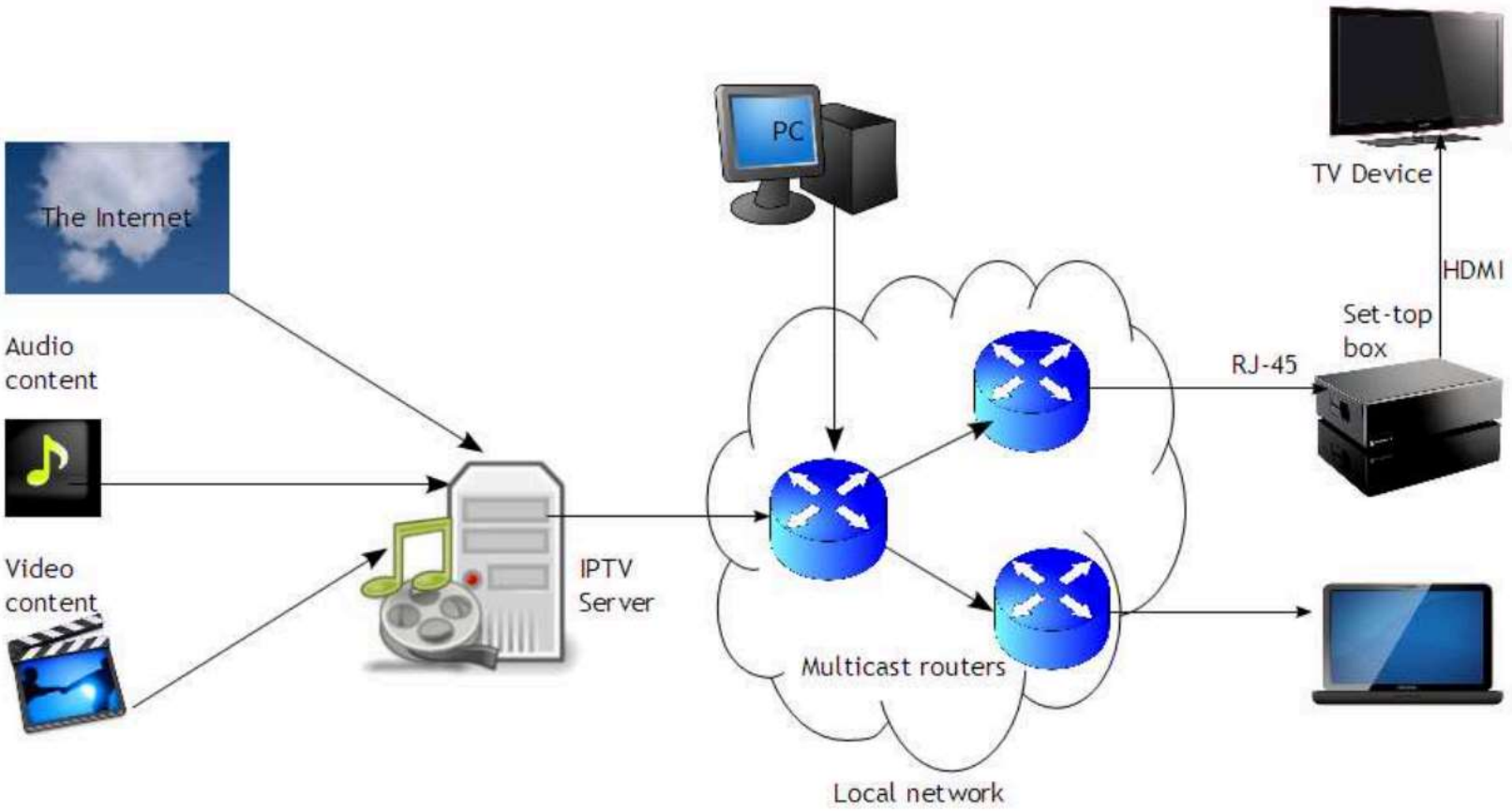
Demonstration of Internet Protocol Television(IPTV)



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What is IPTV?

- IPTV is a general term of IP+TV = IPTV
- Delivery of traditional TV channels and video-on-demand contents over IP network.

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IPTV Definition by ITU-T

- IPTV is defined as multimedia services such as television/video/audio/text/graphics/data delivered over IP based networks managed to provide the required level of quality of service and experience, security, interactivity and reliability.

Before getting IPTV

- Digital TV
- High speed Internet connection
- Set-top box

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TV format

- **SDTV**

  Has a resolution of 480 vertical lines and 720 horizontal lines

- **Standard HD**

  1080i (1920 x 1080).~ 720p.

- **Full HD**

  1080p (1920 x 1080).

The difference between HD and Full HD is whether a display can redraw a 1080 image using progressive scan.

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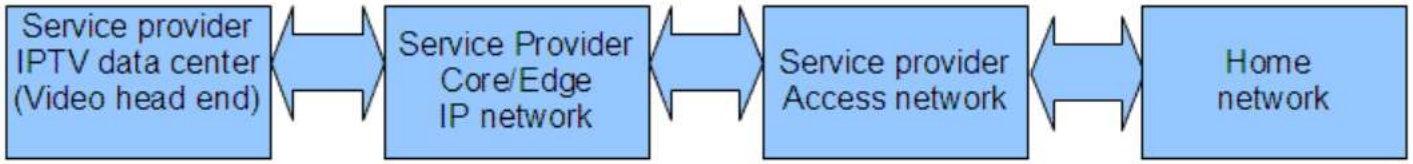
IPTV architecture

IPTV networks basically consists of computer servers, gateways, access network connections and end user devices.



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Content aggregation

Movies or television programs is gathered via communication lines or stored media.

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Video headend

- A headend is the IPTV data center .
- Receives a content from different sources such as local video, cable, satellite and terrestrial.
- Prepares the video content for delivery over an IP network.
- Uses different components like servers, encoders, routers, security systems and subscription management.

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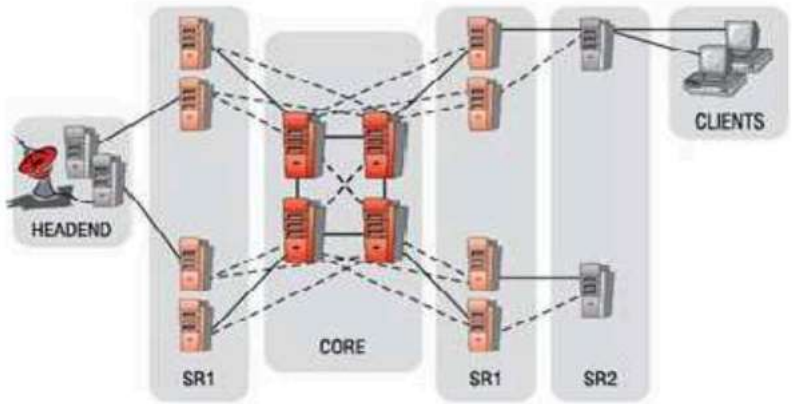
Core network



- The core network is the central network portion of a communication system.
- IPTV core consists of distribution center, QoS, multicast, etc. and transports the encoded group of channel which is forwarded from the video head end. At the network edge the IP network connects to the access network.

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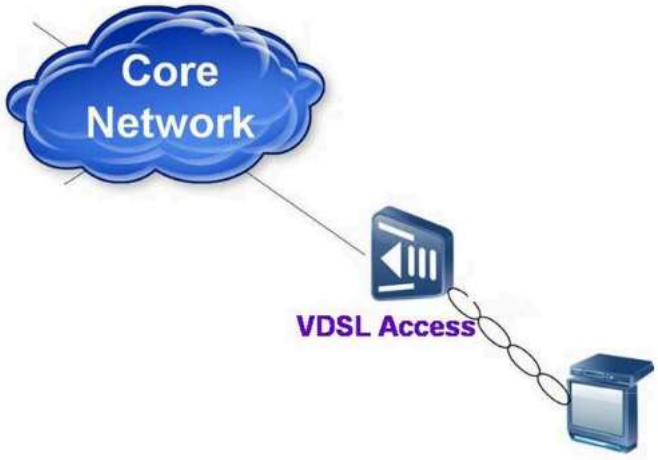
Access network



Allows individual subscribers or devices to connect to the core network. IPTV access networks can be DSL, cable modem, wireless broadband or optical lines.

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Home network

- Set-top box (STB) is a IPTV CD (IPTV consumer device) that allow users to access IPTV services
- STB is also the end point in the home network where the television set is connected.

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IPTV SERVICES

1. IPTV broadcasting
2. Video time-shifting
3. Video on demand(VoD)

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IPTV broadcasting

- IPTV Service Provider streams channels to end-users.
- Streams a single broadcast TV channel to multiple clients simultaneously.
- IP multicast protocol is used

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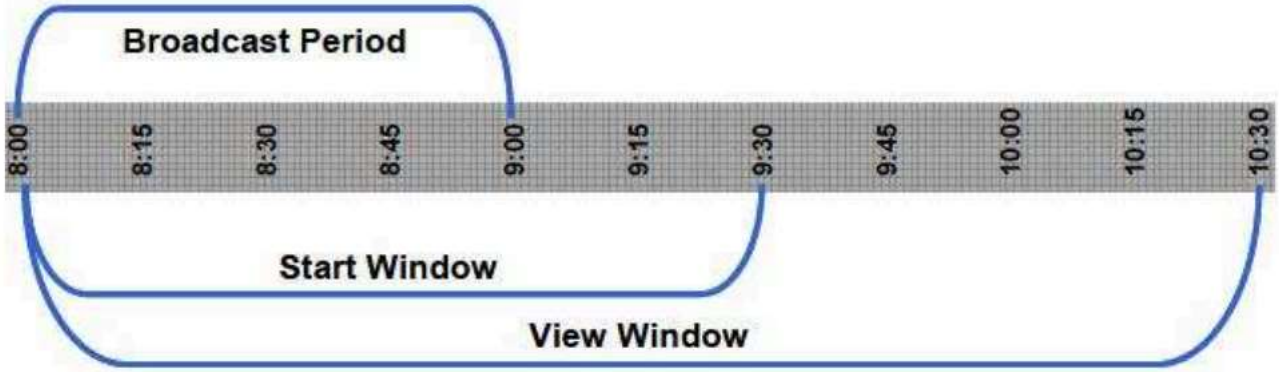
Video time-shifted

Provides a possibility to break or rewind a TV program.



- Broadcast Period is the actual time that program is being broadcast to all users.
- Start Window is the time frame that subscribers can begin watching a program.
- View Window is the time frame that subscribers can view a program.

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Video on demand

- Provides library of digitally stored movies, shows and other programs
- Users can select and instantly view the video
- Offers a freedom to customers.
- IP unicast protocol is used.

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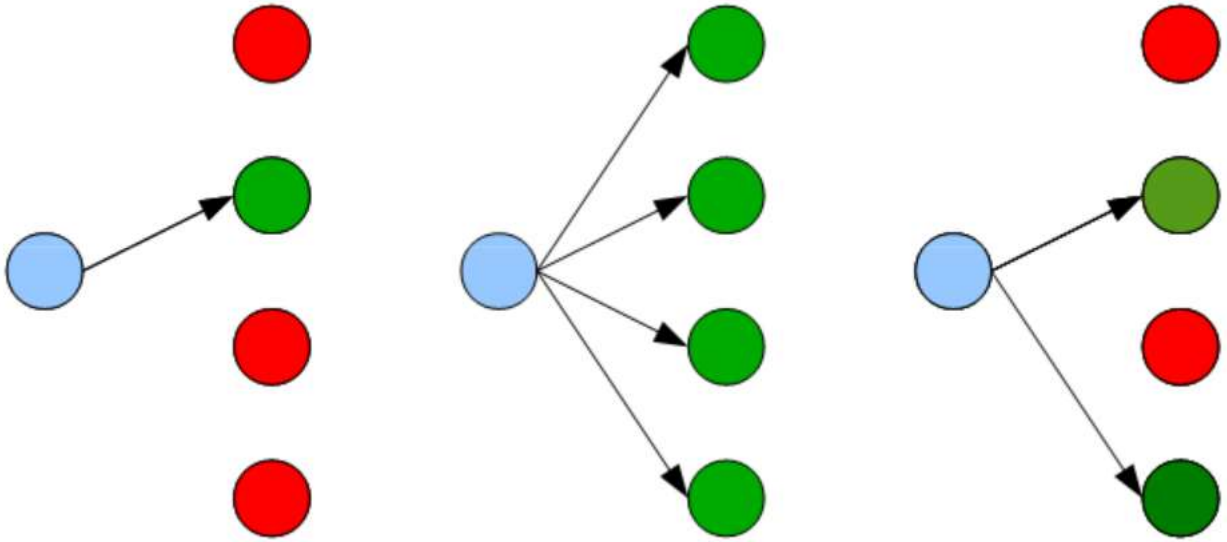
IPTV distribution methods



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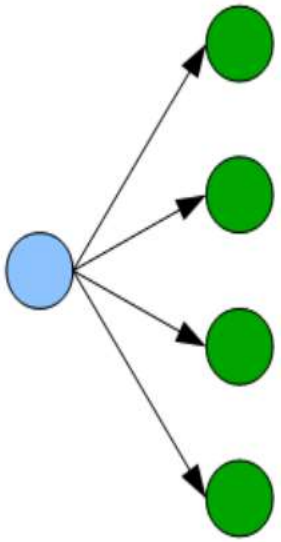
Broadcasting

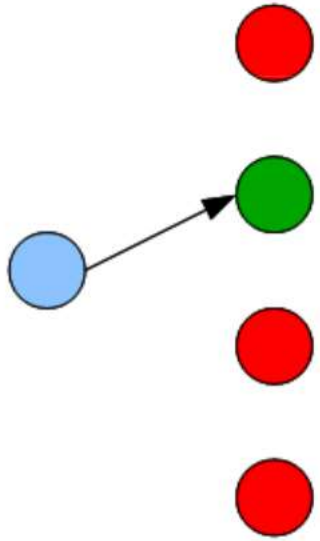
- IPTV channels sends to all customers regardless on whether they requested the video stream or not.
- Network overwhelms
- Unsuitable for IPTV.



Broadcast

Unicasting

- IPTV video stream sends to a single user
- Each user needs a separate unicast stream
- Suitable for VoD services



Unicast

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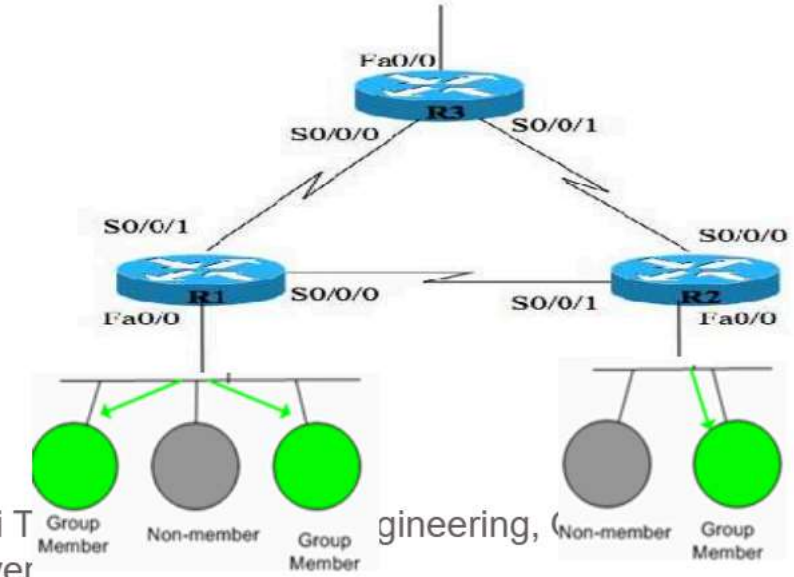
Multicasting

- One to many
- Groups and membership
- Each multicast group is a broadcast TV channel
- Each IPTV channel is only streamed to the IP set-top boxes that request to view
- Reduces bandwidth usage relatively low

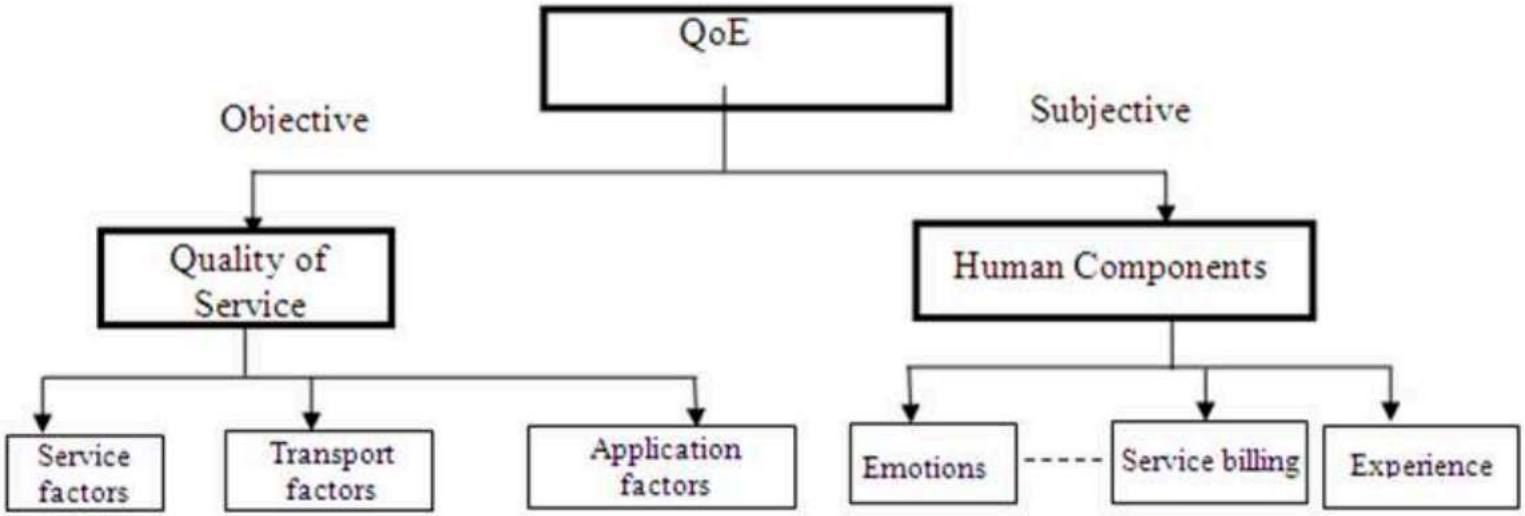


Quality of Service (QoS)

- *"The collective effect of performance which determines the degree of satisfaction of a user of the service."*
- IPTV QoS challenges:
  - Bandwidth limitation
  - Packet loss
  - Network jitter
  - Packet reordering
  - …

Quality of experience (QoE)

- Measurement of user satisfaction
- Including picture quality, voice quality, response time and all other relating functionalities.



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QoE measurement level

- Mean Opinion Score (MOS)
- Represents the video quality
- Users select number between 1 and 5
- Mean of the rated numbers is the MOS value

Quality level	MOS
Excellent	**5**
Good	**4**
Fair	**3**
Poor	**2**
Bad	**1**

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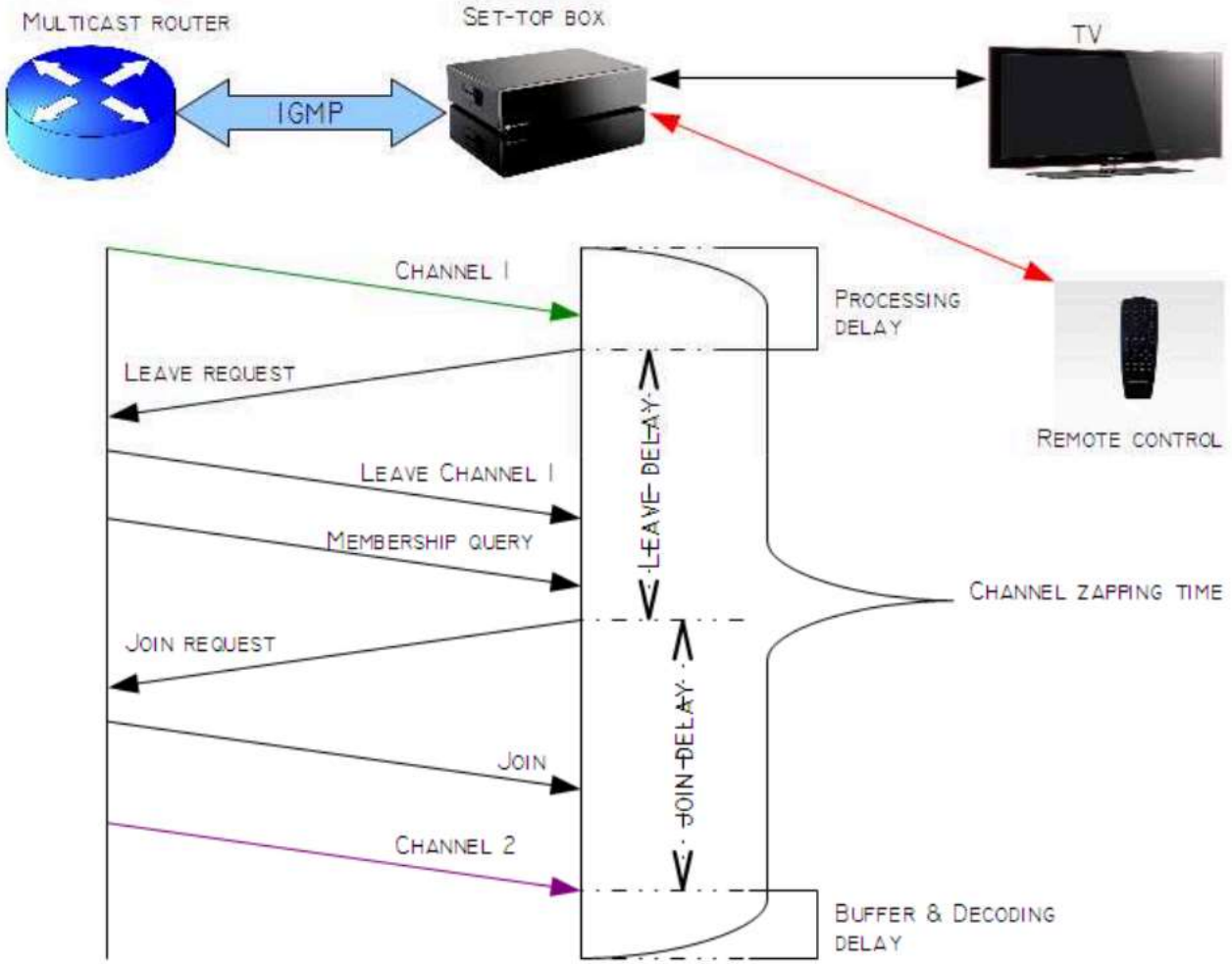
Channel zapping time



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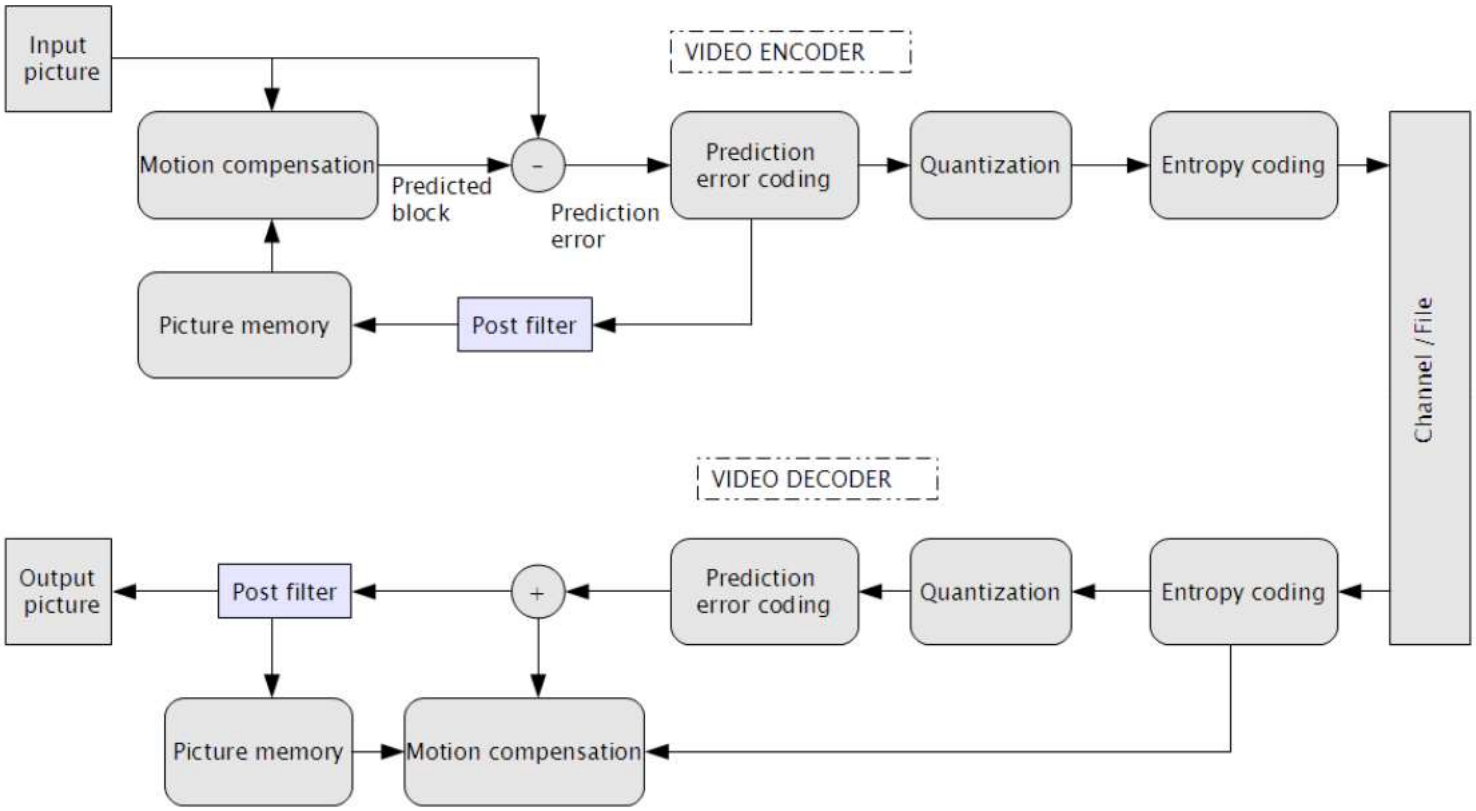
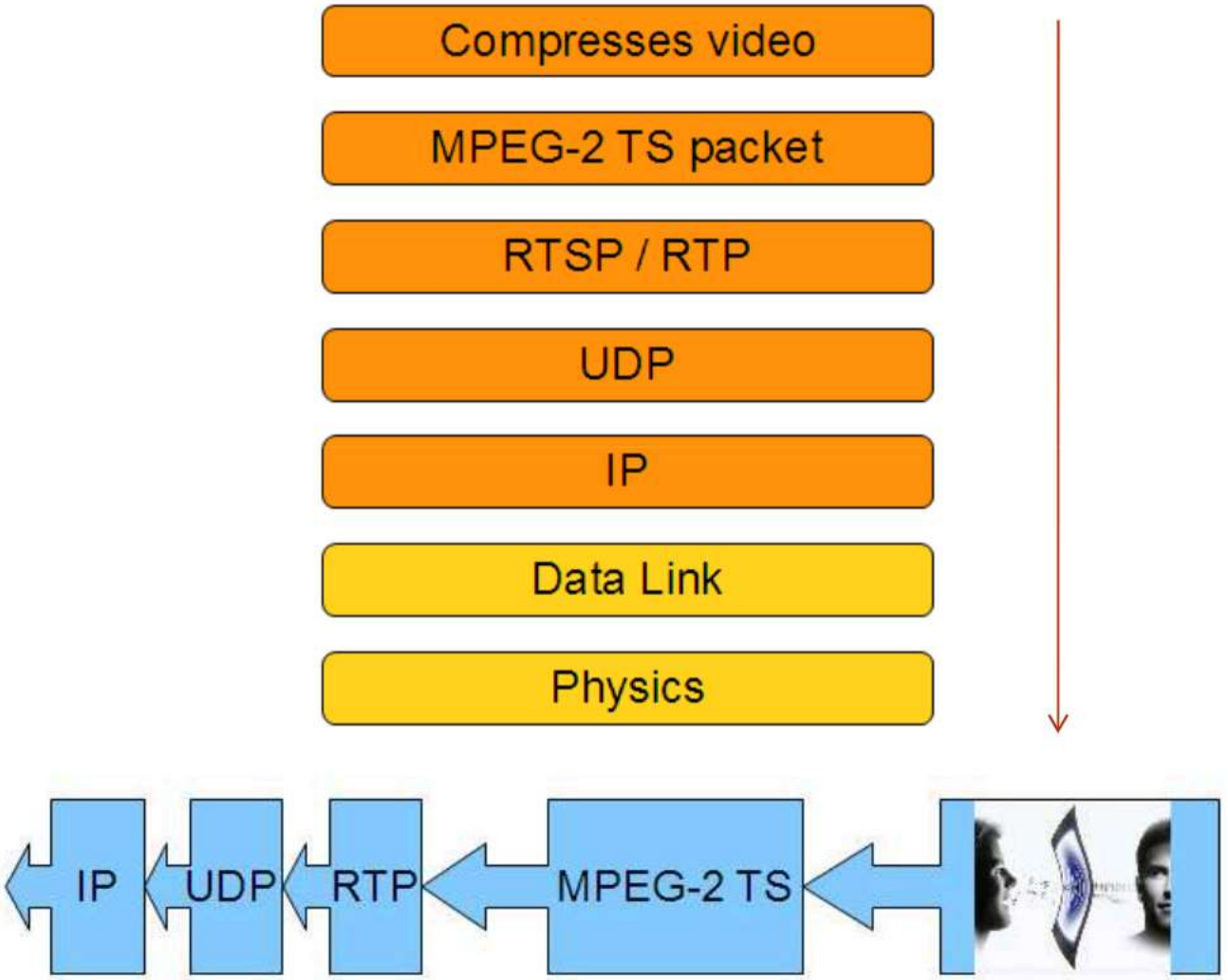
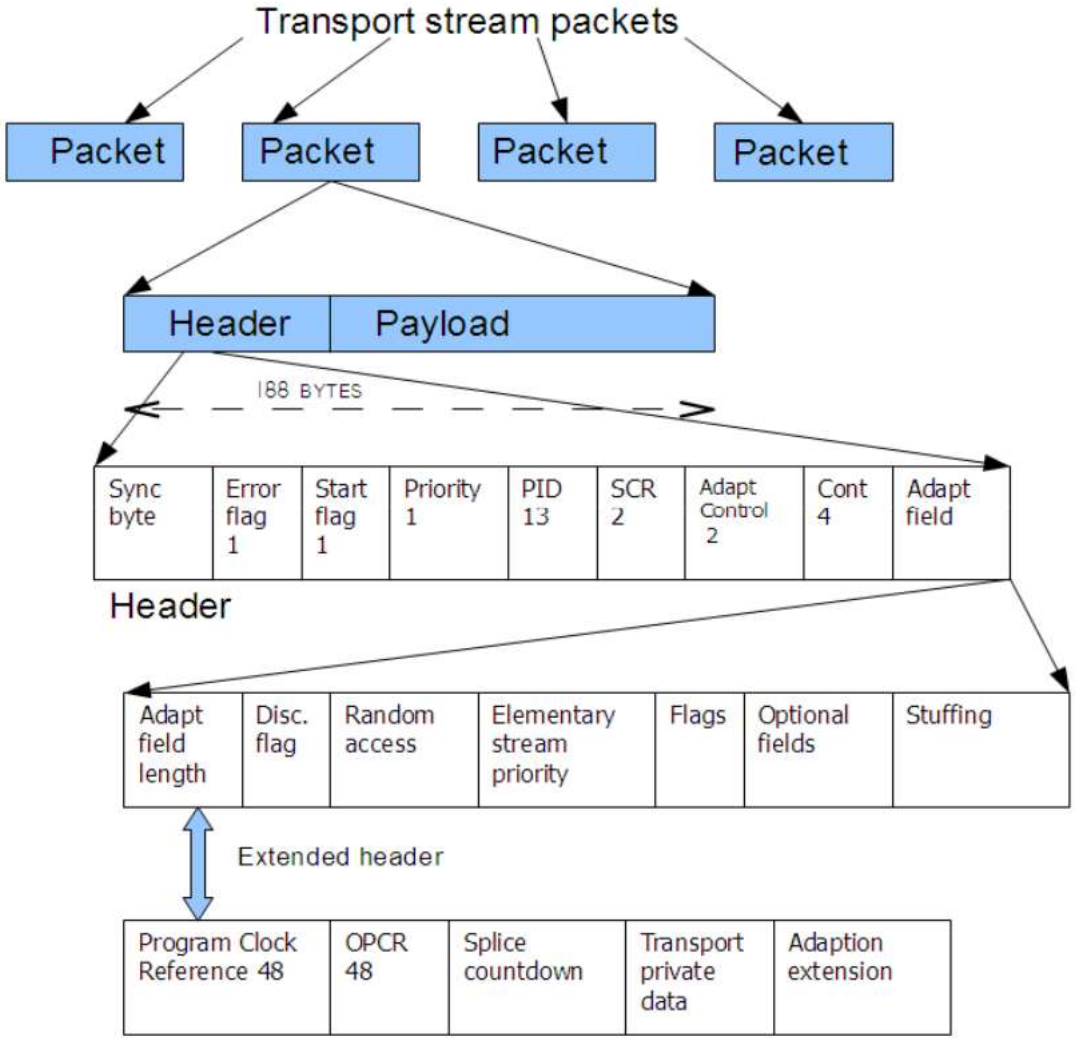
Video codec


Input picture
VIDEO ENCODER
Motion compensation
Predicted block
Prediction error
Prediction error coding
Quantization
Entropy coding
Channel / File
Picture memory
Post filter
VIDEO DECODER
Output picture
Post filter
Prediction error coding
Quantization
Entropy coding
Picture memory
Motion compensation

Transport Stream



Transport Stream



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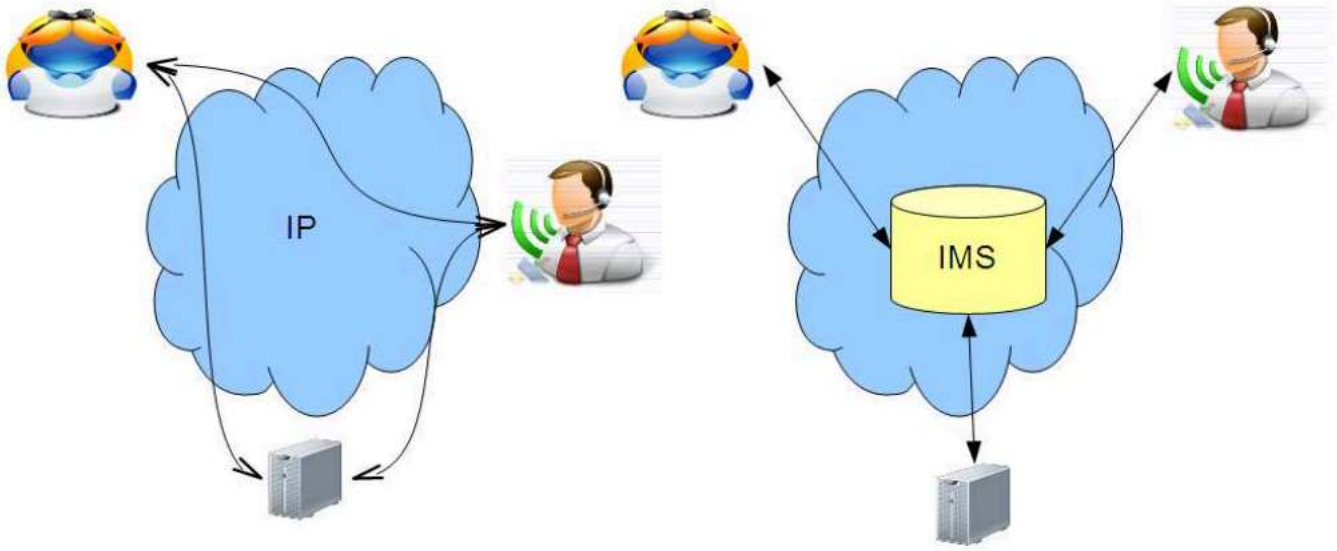
IP Multimedia Subsystem (IMS)



IP network brings free communication between end users

IMS offers SIP based multimedia services:

- More security
- Billing and charging
- Single Sign-On
- Service based QoS

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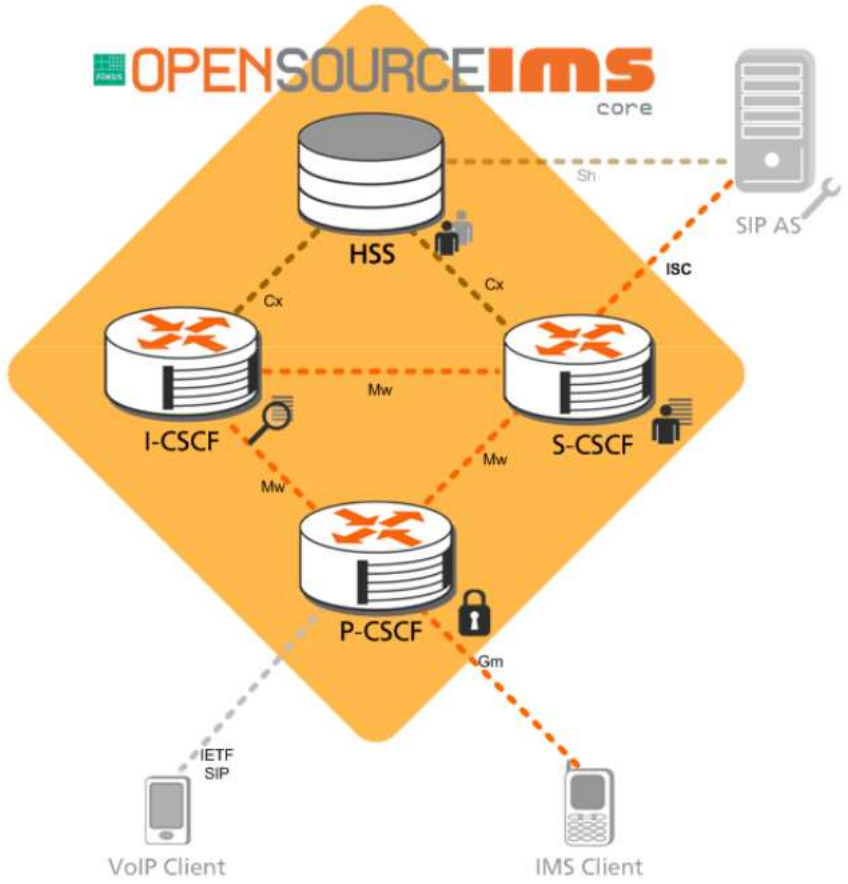
Why IMS?

- Integration
- Mobility
- Vendor independence
- Interworking



(Image courtesy of Fraunhofer Institute for Open Communication Systems FOKUS)

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Why IMS?

- Integration
  - Compress multimedia services into one single platform
  - Seamless communication between mobile and fixed devices

Why IMS?

- Mobility:
  - access to different services independently from the location of the user
- Vendor independence
  - integrating of different components and modules from various solution providers into a unique system
  - optimizing the investment involved.

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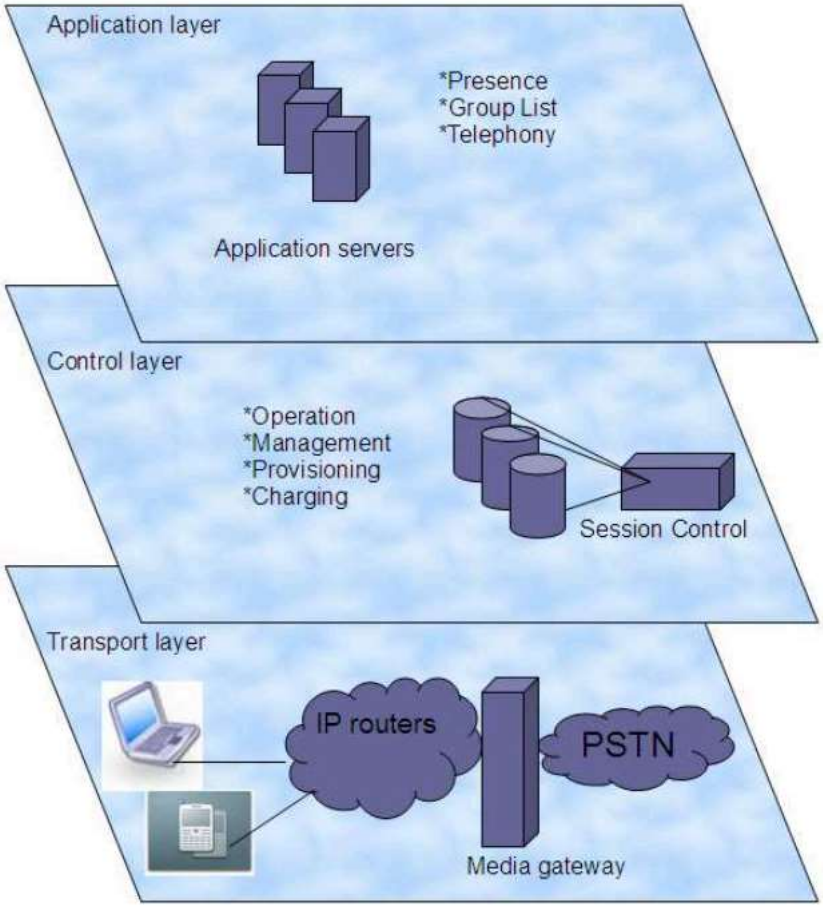
Why IMS?

- Interworking
  - with other communication systems
  - robust multimedia services across diverse networks
  - complete service platform for the Next Generation Network (NGN)



Merging IPTV Service into IMS

- Service blending
  - Mobile IPTV

IPTV and Messaging service: receiving and sending messages from/to TV screen.

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Merging IPTV Service into IMS

- Service blending
  - IPTV and Data service: email, information service, voting, chatting.
  - Location and IPTV Services Interworking

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