Development of 6G Technology and Its Innovative Applications in the Integrated Media Field (Postprint)

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Date: 2025-07-09T15:43:24+00:00

Abstract

[Objective] The ultra-high transmission rates and extremely low latency of 6G technology aim to significantly enhance the dissemination efficiency and quality of integrated media content. Leveraging the powerful connectivity and big data processing capabilities of 6G technology, integrated media can achieve personalized content recommendation and precision marketing. 6G networks can collect user behavioral data, interests, preferences, and other information in real time, and conduct in-depth analysis. [Method] Innovative methods of 6G technology in integrated media industry operations, 6G technology can optimize resource allocation in the integrated media industry through intelligent algorithms. 6G networks can monitor data across various business segments in real time, and the high speed and low latency of 6G can support more high value-added integrated media services. [Result] Innovative results of 6G technology in the integrated media field, intelligentization and efficientization of content creation, in terms of dissemination effectiveness, 6G technology has brought significant improvements. [Conclusion] Innovative conclusions of 6G technology in the integrated media field, 6G technology and integrated media have achieved deep integration and brought about innovative transformations. 6G technology has prompted the expansion and reshaping of integrated media business models.

Full Text

Preamble

Development of 6G Technology and Its Innovative Applications in Integrated Media

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Abstract

Purpose: 6G technology, with its ultra-high transmission rates and extremely low latency, aims to significantly enhance the dissemination efficiency and quality of integrated media content. Leveraging 6G's powerful connectivity and big data processing capabilities, integrated media can achieve personalized content recommendations and precision marketing, as 6G networks can collect and deeply analyze user behavior data, interests, and preferences in real time. **Methods:** This study explores innovative operational methods for the integrated media industry enabled by 6G technology, including optimizing resource allocation through intelligent algorithms. 6G networks enable real-time monitoring of data across various business segments, and their high speed and low latency can support more high-value-added integrated media services. **Results:** The innovative applications of 6G technology in integrated media have led to intelligent and efficient content creation, with significant improvements in dissemination effectiveness. **Conclusion:** 6G technology has achieved deep integration with integrated media, bringing transformative innovations and reshaping business models in the industry.

1. Innovative Applications of 6G Technology in Integrated Media

In the integrated media domain, 6G technology will fundamentally transform how video content is transmitted and consumed. Ultra-high-definition video (such as 8K, 16K, and even higher resolutions) will be transmitted effortlessly, allowing audiences to enjoy clearer and more realistic visuals [6]. This ultra-high speed will provide robust network support for various emerging applications [10]. Simultaneously, 6G will facilitate the development of immersive experiences, such as virtual reality (VR) and augmented reality (AR) applications in integrated media. For instance, news reporting can employ VR technology to place audiences on the scene as if they were physically present, while sports broadcasting can leverage AR technology to provide viewers with real-time enhanced information like player statistics and tactical analysis, significantly enhancing audience engagement and experience [1].

Numerous research institutions and enterprises are actively investing in 6G technology development. According to relevant reports, several countries have al-

ready launched 6G research programs, with commercialization expected around 2030. Terahertz communication, characterized by ultra-high data rates and significant propagation loss, is particularly suitable for short-range wireless communication scenarios, such as providing ultra-high-speed network coverage in hotspot areas, enabling holographic communication requiring massive data rates, and supporting ultra-high-speed data center communications. Therefore, terahertz communication applications in these scenarios can be regarded as a future enhancement of millimeter-wave communication to meet the capability requirements of 6G applications [20].

Terahertz band communication represents a key research direction for 6G technology. The terahertz band offers abundant spectrum resources, enabling higher transmission rates than 5G [9][11][13]. The deep integration of artificial intelligence with 6G is also a major research focus. AI technology can optimize 6G network resource allocation, intelligently predict network traffic, and enable automatic fault diagnosis and repair. For example, machine learning algorithms can be employed to optimize power allocation at 6G base stations, thereby improving energy efficiency.

1.1 Enhancing Content Distribution Efficiency and Quality

6G technology's ultra-high transmission rates and extremely low latency aim to significantly improve the efficiency and quality of integrated media content distribution. In news reporting, journalists can leverage 6G networks to rapidly transmit high-definition video, images, and other materials captured on-site back to headquarters. VR technology enables panoramic news scene reproduction, bringing immersive scene reconstruction to news coverage. For instance, when reporting on major natural disasters such as earthquakes and floods, journalists can use VR equipment to capture comprehensive views of affected areas, allowing audiences to feel as if they are present at the disaster site when viewing news through VR devices [7].

1.2 Achieving Personalized Content Recommendation and Precision Marketing

Leveraging 6G's powerful connectivity and big data processing capabilities, integrated media can achieve personalized content recommendations and precision marketing. 6G networks can collect user behavior data, interests, and other information in real-time for deep analysis [4]. Based on these analytical results, integrated media platforms can accurately push news, videos, advertisements, and other content that aligns with user interests. For example, for users who prefer technology news, the platform can deliver the latest technological achievements and product launch information, thereby improving user satisfaction and platform advertising conversion rates.

1.3 6G Technology Driving Innovative Business Forms in Integrated Media

The integration of 6G technology with artificial intelligence, Internet of Things, and other technologies aims to drive the development of innovative business forms in integrated media. For instance, in the realm of intelligent media, 6G technology can support applications such as intelligent news writing and intelligent video editing. Through AI algorithms, news reports or video content can be automatically generated based on user needs and data mining results. Regarding the integration of IoT with integrated media, 6G can enable intelligent connectivity of all things, allowing integrated media to connect various smart devices to obtain more news sources and materials. For example, smart home devices can provide data support for family life-oriented integrated media programs, thereby creating more novel integrated media products and services.

1.3.1 Intelligent Revolution in Content Creation 6G technology has brought intelligent innovation to content creation in integrated media. Leveraging 6G's ultra-high speed and low latency, creators can achieve real-time collaboration across geographical boundaries. For example, journalists, editors, and photographers distributed worldwide can work on integrated media content simultaneously as if they were in the same office. Concurrently, the deep integration of 6G and AI makes content creation tools more intelligent. AI can automatically generate creative scripts, compose music, or synthesize videos based on big data analysis of user preferences and trending topics, substantially improving the efficiency and innovation of content creation.

1.3.2 Precision and Personalization of Communication Models In terms of communication models, 6G technology drives integrated media toward precision and personalization. 6G networks can collect massive amounts of user data, including browsing habits, geographic location, and interests. Integrated media platforms utilize this data, analyzing it through intelligent algorithms to tailor personalized content for each user. For instance, for young users interested in technology and fashion, the platform will prioritize content such as new technology product launches and fashion trend updates. This precise, personalized communication can enhance user satisfaction and loyalty.

1.3.3 New Frontiers of Immersive Experience 6G technology elevates the immersive experience of integrated media to a new level. Through 6G's high speed and low latency, VR and AR technologies become more mature in integrated media applications. In cultural tourism, visitors can use VR devices to feel as if they are physically present in ancient historical sites, experiencing their unique cultural charm. In news reporting, AR technology can enable audiences to view three-dimensional images of news event scenes, enhancing the realism and sense of presence. This immersive experience will attract more audiences to participate in integrated media interactions.

1.3.4 Deep Integration of Integrated Media with Multiple Industries

6G technology facilitates deep integration between integrated media and multiple industries, fostering new business forms. Through integration with intelligent manufacturing, integrated media can provide customized promotion solutions for smart products, while these smart products can also serve as terminals for integrated media dissemination. Integration with intelligent transportation enables integrated media to provide traffic information, transportation news, and entertainment content within vehicles' intelligent cockpits. This cross-industry deep integration not only expands the development space for integrated media but also creates new opportunities for other industries.

1.3.5 Efficient and Diverse Integrated Media Operations

6G technology enables more efficient and diverse integrated media operations. In operations management, 6G networks can monitor various operational data in real time, such as content traffic, user feedback, and equipment status. Based on this data, operators can use intelligent algorithms to adjust operational strategies promptly and allocate resources rationally. For example, popular content with high traffic can receive intensified promotion and additional server resources. Regarding profit models, beyond traditional advertising revenue, diversified businesses such as paid content and value-added services can be developed, including exclusive high-definition videos and in-depth reporting, thereby enhancing the profitability of integrated media [14].

2. Innovative Methods of 6G Technology in Integrated Media Industry Operations

2.1 Optimizing Resource Allocation

6G technology can optimize resource allocation in the integrated media industry through intelligent algorithms. Integrated media enterprises face allocation challenges across various resources, including human, material, and financial resources. 6G networks enable real-time monitoring of data across business segments, such as content production, dissemination effectiveness, and user feedback. Based on this data, enterprises can use intelligent algorithms to accurately determine which businesses require more resource investment and which need adjustment or resource reduction, thereby achieving efficient resource utilization and improving operational efficiency.

2.2 Expanding Profit Models

6G technology provides new avenues for integrated media to expand profit models. On one hand, 6G's high speed and low latency can support more high-value-added integrated media services, such as launching high-definition and ultra-high-definition paid live streaming services for large-scale concerts and exclusive ultra-high-definition sports events. On the other hand, 6G technology promotes integration between integrated media and other industries. For

example, collaborating with intelligent manufacturing to provide customized integrated media promotion solutions and charging cooperation fees can diversify revenue channels and change the current single-model reliance on advertising for profit [15].

3. Implications of VR Technology for News Media

3.1 Enhancing News Authenticity and Credibility

VR technology's immersive characteristics bring news reporting closer to real scenes. Audiences are no longer passive recipients of information but actively explore details within news scenes. This immersive experience makes viewers feel like direct witnesses to news events, thereby enhancing news authenticity and credibility. For example, when reporting on a grand concert, high-definition image quality allows audiences to clearly see performers on stage, instrument details, and audience expressions. Research indicates that when VR video resolution reaches 8K or higher, audience immersion and satisfaction increase significantly. Simultaneously, ensuring smooth video playback with reduced latency and buffering requires robust network transmission support, such as the widespread application of future 6G networks.

To create compelling VR news, journalists should pursue unique perspectives. Among numerous news reports, 切入 unique angles—such as reflecting broader social phenomena through the fate of ordinary individuals—proves more engaging. For instance, when reporting on urban demolition issues, presenting the story through the perspective of an elderly resident's attachment to their old home and expectations for a new life can reveal the complex social relationships and urban development behind demolition. Traditional news narrative methods require innovation in VR journalism. The development of 6G technology and its innovative applications in integrated media enable multi-linear storytelling, where audiences can choose different storylines to explore news based on their interests.

VR news should incorporate rich interactive features. For example, when reporting on a scientific experiment, audiences can interact with certain elements in the news using controllers or other devices. Content design should also be targeted for different audience groups. For children, more vivid, engaging visual styles and easily understandable content should be adopted; for elderly audiences, operational convenience and content comprehensibility should be prioritized.

As an emerging news dissemination method, VR news must actively fulfill social responsibilities and guide public opinion. When reporting on social hotspot issues, it should promote positive values and convey constructive messages. For instance, when covering environmental protection issues, showing the tragic consequences of beautiful natural landscapes being destroyed can raise environmental awareness and encourage active public participation in environmental action. Improving VR news reporting quality and effectiveness requires attention to multiple aspects, including technology, content creation, user experience,

and journalistic ethics and social responsibility. Only through excellence in all these areas can VR journalism maximize its value in news communication, delivering higher-quality and more meaningful news experiences to audiences.

3.2 Changing Audience Participation Methods

Traditional news audiences primarily obtained information through reading, watching, and listening. VR technology enables audiences to participate in news reporting. They can choose different perspectives and exploration paths within VR news scenes based on their interests and focus points. For example, when reporting on a large-scale sports event, viewers can choose to follow their favorite athlete's perspective or freely switch between different areas of the venue. This participation method significantly increases audience interest and engagement with news. VR technology brings entirely new presentation forms and experiences to news reporting, enhancing authenticity and changing audience participation methods. However, its application faces numerous challenges, including technical costs, equipment 普及, journalistic ethics, and content regulation. With continuous technological development and improvement, VR technology is expected to play a greater role in news reporting, bringing richer, more authentic, and immersive news experiences to audiences.

3.3 Intelligent Interaction and Personalized Integrated Media Services

Integrated media supported by 6G technology will achieve more intelligent interactive experiences. Utilizing artificial intelligence and big data analysis, integrated media platforms can provide personalized content recommendations and interactive experiences based on user interests and behavioral habits. For example, when users watch news or video programs, the platform can intelligently recommend related content or provide personalized interactive segments based on their browsing history, such as online voting or discussions on topics of interest. This will enhance user stickiness and satisfaction with integrated media content.

4. Challenges and Opportunities Brought by 6G Technology

4.1 Technical Challenges

6G technology faces numerous technical challenges during its development. In addition to the technical difficulties of terahertz band communication mentioned earlier, the construction cost of 6G networks is also a significant concern. 6G requires higher frequency bands and more base stations to achieve coverage, which will substantially increase construction costs. Furthermore, 6G network security and privacy protection face new challenges. With the realization of intelligent connectivity of all things, the network attack surface will expand further. Ensuring secure data transmission and protecting user privacy from infringement has become an urgent issue to address [15].

4.2 Development Opportunities

For the integrated media field, the opportunities brought by 6G technology are enormous. It will drive integrated media toward higher-level integration and innovative development. Integrated media institutions can leverage 6G technology to develop new business models, such as launching ultra-high-definition video live streaming for e-commerce and VR/AR-based remote education and training. Simultaneously, 6G technology will promote the international development of the integrated media industry. Globally, integrated media content can achieve faster and broader dissemination through 6G networks, enhancing international influence.

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(Editor in charge: Li Jing)

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