Research on Process Optimization and Reconstruction of Future Media Ecology in 5G Background

Shan Zhang *
School of Economics and Management, Communication University of China.
* Corresponding author e-mail: zhshan126@163.com

Abstract. On June 6, 2019, China's Ministry of Industry and Information Technology officially issued a 5G commercial license, which indicates that China officially entered the 5G commercial year. As a new generation mobile communication system developed to meet the needs of mobile communication, 5G has become a research hotspot in the field of mobile communication in China. Based on the forward-looking issues of 5G in the field of media ecology in China, this study studies the application scenarios based on 5G in the media field on the basis of fully considering the environmental complexity and technical complexity at home and abroad, and deeply explores the process of 5G for the future media ecology. Optimize and restructure, and then build a future media management optimization path, promote the innovative development of 5G in the future media ecology, promote the innovation of the media industry business model, accelerate the media integration process, build a media industry value chain linkage mechanism based on 5G technology, and build a group of new mainstream media with various forms, advanced means and competitiveness, and build several new media groups with strong strength, communication, credibility and influence to form a future media culture with three-dimensional, diverse and integrated development, and enhance the national culture. Strength provides ideas.

1. Research Background

In the highly anticipated 2019 "two sessions" government work report, Premier Li KeQiang stressed that in the media field, "strengthen the construction of Internet content, prosper literary and artistic creation, and develop news publishing, radio, film and television and archives. Reform and development, and enhance the ability of grassroots public cultural services."

According to Intel's "5G Entertainment Economic Report", 5G will inevitably subvert the media industry. In the next 10 years (2019-2028), the media and entertainment industry will compete for a total of $3 trillion in wireless revenue opportunities. Among them, the business brought by 5G network will reach 1.3 trillion US dollars, accounting for nearly half of the revenue opportunities. At present, the development of the media industry faces many challenges, such as:

1) a single media business model; 2) unbalanced development in the process of media integration; 3) lack of linkage mechanisms for industrial value chains. The digital application scenario expansion of the 5th generation mobile communication network and the in-depth integration with technologies such as the Internet of Things, big data, and cloud computing will provide solutions for breaking through the development barriers of the media industry and add new resources and new impetus to the practice development of the media industry. Therefore, exploring the future media development trends and strategies in the context of the 5G era and addressing the problems in the development of the media industry will be a hot issue in the media field.
However, unfortunately, there are few researches on the application of 5G technology in the field of media, and there are few related researches in the context of localization. After collating relevant literature, the existing research content mainly focuses on the exploratory research, media fusion research and media technology research of the new and old media transformation path. For example, Li Suyan and Xu Chi (2018) discussed the impact of 5G on the development of TV media from the perspective of traditional media, and proposed that 5G technology is an important driving factor for TV media in the process of competition with new media.

Family return and mainstream shaping, postmodern thinking and market operation, immersive synaesthesia and individual satisfaction, inter-platform integration and diversified development may become the innovative direction for TV media. From the perspective of new media, Xiao Li discussed the opportunities and challenges faced by new media in the 5G era on the basis of comprehensive consideration of the characteristics of new media. It is proposed that new media from media, VR and Internet of Things will become the typical application of new media in the 5G era. At the same time, massive data and media supervision are the challenges faced by new media in the 5G era. Based on the perspective of media integration, Han ChunMiao (2017) puts forward the “three-dimensional integration” of media in the 5G era, including media form integration, business integration, platform integration and technology integration.

2. Process Optimization and Reconstruction of Future Media Ecology Based on 5G

The key technologies of 5G mobile communication are mainly embodied in ultra-high performance wireless transmission technology and high-density wireless network technology. The transmission rate is increased by 10 to 100 times, the peak transmission rate is 10 Gbit/s, the end-to-end delay is up to ms, the connected device density is increased by 10 to 100 times, the traffic density is increased by 1000 times, and the spectrum efficiency is increased by 5 to 10 times. The user experience is guaranteed at a speed of 500 km/h. 5G realizes information communication to break through time and space restrictions, and quickly realizes the interconnection of people and everything. Technological breakthroughs often bring about tremendous changes in the media industry. The development of 5G technology redefines the content attributes and time-space dimensions of information dissemination, and has a profound impact on the ecological reconstruction of the media. This study uses Peng Lan (2018) to discuss the reconstruction of 5G’s media ecology from four dimensions: user platform, content production, content distribution and information terminal\(^1\).

2.1. User Platform

In the user platform of the media, the 5G simultaneous co-frequency full-duplex technology and the mobile cloud computing and multi-network collaboration technology are used for deep integration of the user platform, and finally the user platform can be implemented under WiFi, ZigBee, and mobile cellular networks. Reach the socialization and scene reconstruction of the user platform. First, 5G further breaks the barriers between people at the technical level, sharing and sending quickly, which will further stimulate the social awareness of new media users, the forwarding and sharing behavior will be more frequent, and the social functions of the user platform will be strengthened. Second, 5G offers the potential for further integration of mobile devices, social media, big data, sensors and location systems. Specific scenarios such as travel, payment, and rest can be deeply integrated with content dissemination, and the scene function of the user platform can be realized. As fig1.
2.2. Content Production
The rapid development and application of 5G technology has enabled the continuous derivation of various platforms, resulting in professional production content, user production content and professional production content. The order of magnitude of content grows exponentially, and the types of content are more diverse, requiring more synergistic, intensive, and intelligent processes in the production of content. 5G in the base station deployment, based on cloud computing, network slicing, virtualization, software-defined network, distributed cloud architecture and other major technology groups, end-to-end network segmentation of the access network, transmission network and core network, through the peer to Network segmentation enables automatic deployment of slices during content production and transmission, and each network slice has a resource layer, data and user planes, control planes, service planes, and application and management planes. It can realize content synergy and intensive production for business diversification; use NFV (network function virtualization) at the edge of IP application SDN (software-defined network)[2], and then collect data signals through distributed antennas while using the central Big data management and joint signal processing coordination to promote intelligent upgrade of content production systems.

2.3. Content Distribution
5G’s refactoring of content distribution is reflected in two aspects.

On the one hand, in the era of 4G networks, how to effectively distribute large-traffic service content and reduce the delay for users to obtain information has become a major problem for network operators and content providers. The content distribution network of the 5G network is to add a new layer in the traditional network, that is, an intelligent virtual network. The CDN system comprehensively considers the connection status of each node, the load status, and the user distance. By distributing the related content to the CDN proxy server close to the user, the user can obtain the required information, which can alleviate the network congestion and reduce the response time, improve response speed. The source server only needs to send the content to each proxy server, which is convenient for users to obtain content from the nearest bandwidth-rich proxy server, reducing network delay and improving user experience[3]. With the advancement of cloud computing, mobile Internet and dynamic network content technologies, content distribution technologies have gradually become more specialized and customized, and they face new challenges in content routing, management, push and security.
On the other hand, with the proliferation of services such as real-time audio and high-definition video, traditional networks based on location communication cannot meet the requirements of massive data traffic distribution. The network presents an information-centric trend. The main concept of the 5G information center network is the distribution, searching and delivery of information, which is no longer the connectivity of the maintenance target host. The new network protocol stack can realize the functions of network layer resolution information name, route cache information data, multicast delivery information, etc.

So as to better solve the problems of scalability, real-time and dynamics in the computer network. First, the content provider sends the content it owns to the network, and the nodes in the network understand how to respond to the request when it receives a request for related content. Then, when the first subscription sends a content request to the network, the node forwards the request to the content publisher, the content publisher sends the content to the subscriber, and the cached node caches the past content. When other subscribers send a request for the same content, the neighboring cached node directly responds to the subscriber with the corresponding content.

Therefore, the communication process of the information center network is the matching process of requesting content. In the traditional IP network, the "push" transmission mode is adopted, that is, the server dominates the entire transmission process, ignoring the user's status, and thus the client receives too much spam. The ICN network is just the opposite. In the “pull” mode, the entire transmission process is triggered by the user's real-time information request, and the network uses the information cache to achieve fast response. The user realizes the efficiency of content distribution, high security and supports client mobile. And so on.

2.4. Content Management
By applying 5G software-defined network technology, content distribution network technology, and information center network technology, in a three- or four-level data center, it is necessary to provide 100% redundancy for mission-critical work, while using mobile cloud computing to collect the collected data is processed and divided, the social public opinion database and case database are constructed and improved, and the automated information capture and semantic analysis capabilities are improved to realize the rapid output of social public opinion real-time warning and public opinion response plan. In addition, 5G technology plays a supporting role in the application of intelligent technologies such as image recognition. 5G will optimize and reconstruct future network content management methods, Content review and supervision methods includes self-media, WeiBo, ZhiHu, live, short video and UP main video[4].

2.5. Information Terminal
The reconstruction of information terminals by 5G is mainly reflected in how to achieve low-power, high-reliability, low-latency information communication transmission under the background of high density. In the context of the explosive growth of mobile data volume, the ultra-dense heterogeneous self-organizing network technology is used to densely deploy the number of low-power nodes, and the distance between nodes in the station is kept within 10m, and within a range of 1 square kilometer. 25,000 users provide services, and at the same time, using edge technology, while the information terminal collects data information, the operation is performed in the terminal module, the calculation result is transmitted to the cloud server, and then the result instruction is distributed. The application of the new generation of communication technology plays a vital role in the reconstruction of information terminals, mainly reducing the delay of the information transmitted by the information terminal, while at the same time maximizing the number of users in the area and ensuring the communication transmission.

Secondly, in the future market application, the application of information terminals and communication terminals will become more and more diversified, and the scene richness is strong. The types of information terminals are also diverse, including information collection, information transmission, data processing, and information storage. The high-tech applications used in this process
are more complicated than the traditional media stream technology applications, including edge computing. Mobile cloud computing, ultra-dense heterogeneous network technology, self-organizing network technology, M2M and D2D technology.

In the context of future enrichment scenarios, in order to better meet the needs of users, the network slicing technology is adopted to modularize and software the 5G core network. Different communication networks are provided for different needs. The future media has a high demand for the delay and reliability (uRLLC) of communication networks\(^5\). At this time, we will sink some UPFs to smart terminals and use Mobile Edge Computing (MEC) to reduce the delay and reduce costs.

3. Research on Application Scene of 5G Technology in Future Media Ecology

At present, the application research of 5G has been extended to various fields of economic society, and its application scenario is shown in Figure 2. 5G broke the limitations of cultural resources and space, and triggered a huge change in the media ecology. 5G in the future media ecology, ultra-high-definition video services, media content production and distribution, VR/AR services, HD backhaul, video surveillance, etc. The application scenarios are worthy of further study.

The application scenarios of 5G in the future media ecology mainly include the following four aspects:

3.1. Ultra High Definition Video

The faster transmission rate and larger network capacity of the 5G network can meet the data transmission requirements of ultra-high definition video services. As video resolution and frame rate increase, the size and code rate of 4K/8K video files increase dramatically. From the results of JVC Hi-Vision camera video acquisition, 7680×4320 resolution (8K) video with a length of about 1 minute requires 194GB of storage space. After compression by H.265 encoding, still requires a large amount of storage space.

Currently, 4G networks have limited bandwidth and cannot support the transmission and online playback of ultra-high definition video. The 5G uses a new spectrum, defines the frequency band in a wideband manner, increases the maximum bandwidth from 20MHz to 100MHz on the C-band and 400MHz on the millimeter wave, and the data download and upload rate is greatly improved. In addition, 5G uses OFDM-based waveform and multiple access technology to extend support for large bandwidth applications on a 4G basis.

3.2. Production and distribution of media content

On the one hand, 5G breaks the traditional media communication port, and the collection and distribution of information will be more diversified. On the other hand, 5G will make the uploading of pixels and quality, the speed of uploading pictures and videos will be greatly improved, and the video produced by 3D movies, using virtual reality or augmented reality technology will be greatly increased, and the content shared by social media will be doubled. increase. As a result, the production and distribution of media content will become increasingly fragmented, and the collaboration of key players in the media industry value chain will become increasingly important.

(1).collaborative media content production. 5G technology enables the media to collaborate with its audience to invest or collaborate to produce innovative media content;
(2).industrialized media content distribution. The media will also need to effectively master the core technologies of the digital architecture, maintaining a balance between the creativity of content production and the industrial production efficiency of production and distribution.

3.3. AR/VR

VR/AR (Virtual Reality/Augmented Reality) service is one of the typical applications of 5G networks and a new growth point for future industry development. VR/AR puts higher demands on network performance while giving users an immersive experience. First, in terms of bandwidth, the encoding rate of VR/AR video is much higher than that of ordinary video due to wide viewing angle and high
frame rate. Taking 4K VR video as an example, the resolution is 3840×920, the frame rate is 60Hz, and the bit depth is 10bit. After H.265 is used for 200 times compression, the code rate is about 50Mbps, so the transmission of VR video is proposed for network bandwidth.

VR will gradually evolve to 6K, 10K resolution, then you need 5G network to provide higher transmission bandwidth. Second, network latency is another important performance metric for VR/AR services. In order to avoid user dizziness and enhance the user interaction experience in interactive VR/AR applications, the network delay needs to be controlled in 10~20ms. The air interface delay of the 5G network will be reduced to one-fifth of 4G, which can well meet the extreme experience of users in VR/AR applications. Finally, 5G networks have provided significant improvements in network architecture while providing high bandwidth and low latency. As one of the key technologies of 5G, edge computing can sink computing power to distributed base stations and support faster network service response, thus better supporting VR/AR services.

3.4. Video Surveillance
With the development of computer vision and network technology, traditional video surveillance is gradually transforming into intelligent and high-definition. As one of the core technologies that 5G can provide flexible architecture, network slicing can flexibly design network functions according to different service scenarios on a common network infrastructure, and provide separate mobile networks, including access networks, transmission networks, and cores. The network allows the surveillance camera to be accessed over the wireless network, making monitoring independent of geography. The core of intelligent monitoring is image processing and analysis based on video big data, including face recognition, scene recognition, emergency monitoring and early warning. This requires the surveillance camera to be gradually high-definition, so the network transmission performance is extremely high. The 5G experience rate can reach 100 times that of 4G. It can support high-definition surveillance images to be transmitted at any time and anywhere from 10Mbps to 30Mbps. Real-time analysis of abnormal events in video can solve the problem that traditional video surveillance is not timely.

4. Media Management Optimization under the Background of 5G Technology
The traditional media ecology shows obvious non-intelligent characteristics. The flow of information and energy between various parts of the ecosystem is far from full, immediate and smooth, and the degree of openness of the ecosystem is also limited. However, 5G takes the characteristics of the connection, opening and interaction of the media ecology to a new level. The media environment under the application of 5G technology will undergo great changes, the time required for information dissemination will be infinitely compressed, the proportion of high-definition video will be greatly increased, and new forms of communication such as virtual reality will appear more. Users will have more choices and richer experiences, and their behavioral characteristics will also undergo a series of changes, which will also challenge the management optimization of the media in the future.

Therefore, based on the research on the evolution trend of user behavior in the context of 5G era, this module will identify the obstacles in the process of future media change through the combination of case analysis and empirical testing, and then find the key to promote the improvement of media management performance. Focus on the key elements, through combing the action mechanism of empirical testing, inductively improve the key variables of media management performance, and promote the core critical path of China's future media management improvement.

(1) Research on User Behavior Evolution in the Background of 5G Era
Based on theoretical analysis and case observation, this module analyzes the characteristics of media content value chain in 5G era, and further analyzes the evolution of media user behavior, and conducts in-depth discussion from user dimension, attribute, distribution and other dimensions to analyze user behavior changes. Efforts are made to analyze the driving mechanism of the user-side to promote 5G in future media applications, and to construct internal induction mechanisms and strategies that play a key role. At the same time, combined with the characteristics of users in the
context of the 5G era, the systemic system integration system of internal and external integration is constructed to form a long-term mechanism to ensure the sustainable and healthy development of the media in the future.

(2) Research on Media Development Strategy in the Background of 5G Era

This module is based on 5G's research on the reconstruction and application scenarios of the future media ecology, and identifies different dimensions of media management performance. Then use empirical analysis, case study and other methods to identify the impact mechanism of future media production, content, users, supervision and other layers of management performance, and provide practical guidance and field application for the identified future media development strategy mechanism and system content. Conduct targeted tracking and investigation visits to case enterprises and policy and standards setting departments, and continue to improve and optimize the guarantee mechanism or policy system for future media technology integration effects, further improve research conclusions, and form important promotion of future media and 5G technology deep integration. Practice guidance basis and government policy design basis.

5. Conclusion

In this paper, from the perspective of multiple systems, the future media is reconstructed and analyzed. At the same time, in the new generation network communication environment, in-depth research on various fields of future media is carried out. Based on the 5G communication network environment, this paper optimizes the process of the future media ecology, and reorganizes the structure of the media ecology, further promoting the innovative development of 5G in the future media ecology.

References

[1] Boccardi F, Heath R W, Lozano A, et al. Five disruptive technology directions for 5G[J]. IEEE Communications Magazine, 2014, 52(2):74-80. W. Strunk Jr., E.B. White, The Elements of Style, third ed., Macmillan, New York, 1979.

[2] Ding Z, Liu Y, Choi J, et al. Application of Non-Orthogonal Multiple Access in LTE and 5G Networks[J]. IEEE Communications Magazine, 2017, 55(2):185-191.

[3] Mulcahy M F. Serum protein changes associated with ulcerative dermal necrosis (UDN) in the trout Salmo trutta L.[J]. Journal of Fish Biology, 2010, 3(2):199-201. G.R. Mettam, How to prepare an electronic version of your article, in: B.S. Jones, R.Z. Smith (Eds.), Introduction to the Electronic Age, E-Publishing Inc., New York, 1999, pp. 281-304.

[4] Borst S, Gupta V, Walid A. Distributed Caching Algorithms for Content Distribution Networks[C]// Conference on Information Communications. 2010. P.G. Clem, M. Rodriguez, J.A. Voigt and C.S. Ashley, U.S. Patent 6,231,666. (2001)

[5] Basta A, Hoffmann K, Hoffmann K, et al. Applying NFV and SDN to LTE mobile core gateways, the functions placement problem[C]// Workshop on All Things Cellular: Operations. 2014.