

On the Development Direction of Radio Broadcasting (Postprint)

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Abstract

With technological advancement and the rapid emergence and development of new media, traditional radio stations face critical decisions regarding survival and development. Only by leveraging their incomparable traditional advantages such as strong credibility and content specialization, optimizing signal coverage, maintaining a clear understanding and strategic planning for the development direction of radio broadcasting, advancing with the times, and pursuing innovative development can they sustain a vigorous posture of survival and development and continue moving forward.

Full Text

Preamble

Abstract: With technological advancements and the mushrooming emergence and development of new media, traditional radio broadcasting faces critical choices for survival and development. These new media leverage their respective advantages in fierce competition, continuously squeezing the audience base of traditional radio stations. However, traditional Chinese radio broadcasting possesses incomparable unique advantages, including well-established coverage networks, a strong audience base, high credibility, and specialized content. Only by leveraging these traditional strengths, optimizing signal coverage, maintaining a clear understanding and planning of development directions, and advancing through innovative development that keeps pace with the times can traditional radio broadcasting maintain vigorous vitality and forge ahead.

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1. The Unique Advantages of Traditional Radio Broadcasting: Diverse and Complementary Coverage Methods

Traditional radio broadcasting has evolved to possess multiple coverage methods including wireless transmission, wired transmission, internet transmission, and satellite transmission, which can complement and penetrate each other.

1.1 Wireless Transmission Coverage

For wireless FM/AM broadcasting, the objective signal relay transmission capability enables excellent coverage signals across vast regions or for dispersed users. Therefore, wireless transmission coverage has been widely applied due to its economic practicality, relatively inexpensive receiving equipment, simple reception, and well-established coverage networks, resulting in a massive audience base.

1.2 Wired Transmission Coverage

For dense urban or town user groups, wired transmission coverage can be fully utilized. Primarily through FM broadcasting, signals are directly transmitted via cables to destinations or transmission stations. Using cable television networks as the transmission medium, radio broadcast signals and other professional data information can be delivered with high transmission quality, wide bandwidth, high spectrum utilization, and superior resistance to electromagnetic interference, enabling stable signal transmission. This has become an important means of radio broadcast signal transmission and coverage. However, since wired transmission only allows fixed reception requiring physical cable connections, this coverage method has certain developmental limitations.

1.3 Internet Transmission Coverage

With the deepening development of the internet, technicians have integrated the advantages of various network infrastructures to transform radio audio signals into digital signals through data processing methods. These signals are then transmitted via the internet to users' mobile phones or computers. This not only brings qualitative changes to audio broadcasting but also significantly enhances practicality and effectiveness through features such as interactive querying, repeat on-demand listening, and multiple presentation forms including graphics, images, and voice, rapidly meeting audiences' demands for faster and higher-quality listening experiences.

1.4 Satellite Transmission Coverage

When employing the aforementioned coverage methods, medium and shortwave broadcasting suffers from several drawbacks: difficult service area control, multipath interference, significant wall-penetration attenuation, and susceptibility to airborne electromagnetic environmental influences. These factors affect smooth and efficient signal relay transmission, resulting in poor sound quality that fails to meet listener requirements. While FM broadcasting offers better sound quality, its coverage range is inherently limited and difficult to expand rapidly, posing obstacles for further signal coverage development. For online listening, the requirement for specific software and hardware on receiving devices leads to relatively high reception costs, creating difficulties for popularizing this transmission method. Consequently, satellite transmission coverage has been increasingly adopted for broadcast program transmission and coverage. This satellite transmission technology can deliver radio audio signals to various relay stations, transmission stations, and cable television networks as audio sources, thereby solving large-area, long-distance signal transmission problems and becoming the most effective tool for current transmission and coverage.

2. Main Advantages of Satellite Transmission Coverage

2.1 Extensive Coverage Area

Compared with the signal relay transmission of wireless coverage and the fixed, cable-connected transmission of wired coverage, satellite broadcasting's greatest advantage lies in its more extensive coverage area. Theoretically, a single satellite can cover tens of millions of square kilometers, and only a few satellites are needed to achieve global coverage. By actively adopting satellite direct broadcast technology to develop radio broadcast signal coverage, China's broadcast population coverage rate can be easily and substantially improved.

2.2 Superior Signal Quality and Shorter System Construction Period

Wireless and wired signal transmission coverage methods require establishing numerous transmission stations and monitoring stations to ensure coverage effectiveness. These approaches involve long construction periods, complex coverage debugging, and substantial investments in human, material, and financial resources. However, constrained by objective geographical environments, they cannot fully guarantee signal transmission quality.

Satellite transmission coverage can avoid the environmental electromagnetic pollution caused by high-power transmission in wireless coverage methods while solving problems of poor listening effects due to multipath interference, wall-penetration attenuation, and airborne electromagnetic environmental influences. Furthermore, it can address the fixed reception limitations of wired transmission and the issues of low reception costs but sound quality

heavily affected by network bandwidth in internet transmission coverage. In essence, satellite transmission coverage can simultaneously solve coverage, sound quality, and listening problems, better satisfying audiences' demands for faster and higher-quality listening experiences.

2.3 Investment Savings

Traditional signal transmission coverage methods require extensive use of FM transmitters as signal sources, relying on overlapping coverage radii to achieve national broadcast coverage. A commonly used 5kW FM transmitter costs approximately 500,000 RMB per unit, with a full-power single-unit coverage radius of merely 50 kilometers. To achieve national signal coverage would require at least 1,300 units, costing 650 million RMB just for transmitter procurement, plus hundreds of millions in annual operation and maintenance expenses—an exceptionally enormous investment. In contrast, satellite broadcast transmission coverage requires only approximately 5 million RMB annually for satellite uplink station leasing, broadcast channel leasing, and program transmission fees combined. This approach not only achieves substantial investment savings but also delivers superior signal coverage effects.

3. Development Directions

3.1 Developing Pure Digital Audio Broadcasting

Digital audio broadcasting can satisfy diverse reception habits for fixed, portable, and high-speed mobile reception while resisting signal fading and multipath interference, delivering pure sound quality. Under equivalent coverage conditions, it requires significantly less transmitter power than traditional analog FM broadcasting, meeting people's demands for high-quality broadcast listening, mobile reception, and multimedia broadcast reception.

3.2 Enhancing Seamless Coverage of FM/AM Synchronized Broadcasting

Among various radio broadcast coverage methods, FM broadcasting is currently the primary means of radio broadcast coverage, satisfying mass listening demands with relatively high quality. Utilizing FM synchronized broadcasting can establish three-dimensional traffic broadcast systems as needed by various organizations, with rapid and timely information transmission that can be adjusted according to actual conditions, providing audiences with more timely and accurate information delivery. Additionally, developing digital broadcasting in the AM band can compensate for the problem of frequency resource consumption in current medium and shortwave broadcasting frequency-based networking, conserving scarce frequency resources and energy while achieving “seamless” medium-wave synchronized coverage and improving sound quality.

3.3 Mutual Penetration Between Traditional and Online Broadcasting

Traditional radio broadcasting faces limitations where listeners with different requirements can only choose one program at any given moment, even when interested in multiple simultaneous programs, causing them to miss other content. Online broadcasting, leveraging network storage advantages, is unrestricted by time and space. Whether brief news or in-depth reports, classical opera or popular music, listeners can select and repeatedly listen to their preferred programs at any time, breaking through the real-time listening limitation of traditional broadcasting and eliminating the frustration of missing important programs, thereby satisfying personalized listening demands. Simultaneously, when listeners wish to express opinions and interact on topics of interest, traditional hotline and SMS interaction methods are severely limited by broadcast scheduling and communication with directors and hosts. With online broadcasting, audiences can fully express their views in network forums, allowing topics to receive thorough exchange and discussion.

3.4 Developing Value-Added Services

Traditional radio stations should fully utilize existing resources and their advantage in specialized content to actively build online broadcasting websites. By leveraging the transmission advantages and resource storage benefits of online broadcasting, they can produce programs that better meet audience needs, thereby forming unique core competitiveness and practicing the principle of “content is king” to gradually develop value-added services. By combining traditional and modern advantages and characteristics, and allowing various interactive coverage methods—wired, wireless, network, and satellite—to complement each other’s strengths, promote mutual development, advance with the times, and innovate continuously, radio broadcasting can maintain vigorous vitality and forge ahead.

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

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