



An Overview of Internet Protocol Television (IPTV) Broadcasting in Nigeria, Prospects and Challenges

B.I. Bakare¹, S.A. Bruce-Allison² and E. Akintewe³

^{1,2}(Department of Electrical Engineering, Rivers State University, Port Harcourt, Nigeria.)

Corresponding Author: B.I. Bakare

ABSTRACT: Technology advancements in TV services have brought about some exciting developments in form of Internet Protocol (IP) Technology and broadband, which have created an emerging market called Internet Protocol Television (IPTV). Internet Protocol Television is a system where a digital television service is delivered using Internet Protocol over a network infrastructure, which may include delivery by a broadband connection. It is a television content that, instead of being delivered through traditional broadcast and cable formats, is received by the viewer through the technologies used for computer networks. IPTV covers both live TV (multicasting) as well as stored video, Video on Demand (VoD). The playback of IPTV requires either a personal computer or a set-top box connected to a TV. Internet protocol television IPTV has arrived, and backed by the deep pockets of the telecommunications industry, it is poised to offer more interactivity and bring serious competition to the business of TV. How prepared is Nigeria for the deployment of Internet Protocol Television IPTV? This paper seeks to answer this question and also discusses the architectural characteristics of IPTV, requirements for effective deployment of IPTV network and how Nigeria will cope with the inevitable transition from Satellite dish and cable technology to Internet Protocol Television Technology, its prospects and the challenges of this technology.

KEYWORDS: Internet Protocol, Television, Satellite, High Definition, Radio Station,

Received 15 May, 2022; Revised 28 May, 2022; Accepted 30 May, 2022 © The author(s) 2022.

Published with open access at www.questjournals.org

I. INTRODUCTION

The deployment of Digital technology in broadcasting has transformed and revolutionized the traditional analogue approach to broadcasting. Digital broadcasting is a broadcast technology based on the transmission of audiovisual media information by bitstreams.[1] (my idigo Paper). As technological advancement continues to change the way people live, the broadcasting industry is also evolving rapidly to adapt to these disruptive advances. One of the technological advancements in the broadcasting world that emerged not too long ago is Internet Protocol Television (IPTV). This is a development that is threatening the dominance of satellite television services across the globe. A communication satellite is a device that amplifies Radio Frequency signal via a transponder (an integrated receiver and transmitter of radio signals). It creates a communication channel between a source transmitter and a receiver at different locations on Earth. The purpose of communications satellites is to relay the received signal around the curve of the Earth allowing communication between widely separated points[2]. IPTV License has been acquired for use in Nigeria and a number of service providers are utilizing this technology to engage audience.

Television streaming is the “quintessential digital convergence medium putting together television, telecommunications, the Internet and computer applications”. Before the advent of the Internet, television stations were limited by geographical boundaries and by signal strength of airwaves. For television viewers also, the feedback mechanism was either limited or delayed because not all the audiences could give their views or opinions about happenings around them. In addition, limited television programs were available for television audiences, at a stipulated time. Thus, television audiences are often saddled with limited choice of television programs and there was no alternative means of watching a missed program. However, one major benefit of television streaming to media operators is that it creates a forum to a wider reach of audience because they are not restrained by on-air signal or coverage. As such, television stations’ contents that are streamed online can be viewed across geographical boundaries. To the audience, they also stand to benefit from watching television programs on the Internet.

The earlier generation of mobile network technologies had solely voice communication but the advancements in the functionality of mobile devices of the fourth generation (4G) wireless technology gave birth to high-quality video conferencing communication over an all-Internet Protocol (IP) network. 4G is an upgrade in the scope of the 3G technology having increased services, measures and Information [3]. The innovation of television streaming aid the audiences to watch their favourite television programs regardless of wherever they are in the world as long as they are connected to the Internet. It also reduces the frequency by which audiences miss television programs because they can now access missed favourite programs using Video on Demand (VoD) television viewing on the Internet. The Internet Protocol Television (IPTV) has recently become one of the most prominent applications demanded by consumers. From the providers' standpoint, IPTV is an excellent opportunity to improve customer experiences offering them customized recommendations on audiovisual content based on age, gender, and behavior (e.g., searches or likes).

Integrated Services Digital Broadcasting – Terrestrial (ISDB-T) for digital terrestrial television broadcasting system was developed in 2000 for IPTV operation. It is a multi-carrier system with RF band segmentation. The ISDB-T system is designed to provide reliable high-quality video, sound, and data broadcasting not only for fixed receivers but also for mobile receivers as shown in Figure 1.

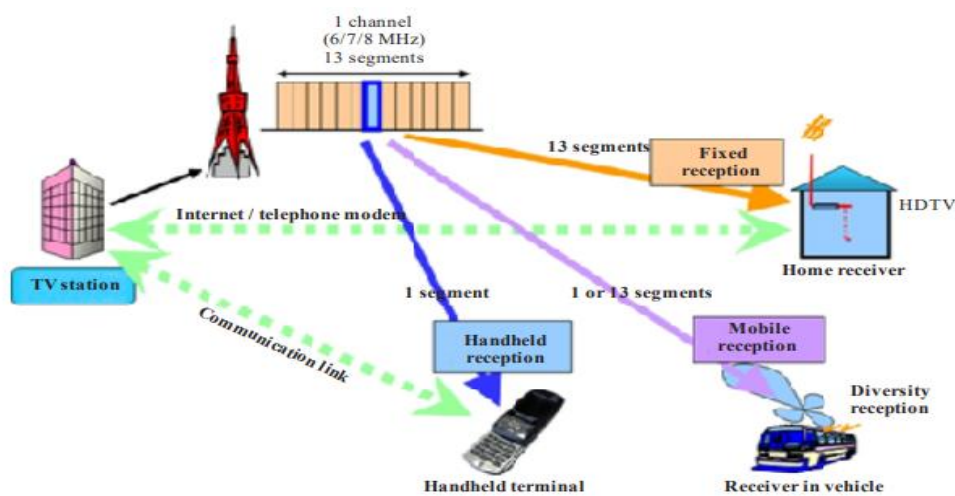


Figure 1: Integrated Services Digital Broadcasting – Terrestrial (ISDB-T)

ISDB-T supports hierarchical transmission of up to three layers. Transmission parameters can be set individually for the layers, each of which consists of several segments. The system was specifically designed to provide flexibility, expandability, and commonality/interoperability for multimedia broadcasting. The ISDB extension for terrestrial multimedia broadcasting, designed for providing real-time broadcasting services such as sound or video programs with various associated data, interactive broadcasting, and filecasting, is defined as ITU-R Multimedia System F[4].

Although IPTV content delivery is different from that of online video platforms like YouTube or Netflix, it does share many of their conveniences. For instance, IPTV allows users to access video on demand (VOD) content on a subscription-based model and watch live broadcasts. That gives viewers the freedom of accessing their favorite shows at will while still having the option of enjoying live events and programs like on traditional TV. This flexibility is why IPTV outshines traditional television and is considered the future of TV. So IPTV bypasses the conventional routes such as terrestrial, satellite and cable formats to get messages across to the audience through Internet Protocol or Web Protocol networks. In Nigeria, some viewers now prefer to watch programmes directly from the internet instead of via satellite TV channels. Instead of going to sources that use wired cables, people can now view channels they like on the Internet through Internet Protocol format. They don't only see the programmes as they appear but also watch past episodes. There are several Video On Demand (VOD) services in Nigeria adopting this technology to satisfy information needs of their audience. Such popular services as iRoko tv, Ibaka tv, Arewa 24, Pipul tv, and Netflix Nigeria provide IPTV services to numerous audience in the country. We believe that nothing is certain in the increasingly competitive online video broadcasting industry, but the chances are that it will only keep growing. After all, the only way for traditional TV to survive the dawn of the digital era is to embrace it and find a way to adapt IPTV Technology accordingly.

II. STRUCTURE OF IPTV

Internet Protocol television refers to the delivery of television content over Internet Protocol networks. You might be wondering what Internet Protocol is. The term, Internet Protocol (IP), is just a set of rules governing the format of data sent over the Internet or other network. It refers to a set of rules, for routing and addressing packets of data so that they can travel across networks and arrive at the correct destination. Protocol here refers to the set of rules for relaying data across boundaries. The set of rules refer to the routing function that enables internetworking, and essentially establishes the Internet. In addition, internet protocol television (IPTV) refers to the network architecture, equipment and technologies, middleware and software platforms used to deliver standard or high-definition television (HDTV) signals, in real time, over managed communications service provider (CSP) networks. Unlike ordinary Internet video services that stream or download highly compressed video to a PC screen, IPTV systems deliver high quality standard-definition and tent in real-time to more demanding displays, such as large-screen TVs. This requires a stable and reliable high-bandwidth network infrastructure as shown in figure 2. IPTV system deployments usually drive major upgrades to the network infrastructure to meet these requirements.

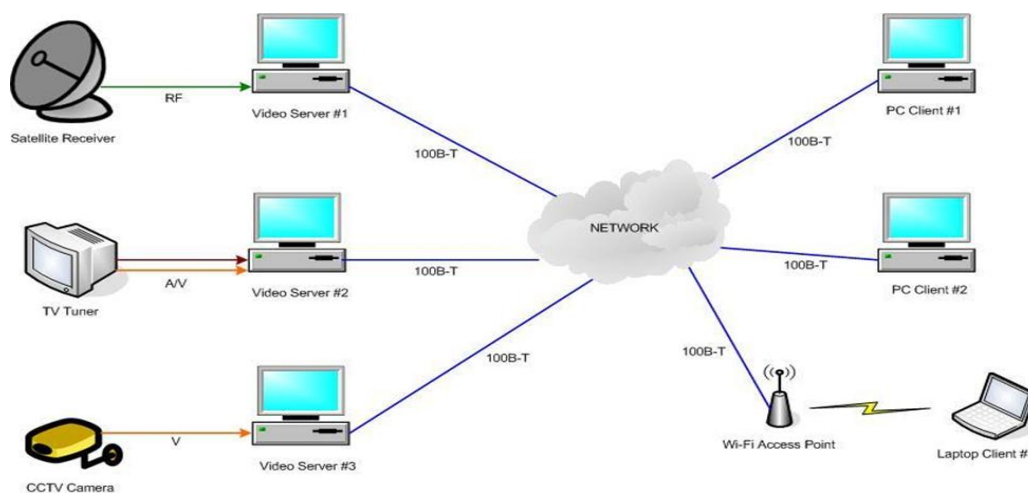


Figure 2: Structure of IPTV

When analyzing the technical infrastructure of an IPTV platform, three main components can be recognized; these are the video head end, the transport network and the end user. In this paper we have seen a complete overhaul of the infrastructure entirely from a technical standpoint which include IPTV end-to-end System Components.

The IPTV chain spans over four domains:

- i. The consumer domain presenting services to the end user;
- ii. The network provider domain allowing the connection between the consumer domain and the service provider domain;
- iii. The service provider domain which is responsible for providing consumers with the services; and
- iv. The content provider domain that owns or is licensed to sell contents or content assets.

2.1 Network Protocols

In networking, a protocol is a set of rules for formatting and processing data. Network protocols are like a common language for computers. The computers within a network may use vastly different software and hardware; however, the use of protocols enables them to communicate with each other regardless.

Standardized protocols are like a common language that computers can use, similar to how two people from different parts of the world may not understand each other's native languages, but they can communicate using a shared third language. If one computer uses the Internet Protocol (IP) and a second computer does as well, they will be able to communicate — just as the United Nations relies on its 6 official languages to communicate amongst representatives from all over the globe. But if one computer uses IP and the other does not know this protocol, they will be unable to communicate.

Furthermore, network protocols are a set of rules, conventions, and data structures that dictate how devices exchange data across networks. In other words, network protocols can be equated to languages that two

devices must understand for seamless communication of information, regardless of their infrastructure and design disparities.

2.2 The IPTV Head-End

The IPTV head-end is where content (such as television channels or Video on Demand movies) is received and prepared for transmission across the operator's private IP network (DVB Internet Protocol IP). Perhaps the most complex piece is simply "capturing" the content. It comes from analog satellites, digital satellites and antennas; the content may be standard definition, high definition, or music; the format can be DVB (digital video broadcasting) or earlier proprietary implementations. A typical head-end will require six or more different types of systems, and multiples of each is required.

Once the signal is "down-linked" or "down-converted", it often needs to be altered to fit the operator's network. If an analog signal is received, an encoder is required to digitize, compress and packetize the signal.

If the signal is received in digital format, it may still need to be converted into the format used by the operator. After that, the operator typically will add local commercials. The Conditional Access (CA) system then encrypts the signal to prevent service theft or unauthorized copying. Finally, the desired signal is placed onto the network for delivery to the subscriber as shown in figure 3. Video on Demand (VoD) traffic goes through a similar process, except that the final version is placed onto a server until someone requests to view the content [5].

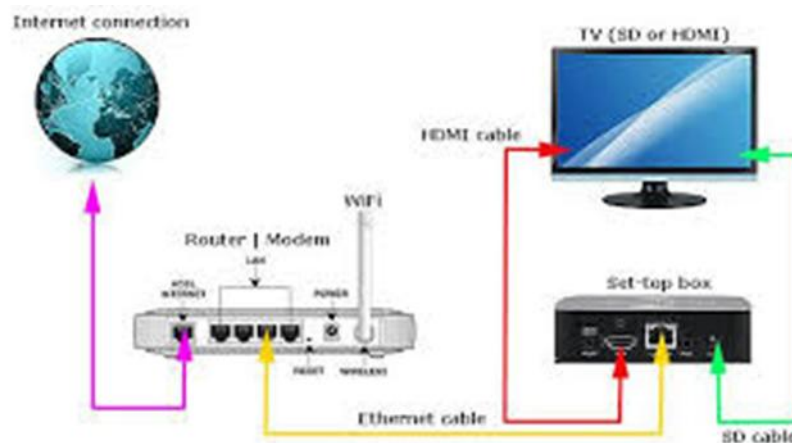


Figure 3: IPTV Devices

2.1 Components of IPTV

We have considered all IPTV components and made it clear that an IPTV system contains a lot of high-performance and complex devices:

- IP network with multicast support.
- DVB to IP Gateway for receiving external TV signals (a separate device).
- Middleware and billing system (a separate device).
- VoD / nVoD server (a separate device).
- TVoD / Time Shifted TV server (a separate device).
- Conditional Access System (a separate device).
- IP set-top boxes.



Figure 3: IPTV Components

III. PROSPECTS AND CHALLENGES OF IPTV

Although IPTV offers incredible flexibility, there's much more to it than just that. It's also vital to look at both sides of the coin here, as IPTV isn't perfect either. Here are some of the most notable pros and cons of IPTV:

3.1 Prospect

- ✓ Easy to Set Up and Use — All you need to get started is buy a set-top box and connect it to your TV set. Also, the Wi-Fi connectivity that newer models have makes the process significantly easier.
- ✓ It is 100% Digital — The world is becoming more digital-oriented by the day, so transitioning to digital TV is an excellent foundation for the future and new tech.
- ✓ IPTV Allows Smooth Simultaneous Streaming of Multiple Programs — IPTV services let users stream multiple programs simultaneously on different devices (TV, PC, Mobile, etc.). This offers tailored tastes to different users.
- ✓ Variety of Service Types — The multiple types of services IPTV offers exist to fit different consumer tastes.
- ✓ Allows Users a Commercial-Free Experience — Many people hate advertisements, so being able to skip or fast-forward them is an excellent quality-of-life improvement.
- ✓ Incredibly Time-Efficient — The lack of having to wait for specific times for your broadcast to start and skippable commercials is why IPTV is so appealing to users worldwide.
- ✓ Multiple viewership --- This allows family members and friends to avail the same subscription and go up to 4 people viewing different screens at one time. Hence it is flexible. One plan can be bought (e.g Premium on Netflix) and the account can be shared among friends and family members.
- ✓ Playback (offline playback feature) --- Viewers can store videos and watch them later even without an internet connection. This works best for plane rides and localities with weak internet connections.
- ✓ High quality library --- More options collections of original movies, popular TV show.
- ✓ User friendly --- It is user friendly, you log in just once and after that whenever you start the application (e.g On your smart TV or smartphone) you get access to the graphical environment of the service.
- ✓ Parental control --- In most IPTV, the first menu you will find is the 'User Profile' menu whereby you select which user of the family will be watching.
- ✓ Device compatibility --- Once the application is downloaded, it can be used on any phone or device.
- ✓ Price --- It is affordable, with little data like 10MB one can see a movie with the app.

3.2 Challenges

- Network Overloads May Cause Technical Issues — If too many users happen to watch a specific show simultaneously, the network may overload and cause buffering or playback issues.
- Users Have Little to No Control Over Channel-Related Issues — If an error occurs on a channel's end, there's little to nothing viewers can do to fix the issue but wait.
- Synchronization Problems Are Commonplace – Due to natural fluctuations in network speed and quality, viewers may experience synchronization problems. If these occur, they deal a massive blow to the quality of user experience.
- Geolocking --- Shows are sometimes contingent to the region where you live. In the US, you have access to a far greater selection of TV shows and movies that might not be available in another region.

- Delayed Updates
- Content uncertainty
- Internet speed
- Requires a great deal of bandwidth to transmit a tone of data at high speed.

As you can see, IPTV isn't omnipotent but has a few downsides to traditional TV. But since technology keeps developing rapidly, we wouldn't be surprised these few issues get dealt with sooner than later. Besides, the UX improvements IPTV brings to the table far outweigh these potential problems.

IV. CONCLUSION

Internet technology in Nigeria has made information processing fast and rapid thus information can get to anywhere like a flash of light. The internet can provide platforms for media men and women to interact with colleagues irrespective of locations thus enabling news sharing. Mass of files can be sent to people over any distance. The media industry now witnesses tremendous progress; reporters do not necessarily need to travel far as they can have correspondents give them up-to-date information from anywhere, news production is faster and, broadcasting has gone beyond the mainstream media and viewers can go on the net to watch their favourite stations and the list is endless.

IPTV covers both live TV (multicasting) as well as stored video ,Video on Demand (VoD). The playback of IPTV requires either a personal computer or a set-top box connected to a TV. Internet protocol television IPTV has arrived, and backed by the deep pockets of the telecommunications industry, it is poised to offer more interactivity and bring serious competition to the business of TV. IPTV will resolve the current negative environmental impact of satellite dishes and cable lines. Using the IPTV network, service providers can offer rich interactivity and services such as television commerce (shopping and payment of bills), Voice-Over – IP (Tele conversation), video conferencing and gaming. Also IP-based platform offers significant advantages, including the ability to integrate television with other IP-based services like high speed Internet access and VoIP. A switched IP network also allows for the delivery of significantly more content and functionality. Nigerian ISPs need to start in time to invest in IPTV infrastructure and begin gradual migration to IPTV. If this advice is heeded, it will ensure a smooth transition to IPTV technology and reaping of the abundant benefits in Nigeria.

It's difficult to tell how many people are using IPTV services at the moment in Nigeria. With the wide variety of providers, different formats, and a huge amount of pirated content available, there are a lot of things to keep track of. But there's no doubt that IPTV will be increasing in popularity. Grand View Research estimated that IPTV market will be worth over \$117 billion by 2025[6]. The increase in user demand as well as improvements in networks will support this growth. Grand View also predicted that subscription-based IPTV will grow quickly over the next decade, suggesting that services like TV Player and Hulu Live TV will gain popularity. Some of that growth has started already.

REFERENCES

- [1]. V.E. Idigo and B.I. Bakare (2021). Assessment of Digital Terrestrial Television Signals in the South-South Region of Nigeria. *International Journal of Electronics Communication and Computer Engineering*, (IJECCE). 12(5) p. 135-146.
- [2]. B.I. Bakare , E.V. Odu and T. Ngeri (2016). Satellite Communication in Nigeria: Prospects and Challenges, *American Journal of Engineering Research*.(AJER). 5(10), p. 111-120.
- [3]. B.I. Bakare , S. Orike and W.N. Abidde (2022).Modulation Scheme for Video Conference Multimedia Application Over Worldwide Interoperability for Microwave Access (WIMAX) Technology, *IOSR Journal of Electronics and Communication Engineering*, 17(2) pp. 20 - 27
- [4]. ITU-R (2016). Handbook on Digital Terrestrial Television Broadcasting Networks and Systems Implementation.
- [5]. Casner, S. and Deering, S. (1992). First IETF Internet Audiocast. ACM SIGCOMM CCR.
- [6] <https://www.grandviewresearch.com/industry-analysis/internet-protocol-television-iptv-market>