A Brief Discussion on the Application and Development of Digital Television Technology in Cable Television Networks (Postprint)

Authors: Dawei Yang

Date: 2023-10-08T00:00:00+00:00

Abstract

With the advancement of time, digital television technology has achieved remarkable progress, and its integration with cable network television not only greatly enhances the network functionalities of cable television, but also delivers an exceptional television viewing experience to users. This paper introduces the working principle of digital television technology and, through an exposition of the composition of cable television networks, analyzes the applications and promising prospects arising from the integration of digital television technology and cable television networks.

Full Text

Preamble

Title: A Brief Discussion on the Application and Development of Digital Television Technology in Cable Television Networks

Abstract: With the advancement of the times, digital television technology has experienced rapid development. The integration of digital television technology with cable networks has not only significantly enhanced the network capabilities of cable television but also delivered superior picture quality to users. This paper introduces the working principles of digital television technology, analyzes the composition of cable television networks, and explores the applications and promising prospects arising from the combination of digital television technology and cable television networks.

Keywords: digital television technology; cable television network; application

Classification Number: TN949.197
Document Code: A

Article ID: 1671-0134(2018)05-084-02
DOI: 10.19483/j.cnki.11-4653/n.2018.05.025

Author: Yang Dawei

The rapid development of communication technology has driven transformation in related industries. As television and radio broadcasting achieve digital coverage, the integration of traditional broadcast media with digital television technology has catalyzed revolutionary changes in cable television networks.

1.1 Concept of Digital Television

Digital television does not refer to the physical television sets used in households; rather, it is a television equipment system that employs digital signals as the carrier throughout the entire process of processing, transmission, broadcasting, and reception. The transmission of digital signals involves several stages: first, image and sound signals are transmitted by television stations. These signals cannot be used directly and must undergo compression and modulation to form new digital television signals. These signals are then transmitted via cable, wireless broadcasting, or satellite. Upon reception by digital television receivers, the signals undergo digital demodulation and decoding to restore the original sound and images [1].

1.2 Development History of Digital Television Technology

Globally, digital television technology first emerged in the Netherlands approximately twelve years ago. Subsequently, countries such as Germany and the United Kingdom conducted large-scale research on digital television technology, leading to the development of three advanced generations of digital satellite television programs and broadcasting. The first generation of digital television sets was successfully developed by American digital television companies in the 1980s, characterized by fewer components and lower production costs. In the 1990s, Hughes Electronics in the United States successfully launched the first digital direct broadcast satellite, establishing a commercial television satellite broadcasting system based on digital compression technology that enabled global information sharing. In the late 1990s, France pioneered digital commercial broadcasting, marking the beginning of vigorous global development in digital television broadcasting, with DVB-S broadcasting technology becoming particularly popular [2].

1.3 Transmission Methods of Digital Television Signals

Currently, digital television signal transmission primarily relies on three methods: cellular mobile networks, terrestrial digital broadcasting, and satellite broadcasting. Cellular mobile network transmission mainly employs streaming media technology to present sound and images on mobile phones and television

terminals through media player software. For instance, short videos from popular platforms such as Kuaishou and Douyin, as well as movies, television dramas, and music, are mostly accessed by users through cellular mobile networks on multimedia software [3]. Terrestrial digital broadcasting involves installing digital television receivers at the receiving terminals and utilizing high-speed transmission to broadcast signals to a broader and larger audience. Satellite broadcasting entails installing satellite signal receiving modules at the receiving terminals, with the originating station transmitting information to the terminals via satellite.

1.4 Development Advantages of Digital Television Technology

Digital information technology has driven the vigorous development of digital television, which integrates information technology and television broadcasting while combining interactivity with digitization. Its clear pictures, comfortable audio effects, and abundant channel resources have won widespread public favor. Traditional analog television, constrained by narrow bandwidth and limited data transmission, restricts channel resource development. In contrast, digital television can simultaneously transmit approximately ten television programs, substantially enriching channel resources. Moreover, with improvements in digital decompression technology, digital television transmission capacity continues to increase, gradually expanding channel offerings. Simultaneously, the integration of digital television technology with broadband networks has promoted the development of related businesses in other industries. For example, Douyin, currently the most popular social media platform, has attracted hundreds of millions of daily video views since its launch in 2016 through short music creative videos. Celebrities and influencers actively upload and share videos, and NetEase Cloud Music has even created playlists featuring Douyin BGM. Douyin's rapid development would be impossible without the integration of digital television technology and broadband networks, which enables video creators and viewers to overcome temporal and spatial limitations, making anytime-anywhere creation and viewing possible.

2.1 Accuracy and Authenticity of Information Dissemination

In the digital television technology era, information dissemination is no longer constrained by space or time, and anyone can become both a publisher and a consumer of information through technological means. Meanwhile, intensifying competition among various new media platforms and between new and traditional media requires digital television technology practitioners to understand audience psychology to determine information content, release methods, and even timing, thereby enabling their drafted or reviewed information to stand out and accelerate dissemination speed. Simultaneously, practitioners must possess sharp discernment to identify maliciously manipulated or false information,

ensuring the accuracy and authenticity of information published through digital television technology.

2.2 Strengthening Information Screening and Prediction Capabilities

In the digital television technology era, the ability of practitioners to screen, predict, and provide early warnings about information is equally crucial. Digital television technology practitioners can derive precise predictions about future events through meticulous analysis of existing large-scale data. These predictions should encompass both natural and social events. The digital television technology era encompasses diverse information types, with valuable data derived from public behaviors, psychological expressions, and interpersonal interactions. This information is collected from various social dimensions, including widely used social media platforms such as WeChat, Weibo, QQ, Douyin, and Kuaishou. When provided to data analysts, professionals can extract relevant psychological data about individuals or groups through large-scale data analysis. Data mining based on precise analysis can predict the development direction of certain situations, making public opinion forecasting and judgment fundamental capabilities for digital television technology practitioners.

2.3 Improving Information Review Capabilities

In the digital television technology era, the emergence of numerous new media has driven traditional media toward large-scale convergence. Radio can now carry text and images in addition to audio, while television can incorporate images and text alongside video. The advent of information networks and computers, relying on digital television technology, integrates the functions of radio and television. The richness and diversity of news content impose higher demands on the information review capabilities of digital television technology practitioners. Under the trend of integrated development of clients such as WeChat, Weibo, and Toutiao, practitioners should release appropriate information content according to the characteristics of different media, distinguishing themselves from traditional information dissemination models to make content more audience-friendly and information carrier forms more innovative.

3.1 Maximizing the Role of Digital Television Set-Top Boxes

Digital television set-top boxes serve as a crucial link and bridge in digital television technology. They convert between digital television signals and analog signals, decoding digitally compressed audio and video signals back into analog format for presentation on television displays and audio equipment, delivering high-quality television programs to audiences. Set-top boxes are now widely used in China, with nearly 90% of households accessing television programs through cable network installation and set-top box purchase. Beyond their

broad user base, set-top boxes offer functions such as video-on-demand, paid program viewing, and one-week program replay. With the widespread application of digital television technology, the development and utilization of digital television set-top boxes will become even more prevalent [4].

3.2 Utilizing Terrestrial Wireless Digital Television

Terrestrial wireless digital television differs from conventional digital television that transmits signals via microwave; it utilizes ground base stations for signal transmission. Terrestrial digital television not only provides clearer images but also experiences lower interference and has minimal requirements for receiving terminals. Any television with digital signal reception capability or older analog television equipped with a specialized set-top box can receive digital television signals.

3.3 Leveraging SDL and Other Transmission Technologies

SDL's rapid transmission of digital signals provides significant advantages in information element delivery for PUD and ATM. Furthermore, SDL information transmission technology is not constrained by SONET/SDH structures during the transmission process, and its superior compatibility effectively ensures the safe and stable transmission of digital television signals. In addition to SDL information transmission technology, HFC and AM-VSB frequency technologies distinguish digital information of different frequencies, guaranteeing the accuracy of digital signals.

3.4 Accelerating Two-Way Network Transformation

With societal progress, the extensive promotion and application of digital television technology have significantly facilitated the development of new media platforms such as WeChat, Weibo, and news clients. As public perspectives broaden, higher demands are placed on digital television technology. For instance, viewers may wish to simultaneously play favorite programs from different channels, which requires transforming the one-way network transmission system of digital television into a two-way network transmission system. Upgrading the client side will substantially enhance data transmission speed and stability, fully satisfying public demand. This represents one approach to addressing the principal contradiction in Chinese society as articulated in General Secretary Xi Jinping's report at the 19th National Congress: the contradiction between unbalanced and inadequate development and the people's ever-growing needs for a better life.

Conclusion

The rapid development of information technology worldwide has accelerated the full digitalization of television broadcasting. Building upon this foundation,

the integration of traditional television media with digital television technology and related functions has given rise to a new digital television industry. The emergence of this new industry has generated tremendous interest among the public and relevant institutions. Numerous countries around the world have formulated policies for analog-to-digital television conversion based on their national conditions. The combination of digital television technology and cable television networks will profoundly impact people's lives, further satisfying their ever-growing needs for a better life and providing a solid foundational guarantee for achieving the Two Centenary Goals outlined in the report of the 19th National Congress.

References

[1] Cao Xinming. Analysis of the Application and Development of Digital Television Technology in Cable Television Networks[J]. Communication World, 2018(01): 104-105.
[2] Zhang Jiandong. Application of Digital Television Technology in Cable Television Networks[J]. West China Broadcasting & TV, 2018(01): 254.
[3] Zhang Wenming. Application and Development of Digital Television Technology in Cable Television Networks[J]. West China Broadcasting & TV, 2017(20): 253-254.
[4] Yao Yucheng. Application and Development of Digital Television Technology in Cable Television Networks[J]. Information Recording Materials, 2017, 18(10): 4-5.

Author Affiliation: Harbin Acheng Radio and Television Station, Heilongjiang Province, China

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