

## A Review on Internet Protocol Television (IPTV) and its Application in Education Field

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### ABSTRACT

This paper illustrates Internet Protocol Television (IPTV) and its implication for education. IPTV is a new type of educational technology that provides digital content (text, graphic, audio and video) which users watch as television broadcasting on the Internet. With the capabilities of IPTV that could be used for educational purpose. Also IPTV could be used in distant education.

**Keywords**— IPTV, VoD, STB, IP, VoIP

### I. INTRODUCTION

Internet protocol television (IPTV) is a collection of modern technologies in computing, networking, and storage integrated to provide digital content through an Internet Protocol (IP) network. This system is used to broadcast various types of digital content including text, graphic, audio and video files over an IP network in order to reach a large number of users. IPTV is a digital broadcast network which is used to broadcast movies, video games and radio. IPTV plays a vital role in giving information, knowledge and entertainment. It has been utilized in multiple sectors such as business, entertainment, communication, healthcare and education. The implication of IPTV for education is becoming admired, especially in supporting distant education. IPTV can provide more collaborative content than traditional television applications and it encourages existing passive television learners to become more actively involved in their learning activities.

### II. LITERATURE SURVEY

The term IPTV first appeared in 1995 with the founding of Precept Software by Judith Estrin and Bill

Carrico. Historically, television was either transmitted from a tower, or distributed over a cable system, or beamed directly from a satellite. The first digital revolution began a decade ago with the mass adoption of internet and the World Wide Web and the launch of digital television services via cable, satellite and terrestrial networks. Today, as we enter the second digital revolution, as a result of high bandwidth and high speed internet access, it has become possible to transmit television and other audio and video services over broadband data networks over a single connection. That could be over a cable television system but it could equally be over a telephone line. In earlier days, the speed of the Internet did not suit the television transmission concept and, as a result, it affected the voice and video services. In recent times, the speed of Internet and bandwidth has increased.

### III. INTERNET PROTOCOL TELEVISION

**Definition:** IPTV has two components

#### **Part 1: Internet Protocol (IP):**

It specifies the format of packets and the addressing scheme for a network. Most networks combine IP with a higher level protocol. Depending on the vendor solution, user datagram protocol is the most typical higher-level protocol. The protocol establishes a virtual connection between a destination and a source. IP allows you to address a package of information and drop it in the system, but there's no direct link between a destination and a source.

#### **Part 2: Television (TV):**

It specifies the medium of communication that operates through the transmission of pictures and sounds. TV is well known, but here referring to the services that are offered for the TV, like linear and on-demand programming.

Internet Protocol Television (IPTV) is a system through which internet televisions services are delivered using architecture and networking methods of internet protocol suite over a packet-switched network infrastructure. IPTV services may be classified into three main groups: Live television, time-shifted programming and video on demand.

1) Live television: with or without interactivity related to the current TV show.

2) Time-shifted television: catch-up TV (replays a TV show that was broadcast hours or days ago), start-over TV (replays the current TV show from its beginning).

3) Video on demand (VOD): browse a catalogue of videos, not related to TV programming. VoD is a service which provides television programs per the demands of the subscribers. The users interactively request and can receive television channels. These television services are beamed from previously stored media consisting of entertainment movies or education videos. It has a live access through live connection, such as news events in real time. The VoD application provides freedom to the individual subscribers to select a video content and view it at their convenience. When the initial IPTV infrastructure is in its place, IPTV applications and potential revenue-generating services, such as video telephony and video conferencing, remote education, and home security/monitoring cameras, will be available. IPTV is distinguished from Internet television by its ongoing standardization process (e.g., European Telecommunications Standards Institute) and preferential deployment scenarios in subscriber-based telecommunications networks with high-speed access channels into end-user premises via set-top boxes or other customer-premises equipment.

IPTV works on the TV with a set-top box that accesses channel, subscription services, on demand and other interactive multimedia services over a secure, end to end operator managed broadband IP data network with desired QoS to the public with a broadband internet connection. Often, this service is provided together with video facility on demand. In addition to this, there is provision to include Internet services such as web access and Voice over Internet Protocol (VoIP). In cases when internet service is also provided, it may be called Triple Play. IPTV is used because it provides Video on Demand with hundreds of Channels and also it is an Interactive program guide.

#### IV. IPTV SYSTEM ARCHITECTURE

Figure (a) below shows a generic IPTV system architecture to support applications such as digital (broadcast) television and Video on Demand (VoD). The generic IPTV architecture is utilized here as a baseline reference to discuss IPTV distribution in-home networks. IPTV operators receive digital satellite channels by satellite antenna and digital terrestrial Services by UHF

antenna. The channels are routed to the transmission center's signal Converter equipment, which converts the television content to an IP network-compatible Format and transmits it into homes via operators' broadband backbone and access Networks. In homes, IPTV services are received by an IP STB whose software and Updates are managed by a configuration server located in the transmission Centre.

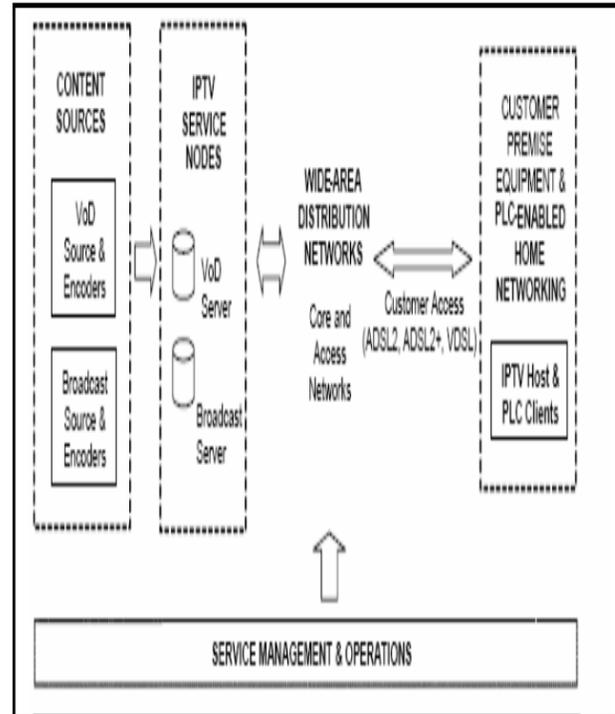


Figure (a): IPTV System Architecture

#### A) IPTV Components

1) Video Head End: As with a digital cable or digital satellite television system, an IPTV service requires a video head end. This is the point in the network at which linear (e.g., broadcast TV) and on-demand (e.g., movies) content is captured and formatted for distribution over the IP network. Typically, the head end ingests national feeds of linear programming via satellite either directly from the broadcaster or programmer, or via an aggregator. Some programming may also be ingested via a terrestrial fiber-based network. A head end takes each individual channel and encodes it into a digital video format, like MPEG-2, which remains the most prevalent encoding standard for digital video on a worldwide basis. After encoding, each channel is encapsulated into IP and sent out over the network. These channels are typically IP multicast streams, however, they may be IP unicast streams as well. IP multicast has several perceived advantages because it enables the service provider to propagate one IP stream per broadcast channel from the video head end to the service provider access network. This is beneficial when multiple

users want to tune in to the same broadcast channel at the same time (e.g., thousands of viewers tuning in to a sporting event).

2) **Video Server:** Video servers are computer-based devices connected to large storage systems. Video content, previously encoded, is stored either on disk or in large banks of RAM. Video servers are mostly used for VoD.

3) **The Service Provider Core/Edge Network:** The grouping of encoded video streams, representing the channel line up, is transported over the service provider's IP network. Each of these networks is unique to the service provider and usually includes equipment from multiple vendors. These networks can be a mix of well-engineered existing IP networks and purpose-built IP networks for video transport. At the network edge, the IP network connects to the access network.

4) **The Access Network:** The access network is the link from the service provider to the individual household. Sometimes referred to as the "last mile," the broadband connection between the service provider and the household can be accomplished using a variety of technologies. Telecom service providers are using digital subscriber line technology to serve individual households. IPTV networks will use variants of asymmetrical digital subscriber line and very-high-speed digital subscriber line to provide the required bandwidth to run an IPTV service to the household. The service provider will place a device at the customer premises to deliver an Ethernet connection to the home network.

5) **The Home Network:** The home network distributes the IPTV service throughout the home. There are many different types of home networks, but IPTV requires a very robust high bandwidth home network that can only be accomplished today using wire line technology.

6) **Middleware (The IPTV enabler):** Middleware is the software and hardware infrastructure that connects the components of an IPTV solution.

7) **Set Top Box (STB)/Terminal:** An IP set top box is an electronic device that adapts IP television data into a format that is accessible by the end user. The output of an IP set top box can be a television RF channel, video and audio signals or digital video signals. IP set top boxes are commonly located in a customer's home to allow the reception of IP video signals on a television or computer for live TV and VoD, the STB supports an EPG that allows the users to navigate through the programming. The STB transforms a scrambled digital compressed signal into a signal that is sent to the TV. The STB hosts the middleware and is poised to become the centre of the communications infrastructure within the home.

## V. COMPARISON OF INTERNET TV AND IPTV

### a) **Geographical Limitations:**

Since Internet TV is based on the Internet, it is available wherever there is a broadband Internet connection. Due to the amount of information being transmitted, it cannot be used over a dial-up connection. IPTV can only be run over networks that are wholly owned by telecom operators. Therefore, it is only available where these companies have installed networks. Only the company's subscribers have access to the programming passed over the network.

### b) **Service Access:**

Internet TV follows the general philosophy of the Internet, which is that content should be available free to all. Although some companies that provide Internet TV do have a subscription charge for premium service, they usually also offer a certain portion of their content for free. IPTV requires a signed contract with the service provider and a decoder box to provide access to programming. The contract only provides for service in one location, the user's home or office. When off site, the user has no access to the system.

### c) **Image Quality:**

Since Internet TV is propagated through the Internet, it is dependent on the quality of all connections that the information passes through. Like all other content passed through the Internet, a certain percentage of "packets" are lost in transit. This can cause delays and skips in the presentation of the video. There is no guarantee of video quality with Internet TV. By running over the provider's own networks, companies that provide IPTV service are able to guarantee high-quality service. Not only are their networks designed for handling large quantities of video content, but their networks are also dedicated to providing service to their customers.

### d) **Content:**

Originally, much of the content over Internet TV was user generated. However, today, this user-generated content is referred to as "Web TV." This leaves the name "Internet TV" for traditional television that is accessed via the Internet. The service available through Internet TV today is similar to that of broadcast TV. Since IPTV has always been controlled by the companies that offer the service, it has always been used to provide broadcast television content and movies. Normally, this is the same content that established media companies are broadcasting.

### e) **Charges to the User:**

A significant portion of the content that is provided through Internet TV is totally free of charge. Many companies provide a "premium" paid subscription service, offering additional content (usually new content that the company has to pay a premium to offer). IPTV, on the other hand, charges the consumer for everything they

use. This is typically done through a monthly service contract.

Hence Internet TV and IPTV are both systems for delivering television programs and movies to the consumer through the Internet, they are very different systems. Internet TV follows the general freedom of information flow that the whole of the Internet is based on. While companies can commercialize on this, there is no exclusivity of programming, blocking other companies from providing the same content. On the other hand, IPTV keeps media companies in control of content distribution, maximizing their ability to commercialize their products. It is this philosophy which makes IPTV a perfect platform for Hollywood. The struggle that exists for IPTV is in finding a way to integrate their services with already existing licensing conventions and requirements currently in place in the media market.

	Internet TV	IPTV
Geographical Representation	Run over Broadband connection	Run over networks
Service Quality	Free to all	Require contract with service provider
Image Quality	Low	High
Content	User generated	Broadcast television content
Charges	Content at free of cost	Charges for everything

Table (a): Comparison of Internet TV and IPTV

## VI. APPLICATION OF IPTV IN EDUCATIONAL FIELD

### A) IPTV Architecture Implication for Education is shown in figure (b).

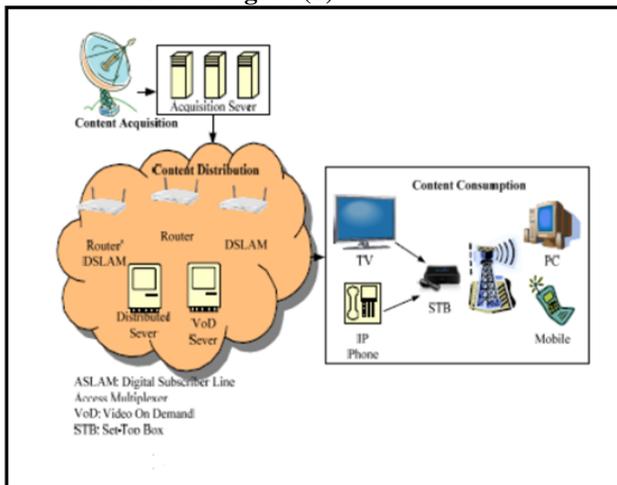


Figure (b): The Basic IPTV Architecture

### B) The basic IPTV architecture components include

- 1) Acquisition servers (A-severs): for encoding video and DRM metadata.
- 2) Distributed servers (D-Sever): provide caching and QoS control.
- 3) VoD creators and servers: retain a library of encoded VoD content to provide VoD services.
- 4) IP routers: route IP packets and provide fast reroute in case of routing failures.
- 5) Residential gateways: IP routers for bundled service at home.
- 6) STBs: a STB (Set top box) is a device on the user side that interfaces with the user terminal (e.g. TV, PC, laptop, and others) with DSL or cable wiring. An IP set top box is an electronic device that adapts IP television data into a format that is accessible by the end user. The output of an IP set top box can be a television RF channel, video and audio signals or digital video signals. IP set top boxes are commonly located in a customer's home to allow the reception of IP video signals on a television or computer for live TV and VoD, the STB supports an EPG that allows the users to navigate through the programming. The STB transforms a scrambled digital compressed signal into a signal that is sent to the TV. The STB hosts the middleware and is poised to become the center of the communications infrastructure within the home [4].

### C) CHANNEL BROADCASTING

Channels, Contents and Users:

IPTV was designed to broadcast in four channels and provided the following contents:

#### 1] Channel 1 (kid program):

This channel broadcasts teaching and learning at primary schools. Most of the contents are useful for distance students who are studying in the Bachelor of Education Program in Pre-school Education. Most of them are teachers and therefore the contents of this channel are useful for them. This channel broadcast more than 372 programs that focus on early childhood education. There are many interesting program such as brain based learning, toys for children, and food and nutrition for children. Moreover, there are some live programs such as Kindergarten Fantasia which broadcasts children's activities in their classroom; parents can watch these programs from the Internet. Users who are distance students. Furthermore, the audience includes parents, kindergarten school teachers, and researchers who are interested in studying early childhood education.

#### 2] Channel 2 (video on demand of university teaching):

This channel broadcasts video on demand for bachelor's and master's degree students. This channel broadcasts more than 95 programs. Users will be students.

#### 3] Channel 3 (variety):

This channel broadcasts variety programs with a focus on the university's strengths. This channel broadcasts more

than 240 programs. There are many interesting program such as Food, Handicrafts, Tourism, Food and Beverages, and others. Users will be students, teachers, university staff, and people who are interested in these programs.

4] Channel 4 (radio):

This channel broadcasts radio programs for users who have low internet access. This channel broadcasts 11 programs. There are many interesting programs such as Art of children, Knowledge Management for Fun, and others. Users will be people who have low speeds of internet access [4].

## VII. IPTV FEATURES, ADVANTAGES AND DISADVANTAGES

### A. IPTV Features:

1. Support for interactive TV: The two way capabilities of IPTV system allow service providers to deliver a whole raft of interactive TV applications such as standard live TV, high-definition TV (HDTV), interactive games and high speed internet browsing.
2. Time shifting: IPTV in combination with a digital video recorder permits the time shifting of programming content.
3. Accessible on multiple devices: Viewing of IPTV content is not limited to televisions, consumers often use their PCs and mobile devices to access IPTV services.

### B. IPTV Advantages:

1. IPTV signals are 100% digital, so the days of analogue TV are fast becoming a thing of past.
2. IPTV works on any existing connection. So we just need to install set top box and power it on.
3. IPTV doesn't require too many wires to get its signals. The newest set top boxes work on wireless signal.
4. Programs can store on the servers and ready to view with the click of a button on IPTV remote (in contrast to broadcast TV).

### C. IPTV Disadvantages:

There are some limitations to IPTV because IPTV is based on the Internet Protocol, it is sensitive to packet loss and delays if the IPTV connection is not fast enough and it also does not support High Definition Television at the moment.

## VIII. APPLICATION OF IPTV

1. It is used to provide video on demand services.
2. It is also used for time shifting purpose.
3. It supports distant education.
4. It has been utilized in multiple sectors such as business, entertainment, communication, healthcare and education.

## IX. CONCLUSION

In this paper, the meaning of IPTV, IPTV architecture along with the components is explained. That is this IPTV is used to broadcast the program as per our choice. Users can watch the programs both in the live and video on demand format. The main application of IPTV in education field is explained in this paper that is IPTV plays a main role in distant education. The IPTV concepts were design to support distant learning. It consisted of four channels (kids, video on demand, variety and radio) and provided information regarding bandwidth availability and it supported a variety of output devices (television monitors, PCs and smart phones). This is very helpful for the students to get distant education.

## X. FUTURE SCOPE

The future scope of this IPTV is to develop a mobile IPTV as day by day mobile becoming so popular should develop IPTV to mobile IPTV system because the technological trend of mobile IPTV is becoming popular and advance. Mobile IPTV is an application which allows users to transmit and receive multimedia content through an IPTV based network with the support of security, mobility and interactivity.

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