two, thereby ensuring comprehensive improvement of program quality.

4.4 Achieving Effective Application and Expansion

Generally, hybrid network on-demand systems primarily utilize the bidirectional characteristics of Internet technology to configure digital television downstream channels, thereby improving customized content and user demands for website portals and broadcasting more high-quality television programs [9]. Current hybrid network on-demand system transformation in China exhibits significant disparities, making regional transformation situations less than optimistic. Therefore, during the integration of broadcasting technology and network technology, it is also necessary to continuously strengthen the reasonable application of telecommunications broadband technology, using the Internet as a return channel to more effectively expand broadcasting interactive services.

4.5 Improving Program Content Innovation

Currently, China' s broadcasting industry primarily focuses on generating more economic returns during development but neglects the development and application of other functional aspects in many areas. Additionally, influenced by Internet television, significant constraints have been imposed on market scope. Therefore, future broadcasting development should strengthen the integration of network digital technology and broadcasting technology to build a more complete culturally distinctive market. Meanwhile, although the integration of network digital technology and broadcasting technology can greatly enrich program types and content, it remains in a continuous development and innovation stage, making it difficult to transform technical optimization advantages into industrial chain development value [10]. Consequently, besides innovating broadcasting program content, it is also necessary to achieve continuous development of technical means in the application of network digital technology.

4.6 Promoting Simplification of Remote Editing

Strengthening the application of network digital technology in the broadcasting field can not only significantly improve television program editing efficiency but also substantially expand public access to cultural information. The main advantage of digital technology lies in its ability to simplify remote editing of broadcasting, thereby controlling and shortening working hours [11]. Therefore, during remote editing, staff can also search online to obtain desired relevant materials, using digital editing technology and equipment to more effectively trans-

mit information and simplify editing workflows and content. However, many problems still exist in the simplification of editing processes in China, with obvious imperfections remaining in overall system development. Consequently, to address these issues more effectively, future work should strengthen technology research and exploration. During the improvement and upgrading of relevant technologies, the adaptability of technical equipment should be enhanced to more effectively obtain and master problem-solving solutions and countermeasures. Only in this way can the reasonable application of digital technology in the broadcasting field be ensured, thereby attracting more audiences during the process of improving program quality.

In future broadcasting development, to achieve greater progress, it is necessary to optimize technology from a developmental perspective, thereby addressing work issues with a dialectical viewpoint and attitude. Based on currently mastered technologies, resource space should be expanded, and business development should be continuously achieved. Only in this way can the construction and development of information resources be ensured.

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(Author' s Affiliation: Yiwu Radio and Television Group Co., Ltd., Zhejiang Province)

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