EFFICIENT UTILIZATION OF BROADBAND SERVICES FOR DELIVERING IPTV THROUGH VIRTUALIZATION

[1]KALIDINDI SINDHU, [2]CHINTHIREDDY LAVANYA, [3]NIKHIL VELAGA, [4]S.P. ANANDARAJ, [5]S.POORNIMA

[123]UG Scholar, SR Engineering College, Warangal, [4]Sr. Assistant Professor, SR Engineering College, Warangal, [5]Assistant Professor, SR Engineering College, Warangal

Abstract: Virtualized cloud-based services will make the most of applied mathematics multiplexing across applications to yield vital price savings to the operator. However, achieving similar advantages with time period services are often a challenge. This paper focuses on lower provider's prices of time period. IPTV services through a virtualized IPTV design and through intelligent time shifting of service delivery. This paper tends to multiplex the services Live TV and Video on Demand to make variations within the deadlines effectively. It offers a generalized framework for computing the number of resources required to support multiple services, while not missing the point in time for any service. It tends to construct the matter as associate optimization formulation that uses a generic price function. It tends to take into account multiple forms for the value perform to replicate the various rating choices the answer to the present formulation offers the amount of servers required at totally different time instants to support these services. This paper implements an easy mechanism for time-shifting regular jobs and studies the reduction in server load exploitation real traces from an operational IPTV network. The results show that it tends to area unit able to scale back the load by ~24%. This conjointly shows that there are fascinating open issues in planning mechanisms that permit time-shifting of load in such environments.

Keywords: IPTV Services, Virtualization, Broadband Services, Video on Demand

I. INTRODUCTION

IP-based video delivery becomes more prevalent, the demands placed upon the service provider's resources have dramatically multiplied. Service suppliers usually provide the highest demands of every service across the subscriber society. However, providing the demands of the subscribers leaves resources underutilized in the IPTV services as it is often significantly evident with Instant Channel Change (ICC) requests in IPTV.

In IPTV, Live TV is usually multicast from servers using IP Multicast, with one group per TV channel. Video-on-demand(VoD) is additionally supported by the service supplier, with every request being served by a server using a unicast stream when users change channels while watching li ve TV, we want to provide extra practicality to so that the channel change takes effect quickly for every channel change takes effect quickly for every channel change, the user has to join the multicast group related to the channel, and wait for enough information to be buffered before the video is displayed; this could take some time. As a result, there have been several attempts to support Instant Channel Change by mitigating the user perceived channel switching latency. With the typical ICC implemented on IPTV systems, the content is delivered at an accelerated rate employing a unicast stream from the server. The playout buffer is filled quickly, and thus keeps switching latency tiny. Once the playout buffer is filled up to the playout point, the set top box reverts back to receiving the multicast stream.

ICC adds a demand that's proportional to the number of users at the same time initiating a channel change event. Operational data shows that there is a dramatic burst load placed on servers by correlated channel change requests from consumers. This leads to large peaks occurring on every half-hour and hour boundaries and is often important in terms of both bandwidth and server I/O capacity. Currently, this demand is served by a large range of servers sorted in a data center for serving individual channels, and are scaled up as the number of subscribers increases but this demand is transient and typically only lasts several seconds, possibly up to a couple of minutes. As a result, majority of the servers dedicated to live TV sit idle outside the burst period.

The goal of this paper is to take advantage of the distinction in workloads of the various IPTV services to better utilize the deployed servers. For instance, while ICC workload is incredibly bursty with a large peak to average ratio, VoD includes a relatively steady load and imposes "not so stringent" delay bounds. More importantly, it offers opportunities for the service supplier to deliver the VoD content in anticipation and potentially out of-order, taking advantage of the buffering available at the receivers. Consequently it reduces the resource

requirements for supporting the service by taking advantage of statistical multiplexing across the various services in the sense this satisfies the height of the sum of the peak demand of the services, instead of the sum of the peak demand of each service when they are handled independently. Virtualization offers the ability to share the server resources across the services.

There exist numerous tools and technologies for cloud, like cable TV and Digital TV (DTV) is a telecommunication system for broadcasting and receiving moving pictures and sounds by means of digital signals in analog (traditional) TV. It uses digital modulation data, which is digitally compressed and requires decoding by a specially designed television set or a standard receiver with a set-top box.

- Setup boxes and lot of physical equipment is needed.
- Customer's desired channels may not be provided some times.
- More waiting time.
- Not cost effective.

A system is proposed where a digital TV service is delivered using the internet Protocol over a network infrastructure, which may include delivery by a broadband connection. For residential users, IPTV is usually provided in conjunction with Video on Demand and may be bundled with internet services such as net access and VoIP. IPTV is often equipped by a broadband operator employing a closed network infrastructure. This closed network approach is in competition with the delivery of TV content over the public internet this kind of delivery is widely referred to as TV over Web or Web TV. In businesses, IPTV may be could also be deliver TV content over corporate LANs and business networks perhaps an easier definition of IPTV would be TV content that, rather than being delivered through ancient formats and cabling, is received by the viewer through the technologies used for networks.

II. ARCHITECTURE

The emerging IPTV service market is a boon for the cable and wire line operators to make huge profits. However delivering and managing reliable and profitable services needs meticulous planning so as to tackle the operational challenges along the way. This paper scrutinizes these challenges and designs a network infrastructure and network management solution that will optimize IPTV service delivery.

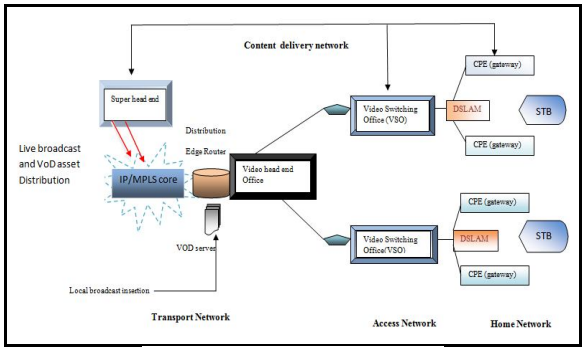

Figure 1.1: Framework for IPTV

The IPTV architecture provides the ideal platform for delivering IPTV services. This architecture combines superior video-to-network linkages, high availability, video-aware intelligence, scalability, and flexibility to accommodate new services as they evolve a true multiservice convergence platform, this architecture permits carriers to converge entertainment and business-grade services to converge entertainment and business-grade services onto a common infrastructure and to deliver large number of services to any market, over any IP-based high-speed access technology.
The following sections describe the three primary segments of an IPTV infrastructure:

- Transport network
- Content delivery network
- Access network

A. Transport Network

The transport network infrastructure consists of high-bandwidth MPLS/IP core and distribution. The Carrier Routing System platform, which can process packets at terabit speeds, is used as core routers for video services.

B. Content Delivery Network

Video Head End: The video head end consists of real-time encoders/decoders for local and national broadcast video channels, VoD libraries for on-demand video services, and video switching equipment for video transport. The real-time encoders take the live feed from a broadcaster in either analog or digital format and convert it to digital stream that is encapsulated in IP packets. The output of the encoder is a digitally compressed stream that is encapsulated in IP headers and sent to a multicast address. Each encoder produces three output streams: standard definition, high definition, and picture-in-picture. The compression method used by the encoder may be either MPEG-2 or MPEG-4, while the IP-based transport encapsulation used is MPEG-2 transport over UDP/IP/RTP. One encoder is required for every channel.

Video on Demand: The VoD servers implement the storage and real-time streaming functionality for on-demand services. These system offer provide

intelligent, network-based platform for supporting video ingest, storage, content distribution, personalization, and streaming functions, permitting carriers to deliver customized, interactive and local content the solution supports the full range of next-generation video entertainment applications, including

• VoD
• Near VoD (nVOD)
• Network Digital Video Recorder (nDVR)
• TV time-shifting
• Personalized ad insertion
• Delivery of the Public Access, Education, and Government (PEG) channels

C. Conditional Access Systems

The conditional access system (CAS) provides encryption and decryption services, as well as key generation and distribution functionality, for both broadcast and on-demand services. The CAS consists of the encryption resource manager, the encryption engine, and the video decryption process in the STB. The CAS interfaces with middleware when session-based encryption is used for on-demand services. The CAS may also interface to middleware for encryption key distribution between the encryption resource manager and the decryption process on the STB. Finally, the CAS interfaces to VoD servers where pre-encryption is used for on-demand content.

Middleware: Middleware ties a number of logical components together into a more comprehensive IPTV/video software system. Middleware implements the user interface for both broadcast and on-demand services. (Note that there are several different middleware implementations depending upon existing/proposed OSS architecture.)

Billing server: Billing of content services can be either pre-paid or post-paid.

Post-paid: The actual bill amount of the service availed by the user is sent to billing system by the application server.

Pre-paid: On authentication request, a message is sent to the billing server to check the balance and reserve a fixed amount (based on service selected). The service is only provided if the user account has the required balance. When the user avails the service, fully or partially, the actual bill amount is sent to the billing server for deduction in the user's pre-paid balance.

Access Network: The end user access is DSL, Ethernet, or Fiber to the Home (FTTH) for wire line providers and QAM/coaxial for cable operators.

Set-Top Box: The set-top box (STB) is the hardware and common software infrastructure component that is used by the on-demand and broadcast clients as well as by the video decryptor and the video decoder. The hardware may also include a hardware-based decoder and decryption subsystem. The STB software typically includes an embedded operating system, and may also include application infrastructure components such as a Web browser.

III. IMPLEMENTATION

Internet protocol television (IPTV) is a process of providing television (video and/or audio) services through the use Internet protocol (IP) networks. These IP networks initiate, process, and receive voice or multimedia communications using Internet protocol. These IP systems may be public IP systems (e.g. the Internet), private data systems (e.g. LAN based), or a hybrid of public and private systems.

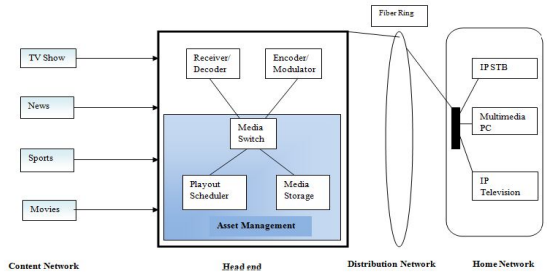

Figure 1.2 Implementation of IPTV

To get IPTV these key parts are needed:

- Viewing devices or adapters
- Broadband access providers
- IPTV service providers
- Media content providers

IPTV systems comprise of content providers, distribution networks, viewing devices, and IPTV service operators. The content providers include existing television networks, on demand content providers (content aggregators), and independent content provider companies. This example shows a distribution networks that uses many types of systems to transfer IP video packets from the content source to the viewing devices. IPTV viewing devices include standard televisions (with adapters), multimedia computers, and multimedia mobile devices. The IPTV system operator manages how customers can connect to the system which services they can receive.

The viewing devices or adapters convert digital television signals into a form that can be controlled and viewed by users. Broadband access providers supply the high-speed data connection that can transfer the digital video television signals. Service providers identify and control the connections between the viewing devices and the content

providers (media sources). Media content providers create information that people want to view or obtain.

Media Content Providers
IPTV content sources can range from live TV networks (such as CNN) to niche on-demand content from micro-producers. IPTV systems can deliver an unlimited number of channels as each television set only require one TV channel connection which can be linked to any other TV source the IPTV operator can provide.

IPTV Service Providers
IPTV service providers obtain the rights to transmit media programming to their customers. While IPTV service providers may focus on provide TV services in geographic areas (such as where they own or control TV distribution rights), IPTV service providers can technically provide programming anywhere in the world they can reach customers through a broadband data connection.

IP Distribution Systems
IP distribution systems transfer media programs from the content sources to viewing devices. There are many types of systems that can distribute IP data packets which include telecom, wireless, cable TV systems, power companies (data over power line), and competitive access providers (such as new optical networks).

IPTV Viewing Devices
The user can view the media which is received in IP form to the IPTV viewing devices. IP viewing devices range from standard televisions that use IP set top boxes to convert IP video signals into a format that can be viewed on a standard television to mobile telephones with digital video viewing capabilities.

CONCLUSION

The biggest advantages with using IPTV over the other distribution methods is that with IPTV it is easy to decide what information a person wants to be provided with and have real on- demand services as VoD and not NEAR-VoD as some of the other distribution methods provide. And this technology will also be able to provide a bigger selection for the VoD service with IPTV than with the other distributions methods. For the operators the advantage is that they only have to send the channels that people are watching, for example if every viewer would watch the same channel the server would only need to send that channel. Because of this it is also possible to provide a lot of channels. Yet, it suffers from various problems related to multi access and it is expensive to watch another channel on different TV. IPTV is definitely a part of the future in television, even though it only will be an option for those with a high bandwidth broadband to provide multi accessing.

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