Review of IPTV System Architectures

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Abstract. IPTV stands for Internet Protocol Television. In other words, users who have any kinds of IP devices are able to watch Television wherever they are. As digital technologies and telecommunication technologies are advanced and more entertainment demands are requested, the interest in IPTV is increasing dramatically. This paper investigates evolution of IPTV architecture.

Keywords: IPTV, peer-to-peer IPTV, mobile IPTV

1   Introduction

IPTV stands for Internet Protocol television, and any user with an IP device such as a smart phone can get IPTV service anywhere and anytime as long as the user can access the Internet [1,2] Nowadays, based on the needs of audio-video entertainments by customers and advanced network development, the IPTV has been intensely developed by the telecommunication, multi-media, and network research staffs [3].

Internet TV also delivers video to end-users through the Internet. Internet TV is different from IPTV in that it does not guarantee QoS(Quality of Service). However, Internet TV has no geographical limitations and extremely popular nowadays.

In telecommunications, triple play service is a marketing term for the provisioning, over a single broadband connection, of two bandwidth-intensive services, high-speed internet access and television, and the latency-sensitive telephone [4]. The triple play and high-definition (HD) TV boost IPTV service. This paper investigates the evolution of IPTV architectures

2   IPTV Architectures

The IPTV chain spans over four domains: 1) the consumer domain presenting services to the end user; 2) the network provider domain allowing the connection between the consumer domain and the service provider domain; 3) the service provider domain which is responsible for providing consumers with the services; and 4) the content provider domain that owns or is licensed to sell contents or content assets [5]. The architectures of basic IPTV system, IP multicast, peer-to-peer, and mobile are discussed in this section.
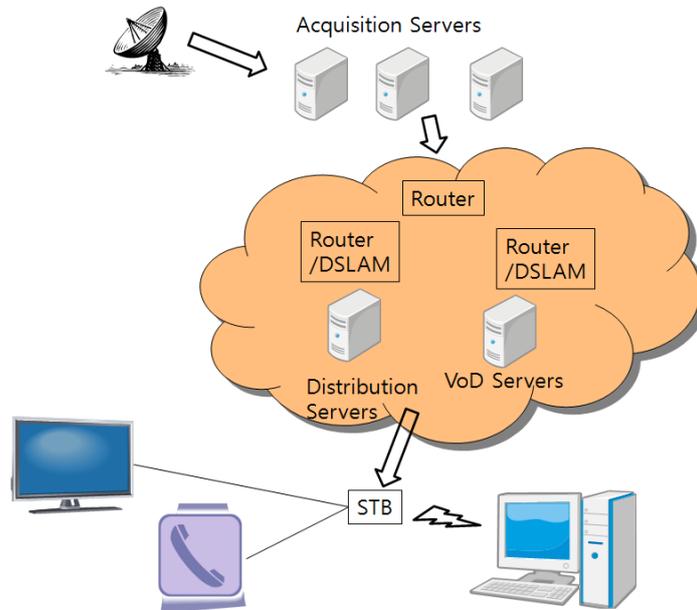
2.1   Basic IPTV System [5]

Fig. 1. The basic IPTV architecture

The basic architecture discussed in [5] is described in Figure 1. The major components of a typical IPTV system are:

1) Acquisition servers: They encode video and add DRM metadata

2) Distribution servers: They provide caching and QoS control

3) VoD creators and servers: They retain a library of encoded VoD content to provide VoD services.

4) IP routers: They route IP packets and provide fast reroute in case of routing failures.

5) Set-Top-Boxes (STB): A STB is a device on the customer side that interfaces with the user terminal (e.g., TV, PC, laptop, and others) with a DSL (Digital Subscriber Line) or cable wiring.

2.2 IP-multicast IPTV Architecture [6]

IP multicast is a method of sending IP packets to a group of interested receivers. IP multicast uses network infrastructure efficiently by requiring the source to send a packet only once, even if it needs to be delivered to a large number of receivers. As shown in Figure 2, AT&T U-Verse adopts the IP multicast architecture [6]. A TV program is encoded at the super hub office (SHO), and then delivered via multicast through video hub offices (VHOs), intermediate offices (IOs), central offices (COs),

digital subscriber line access multiplexers (DSLAM), and residential gateway (RG), to the TV set-top-boxes (STB).

- SHO is for acquisition of national live TV programs. Live TV programs are received via satellite and processed for delivery to multiple VHOs.

- VHOs are the video distribution points within each demographic market area (DMA).

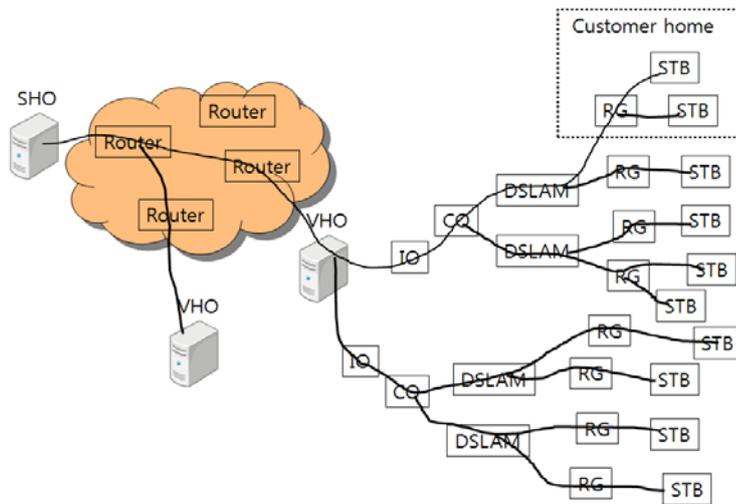- IOs and COs are located at each metropolitan area and connect to access networks.

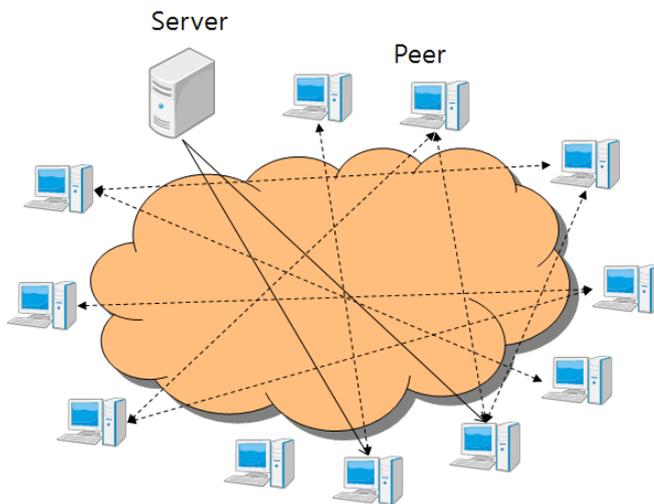**Figure 2.** Architecture of an IP-multicast IPTV system

Fig. 3. Architecture of a Peer-to-Peer IPTV system

2.3 Peer-to-Peer IPTV Architecture [7]

For a Peer-to-Peer (P2P) IPTV distribution, there is a source and a group of peers watching the video. We refer to the source and the group of peers as a torrent. The source encodes video and disseminates the video packets into the P2P torrent. Each peer receives packets from the source or/and from other peers as shown in Figure 3.

A mobile IPTV prototype has been designed and implemented to support users via wireless and mobile networks in [8].

3   Conclusions

Reviewing the evolution of IPTV system architecture, we found that mobile IPTV is very attractive. For further study, we are now implementing a prototype mobile IPTV for a local government .

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