

# A Comprehensive Survey on Internet Protocol Television (IPTV)

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**Abstract:** IPTV was convergence product between broadcasting, telecommunication and information technology because it gave multimedia service such as TV broadcasting, video, audio, text, and data transmitted by using IP protocol. IPTV service had a better quality than conventional TV, such as voice over internet protocol (VoIP), data (internet), and video on demand (VoD). IPTV is distinctly different from "Internet Video" that simply allows users to watch videos like movie previews and webcams, over the Internet in a "best effort" fashion with no into- end service management an quality of service considerations. This paper is an overview of the new emerging IPTV technology. Our future work will be focusing on IPTV Quality of Experience, its architecture security threats and its possible solutions and so on.

**Keywords:** IPTV, Analysis, IMS, STB, RTP .

## 1. Introduction

When IPTV stands for Internet Protocol television and the IPTV main role is to deliver audio , video and any other data called Triple Play services over an IP network. i.e IPTV includes services such as voice over IP(VoIP),video on demand and web access services that commonly known as Triple Play services. The IP network for IPTV might be public IPTV network. Such as internet or private IP network, such as LAN based network. IPTV has a numerous no. of features such as to way capability of IPTV system which allows service provider to deliver a whole , interactive television application.( e.g., Interactive games, high speed internet browsing, and high definition television)

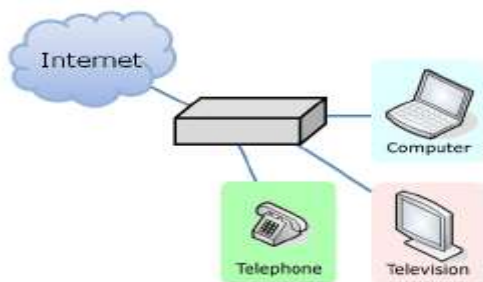


Figure 1: IPTV technology overview as part of the Triple Play solution

## 2. Functional Components of the IPTV Architecture

**Content Sources:-** It receives video content from producers and other sources, encodes them and stores content to an acquisition database.

**Services Nodes:-** It receives video stream in various formats and then reformats and encapsulates them for transmission with that appropriate Quality of Services(QoS) indicates to the (WAN)wide area network for delivery to the customers. Its also

communicate to the Customer Premises Equipment(CPE) for the service management. And it may be centralized in metro area(for e.g., at the Central Offices).

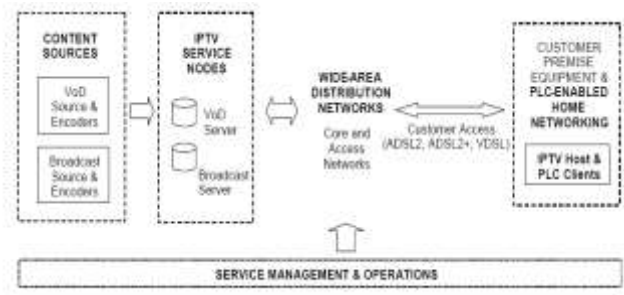


Figure 1: IPTV System Architecture

**Wide Area Distribution Networks:-** it provides the distribution services ,quality of services, and other capabilities, such as multicast and other timely distribution of IPTV data streams from the Service Nodes to the Customer Premises.

**Customer Premises Equipment (CPE):-**This device located at the customer premise provides that the Broadband Network Termination(B-NT) that the functionality at the minimum .And its may include some other integrated functions like that set-top box ,routing gateway and some other home networking capabilities.

**IPTV Client:-** The IPTV Client is the functional unit, basically it performs the functional processing ,which includes setting up the connection and Quality of Services, decoding the video streams such as set-top box.

## 3. Architecture of IPTV

### 3.1 IPTV System

In this architecture is described in Figure. Some major components of IPTV given in below:

- a) **Acquisition servers:-** They add DRM metadata and encode video.
- b) **IP routers:-** They provide fast reroute in that case if routing are failures. Basically they route IP packets.
- c) **Distribution Servers:-** They are provide QOS control and caching.
- d) **Set-Top –Boxes(STB):-**This device on the customer side in that interfaces with the user terminal (e.g., PC, TV, laptop and others)with a Digital Subscriber Line(DSL).
- e) **VoD creators and servers:-** They retain the library of encoded VoD content to provide VoD services

**3.3 Peer-to-Peer IPTV Architecture:**

In this Architecture for a Peer-to-Peer(P2P) IPTV distribution, there is a group and a source of peers as a torrent. Each peer receives many packets from the source and from other peers as shown in Figure.

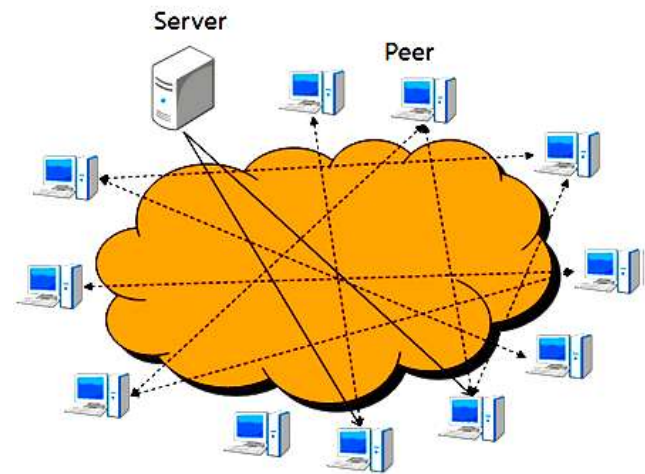


Figure 4: Peer-to-Peer IPTV Architecture

**4. IPTV Set-Top Box (STB)**

Set-Top box is an IPTV device that is used to receive and decode digital television broadcast and to turn that signal into content which is then displayed on a TV screen or any some other display devices.

**Professional Set-Top box :** It's referred to as Integrated Receiver Decoders (IRD) are professional method of the broadcasting audio and video contents to the display devices. They are technically superior. (For e.g. Tornado M10 Set-Top box)



Figure 5: Professional Set-Top box

**Hybrid IPTV Set-Top box** It is designed basically to deliver video contents. This allows viewers to view broadcast television and internet video on their display along with IPTV services such as VOD. A new consumer television experience can created internet browser.



Figure 6: Hybrid IPTV Set-Top box

**Wireless IPTV Set-Top box:** It is to deliver IPTV contents through a wireless network connection. Its connect to displays

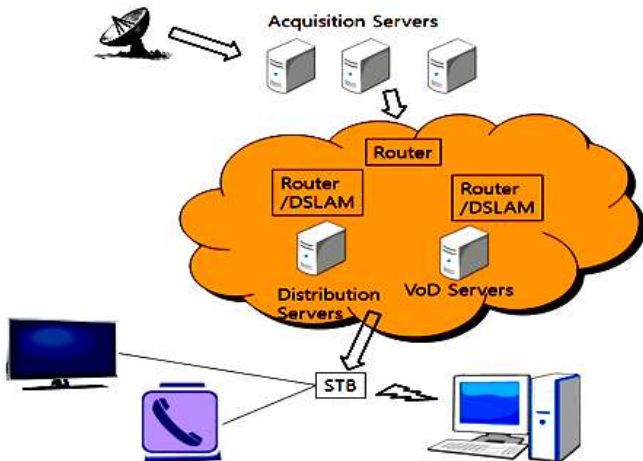


Figure 2: Basic IPTV System

**3.2 IP-multicast IPTV Architecture**

IP-multicast is a method of sending IP packets to a group of interested receivers. As shown in Figure , AT&T U-Verse adopts the IP multicast architecture. When a TV program is encoded at the super hub office (SHO), and then delivered via multicast through video hub offices(VHO), intermediate offices(IOs), central offices(Cos), Digital Subscriber line access multiplexers(DSLAM), & residential gateway(RG), to the TV Set-Top-Boxes(STB).

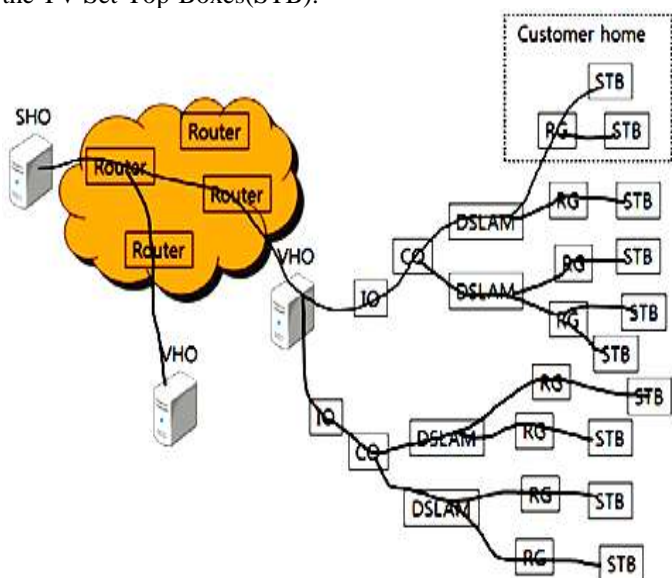


Figure 3: IP-multicast IPTV Architecture

using high definition multimedia interface (HDMI) and S-video interface that can take input from the internet and deliver it to the display device. It can deliver high quality audio and video those contents to the displays with high speed network connection.



Figure 7: Wireless IPTV Set-Top box

## 5. Protocols used for IPTV

**A. RTP:** Real-time Transport Protocol provides many packet format for delivering video and audio contents through IP network. RTP is commonly used in some streaming media services like including telephony & video teleconference applications services. This is used for streaming channels and it's controlled by the Real Streaming Time Protocol (RSTP).

**B. RTSP:** Its stand for Real Time Streaming Protocol or controlling network protocol It's used to establish and control media sessions from the server to the user. The media servers issue pauses and play commands to easily control that those transmissions of media files from the server. In RTSP Streaming of data is one-directional. Data streams can be sent from the server to the user RTSP is used to control all unicast and multicast streams.

**C. PIM:** Protocol-Independent Multicast (PIM) is a collection of multicast routing protocols that can provide data distribution through IP network such as the internet, LAN (Local Area Network), and WAN (Wide Area Network). PIM is independent and it uses routing information provided by various routing protocols such as BGP (Border Gateway Protocol) In IPTV, PIM is commonly used to route IPTV multicast streams between networks.

**D. IGMP:** IGMP stands for The Internet Group management protocol. Its used to manage membership in IP multicast groups. This protocol is basically used in online streaming video and gaming. IGMP is main part of the multicast specification over IP network. It is used to change from one TV channel to another TV channel.

## 6. CONCLUSIONS AND FUTURE WORK

This paper describes the various standardization, ways of deployment, implementation and evaluation of IPTV service, performance capacity and security. The objectives of various IPTV approach have been explained and also reasons and advantages identified for the presented concept. Main components of IPTV service architecture as well as the roles of different functions have been explained in the paper. In our future work we plan to elaborate a further interaction between IMS mechanisms and IPTV service. First we want to enable a dynamic adaptation of IPTV QoS parameters depending on the network resources available for the user at any time.

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