Postprint: Smart Broadcasting Development in the 5G Era

Authors: Shang Dongxia

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Abstract

With the continuous development of science, technology, and network technology, China has entered the 5G era. The advent of 5G has presented numerous development opportunities for various industries. Consequently, all sectors must align with the developmental characteristics and prospects of the 5G era to effectively improve and innovate their existing development models and methods, thereby achieving modernization transformation. In the current broadcasting and television industry, it is imperative to integrate the features of the 5G era and incorporate 5G technology to enhance the effectiveness and quality of practical operations, thus constructing smart broadcasting and television and accelerating information dissemination.

Full Text

Smart Broadcasting Construction in the 5G Era

Taiyuan Broadcasting and Television Station, Taiyuan, Shanxi 030024

Abstract

With the continuous development of science and network technologies, China has entered the 5G era, which has brought numerous opportunities for growth across all industries. Consequently, every sector must effectively improve and innovate its existing development models and methods by aligning with the characteristics and prospects of the 5G era to achieve modern transformation. In the current broadcasting and television industry, it is essential to integrate 5G technology in accordance with the features of the 5G era to enhance operational effectiveness and quality, thereby constructing smart broadcasting and accelerating information dissemination.

Keywords: 5G technology; smart broadcasting; live interaction; human-computer interaction; sensors

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The report of the 19th National Congress of the Communist Party of China explicitly emphasizes the importance of developing and innovating communication methods to enhance the dissemination capacity, guidance, influence, and credibility of news and public opinion. For the broadcasting and television industry, the vigorous development of 5G technology requires implementing the spirit of the 19th Party Congress from a holistic and coordinated perspective to fully leverage the opportunities presented by 5G. This will enable successful transformation of broadcasting in the 5G era, promote the effective application of 5G technology in smart broadcasting construction, and improve the efficiency of information transmission.

1. Overview of Smart Broadcasting

In the process of constructing smart broadcasting in the 5G era, relevant personnel must thoroughly analyze and research the characteristics and primary working approaches of smart broadcasting to lay a foundation for subsequent work. As China' s 5G and big data technologies continue to develop, cities are constantly evolving and transforming, with smart cities becoming the main direction and pathway for urban development. Through the construction of smart platforms, commerce and networks can be integrated to form extensive systems that not only enhance urban development but also facilitate daily life. Against this backdrop, the concept of smart broadcasting has gained widespread popularity. Relevant personnel need to undertake large-scale 5G technology deployment on the basis of existing cable networks to effectively innovate and adjust broadcasting development models and patterns [1]. Managers must develop cross-regional and cross-network services on current operations, establishing new models and frameworks for media services and information service operations. Staff should effectively innovate their previous work modes and concepts, then integrate 5G technology perfectly into the broadcasting industry to construct new frameworks, enabling the broadcasting industry to achieve sustainable development and improve its quality in the 5G era.

Therefore, in practical work, relevant personnel must pay greater attention to this issue, integrating 5G technology into all aspects of smart broadcasting construction. Centered on broadcasting 5G and relying on media convergence, cloud-network integration, cable-wireless integration, data and IoT integration, technology-culture integration, and B2B2C business fusion, we should promote network intelligence, service convergence, and product ecosystem development.

This will achieve new infrastructure network upgrades, new product and service enhancements, and innovative new scenario applications, thereby effectively improving the development level of smart broadcasting.

2. The Role of 5G Technology in Smart Broadcasting Construction

The technical characteristics of 5G are "high bandwidth, low latency, and wide connectivity." In the development of 5G, high bandwidth makes 4K and even 8K high-definition video services a primary advantage for broadcasting development, low latency enables real-time information interaction, and wide connectivity creates close relationships among various smart devices. In the process of broadcasting development, it is essential to firmly grasp the characteristics and development opportunities of 5G technology to promote successful transformation and effectively improve the level and effectiveness of smart broadcasting construction.

During broadcasting construction, effective extension and expansion must be undertaken in both horizontal and vertical dimensions. As a digital lifestyle service provider, broadcasting should carry out new infrastructure work based on content, highlight industry characteristics and 5G technological advantages, promote production and broadcasting upgrades and station-network integration, refine the new audio-visual field, and demonstrate the broad application space of broadcasting 5G. In terms of content production, ultra-high-definition and VR/AR have become the future direction of video services, but the massive data generated also places higher demands on information transmission speed. With its large bandwidth and low latency features, 5G enables high-speed broadcasting and live streaming of ultra-high-definition and VR/AR video content. Furthermore, 5G' s ultra-high transmission speed allows large amounts of computation to be "cloud-based," facilitating lightweight equipment.

5G network' s high speed and low latency will drive technological and product-level innovation in broadcasting. High speed refers to 5G networks achieving transmission speeds of up to 125 GB per second, 1-100 times faster than 4G, which precisely meets the transmission speed requirements of AR and VR equipment. Low latency significantly reduces the possibility of delays and buffering, substantially improving media content quality. In essence, 5G networks unleash comprehensive imagination for the application of intelligent technology in content product and model innovation. With the continuous development of artificial intelligence technology in China, AI has been widely integrated into the broadcasting industry, effectively addressing previous shortcomings. For example, using speech recognition for TV control improves the efficiency of information acquisition for customers and enhances satisfaction with news dissemination and content services, though it suffers from high latency, slow recognition, and insufficient real-time interaction. In the 5G era, 5G+AI will enable deep integration in program quality, program selection, targeted advertising, and human-computer interaction, significantly improving previous experience

deficiencies and fully exploiting the value of broadcast content, thereby providing new development opportunities and enhancing development levels [2].

In smart broadcasting construction, first, applying 5G technology can effectively improve transmission rates. In mobile scenarios, terminals require rates exceeding 10M to deliver high-definition video experiences to users. However, in the 5G context, ordinary users can achieve rates of 100M, while high-end users can reach gigabit levels, with support for multi-screen interaction and synchronized multi-screen video viewing, transforming daily life and news acquisition methods. Second, applying 5G technology in smart broadcasting helps expand broadcasting development beyond television programs, enabling social media functions and broadening the scope of broadcasting construction. Users can satisfy their information needs through mobile communication networks and wireless local area networks, and can also access real-time digital broadcasting, achieving comprehensive coverage.

3. Pathways for Smart Broadcasting Construction in the 5G Era

3.1 Smart Home Construction in the 5G Era

In the 5G era, the concept of smart homes becomes clearer, and televisions reaching thousands of households will give broadcasting companies with telecom operation licenses unparalleled advantages in the 5G era. On one hand, 5G' s large bandwidth will gradually popularize 4K and even 8K high-definition live broadcasting, and the large screen advantage of televisions will greatly enhance viewing experiences. Meanwhile, the promotion of emerging applications such as AR and VR continues to strengthen the experiential advantages of television, making it the core device of smart homes. On the other hand, each television has a unique identification number that can communicate in real-time with mobile terminals of major operators anytime and anywhere, truly realizing smart home services centered on smart TVs. This connects various smart home devices closely through 5G networks and local area networks, forming a nationwide network that extends smart homes beyond the original small family unit to all parts of the world, with qualitative improvements in security and convenience.

With the large bandwidth and low latency of 5G networks, cloud computing and artificial intelligence will play greater roles in smart homes. Voice interaction will provide instant interaction effects that feel face-to-face, while AR and VR bring immersive experiences, evolving smart homes from physical households to nationwide virtual families. This enables family members working, studying, or traveling in different locations to enter the virtual home anytime and experience the feeling of home, delivering ultimate experiences. In smart home services, we should connect smartphones, TV terminals, and home information terminals, form a high-quality, full-media comprehensive information content service system centered on audio-visual services by sensing users' life needs, and build small home IoT systems through smart home information terminals to form a

collaborative system between audio-visual content services and life services.

3.2 Enhancement of Live Interaction Experience by 5G Systems

In smart broadcasting construction under the 5G era, relevant personnel must fully leverage 5G technology advantages to achieve effective business expansion and extension, thereby improving broadcasting construction levels. With 5G' s ultra-high uplink and downlink bandwidth and powerful big data platform processing capabilities, combined with VR technology, we can construct immersive interactive live broadcasting. Hundreds of cameras deployed in studios capture on-site information comprehensively, big data processing platforms synthesize holographic images and project panoramic images to audiences through VR glasses, enabling users to experience live broadcast effects at home. On this basis, audiences can also change perspectives according to their preferences, forming a holographic interactive live broadcast where everyone is a director. Similarly, using high-definition cameras to capture real-time high-definition images of audiences and transmit them back through 5G networks, AI and cloud computing can perform intelligent recognition of ultra-high-definition images, conduct real-time analysis of changes in studio audience expressions for comprehensive emotional analysis, and provide multi-dimensional real feedback on program and production effects to adjust program strategies promptly, significantly improving content quality.

3.3 Cultivating a New Ecosystem for Smart Broadcasting

In the current era, smart broadcasting construction has become a major social development trend. With 5G licenses, broadcasting can become a provider of platform-based ecological service systems by building open platforms and intelligent network nodes. Smart broadcasting networks should achieve transformation from "watching TV" to "using TV," creating a new "smart broadcasting" ecosystem around government, commercial, and civilian applications, thereby establishing a diversified and intelligent ecological service system oriented toward governments, enterprises, and ordinary consumers. For government use, we can launch integrated innovative businesses such as learning lecture halls, Xueliang Project, smart cities, and smart tourism. For commercial use, we can facilitate rural e-commerce development. For civilian use, we can support telemedicine implementation. Therefore, in practical work, relevant personnel must fully leverage 5G technology advantages, cultivate a new ecosystem for smart broadcasting, and fully exploit the advantages and roles of big data technology to effectively aggregate and utilize data resources in the broadcasting industry.

In constructing home information terminals, we need to establish smart home services centered on smart TVs to provide users with more diverse audio-visual programs. Additionally, we must strengthen cooperation and exchanges with education and tourism industries to achieve virtual education and virtual tourism, opening up new markets and effectively enhancing economic growth points for

the broadcasting industry to achieve a new round of smart innovation and promote stable industry development.

3.4 Creating New Ideas for Smart Broadcasting Construction

To improve the effectiveness and quality of smart broadcasting construction in the 5G era, relevant personnel must implement effective reforms and innovations. 5G technology will drive the development of the Internet toward the Internet of Things. With the continuous development of human-computer interaction technology and sensor technology, we must constantly innovate and adjust broadcasting construction models to explore more application scenarios and effectively improve construction results. The advantage of 5G networks is fast transmission speed, which can maximally meet actual signal transmission needs and requirements. In the current era, we need to strengthen the effective development of 5G products and achieve fully intelligent mode applications.

For example, the 2019 Spring Festival Gala already utilized 5G transmission, where cameras and broadcasting vehicles could be connected wirelessly through high-bandwidth, low-latency 5G networks to achieve effective high-definition signal transmission. This approach not only reduces live broadcasting costs but also enables flexible camera positioning, effectively solving previous limitations in camera work. Therefore, in smart broadcasting construction, we must strengthen the application of new technologies to achieve successful transformation in production methods and models. As China' s wireless digital TV coverage network continues to expand, radio and television have achieved full 5G network coverage, and some wireless broadband networks have been effectively integrated, presenting new development models and postures for radio and television. Consequently, radio and television must pay greater attention to high-quality and innovative development to provide important direction and main ideas for smart broadcasting construction.

For instance, we need to undertake digital conversion of wireless radio and television to achieve high-definition signal transmission through wireless digital coverage projects, realizing revolutionary changes and opening up new development opportunities for the new era. To strengthen the construction effect of intelligent broadcasting, we must expand the functions of IoT gateways and data gateways to effectively innovate converged media business formats and lay a solid foundation for smart city construction.

3.5 Developing and Cultivating New Business

In smart broadcasting construction under the 5G background, we need to develop new businesses beyond existing operations to demonstrate new development models and achieve successful transformation and innovative development of broadcasting media. In practical work, businesses can be divided into video and non-video categories. In video innovation, we can integrate terrestrial mobile digital broadcasting or drone live broadcasting to multi-dimensionally sat-

isfy user needs and requirements for broadcasting. In non-video innovation, we can expand mobile immersive education and entertainment functions, using 5G technology as the main entry point for effective attempts.

In practical work, we must also strengthen the cultivation of talent for relevant positions and introduce more 5G technology professionals to provide important support and guidance for actual operations. Relevant personnel can conduct optimized layout from a holistic perspective, deeply explore 5G application models, focus on improving video quality to gain business expansion dominance. For non-video businesses, they can become primary economic growth points for the broadcasting industry, enabling broadcasting media to enhance their competitiveness and develop new emerging businesses. Notably, in practical work, we must conduct model design and system architecture, conduct multi-dimensional trials and development of products, ensure orderly operations through close connections among various links, and integrate high-end technologies under basic conditions and market environments to establish innovative business models, thereby providing sufficient development platforms and space for the broadcasting industry.

In the process of smart broadcasting construction in the 5G era, relevant personnel must improve their work quality and competence, achieve effective transformation and innovation in technology and development models, firmly grasp new opportunities in 5G construction, and combine the advantages of 5G networks and artificial intelligence to enhance the level and quality of smart broadcasting construction, thereby promoting the stable development of the broadcasting industry in the current era.

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Author Profile: Shang Dongxia (1967-), female, from Xiaoyi City, Shanxi Province, senior engineer, research direction: radio and television technology.

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