State of the Art in IPTV

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Introduction

- IPTV is essential new technology in ICT
- changes the perspective of the way end users consume TV services
- serves as a platform for new ideas and concepts in other areas, such as medicine, science and industry.
- brings significant contribution in different scientific areas, as well as medicine and industry, besides the development of ICT.

Background

- Three different approaches to IPTV technology research:
- System and technology functionality upgrade,
- Performance analysis, and
- creating or improving technology assisted living.

Functionality upgrade

- contextualized IPTV monitoring,
- IPTV channel control algorithm,
- reducing energy consumption in IPTV networks,
- IPTV channel control algorithm,
- reducing channel zapping time by creating adjacent multicast groups,
- the mesh-pull P2P streaming approach,
- etc.

Performance analysis

- Measuring Bit-torrent
- Measuring large-scale P2P IPTV systems
- etc.

Technology assisted living

- Creating or improving technology assisted living:
- Full-duplex emergency IPTV alert system,
- An IPTV platform for Integrating Multimodal Technologies,
- IPTV in health tele-monitoring
- IPTV in education.

Definition of IPTV

- A technology that aims at securely delivering high quality broadcast television and/or on-demand video and audio content over a broadband network.
  - ***Support for interactive TV***. (2 way capabilities and delivery of interactive TV applications (standard live TV, HDTV, interactive games, high speed Internet browsing).
  - ***Time shifting***. Recording and storing IPTV content for later viewing, along with a digital video recorder
  - ***Personalization***. Decision what the users want to watch and when they want to watch it.
  - ***Low bandwidth requirements***. Streaming only channels the end users requested.
  - ***Accessible on multiple devices***. Use on TVs, PCs and mobile devices.

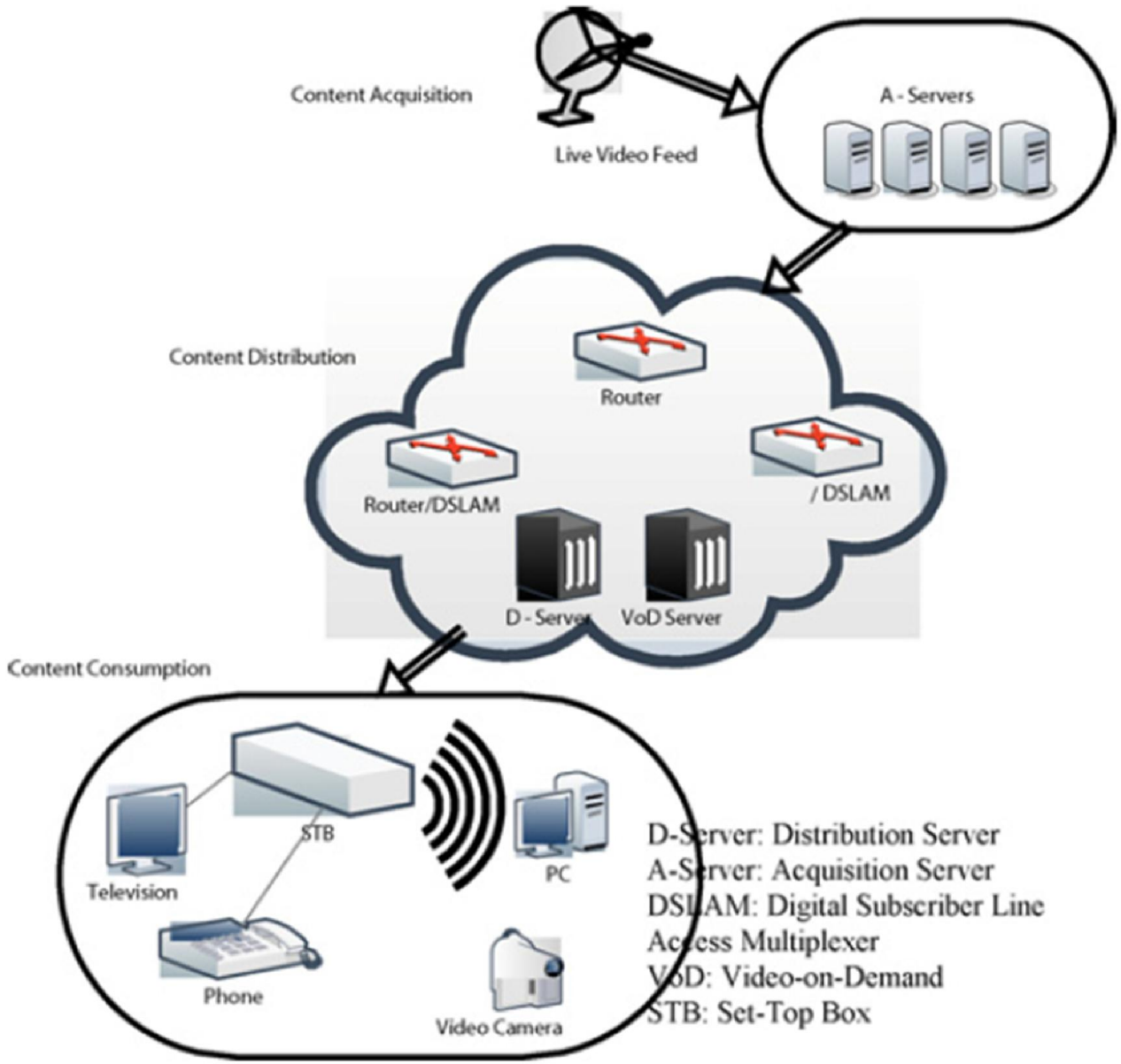
Comparison to Internet TV

Features	Internet TV	IPTV
Platform for delivering video services	Leveraging the public Internet	Secure dedicated private networks managed by the SP
Geographical reach	No geographical limitations	Located in fixed areas
Network infrastructure ownership	QoS is not guarantied	QoS is guarantied
Access medium	STB device	PC
Costs	Mainly free	monthly subscription
Content generation methodologies	User generated content	Traditional shows and movies

IPTV applications

- EPG (electronic program guide) and interaction
- On-demand video content and gaming
- IPTV browsing
- IPTV e-mail
- Digital video recording
- Walled garden portal
- Instant IPTV messaging
- IPTV commerce
- Targeted interactive TV advertising
- Parental control,
- Emergency alert systems

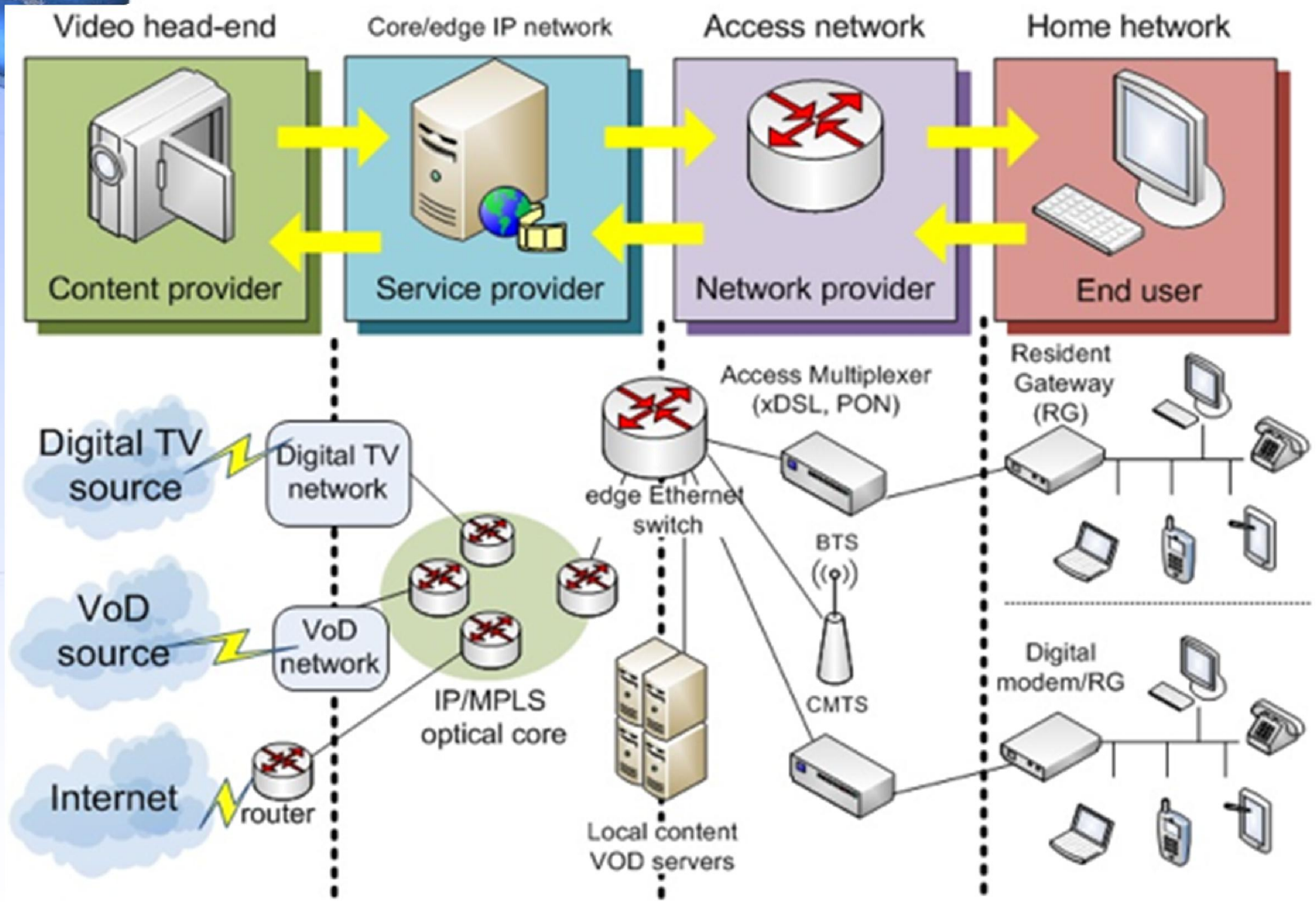
IPTV architecture



Functional units

- A-server = acquisition server (encode video)
- D-server = distribution server (caching and QoS)
- VoD (video on demand) server
- IP routers
- Residential gateway
- STB (set top box) device = interface

Generic IPTV system



Research topics

- Optimizing the bandwidth
- P2P systems
- Application in Technology Assisted Living
- Different STB applications

Related projects

B. Veselinovska, M. Gusev, T. Janevski, “Overview of current trends in IPTV related FP7 projects”, ICEST proceedings, 2013, 26-29 June 2013, pp.111-114.
Analyzed:

- ViSTA-TV
- OptiBand
- W3TV
- VitalMind
- NAPA-WINE
- My-E-Director
- I2WEB

Research papers analysis

Research	State of the art contribution
	Functionality Upgrades
[10]	scalable monitoring system which captures and analyzes network traffic, provides granularity (hundreds of subscribers) and pinpoints the source of errors
[5]	a channel control algorithm which effectively guarantees channel zapping time
[9]	bandwidth, energy and cost savings by creating a dynamic power consumption model scheme
[15]	Reducing latency in channel switchings within P2P IPTV systems with four novel fast channel switching schemes
[6]	improving the channel zapping time by making adjacent multicast groups of a current channel
[12]	increasing bandwidth savings with the mesh-pull P2P streaming approach

Research paper analysis

System Performance Analysis	
[13]	common simulation framework for rapid P2P TV systems
[11]	achieving shorter star-up delay, higher rate streaming, smaller peer lags and better NAT traversal in large-scale P2P mesh-pull IPTV systems
Technology-Assisted Living	
[2]	a highly available two-way EAS with redundancy of devices, multiple means of alert notification, scalability and prioritization of data
[16]	improving user's interactivity by a distributed system of non-web speech-based multimodal services (automatic speech recognition, text-to-speech synthesis, virtual assistants, etc.)
[17]	blood pressure, body weight and on-line medical interviews provided by a personal health telemonitoring application integrated into the IPTV service at home
[19]	IPTV in tertiary education, continuing professional development (CPD), and personally tailored education services

Comparing STBs

- Support for Interactive TV, time shifting, personalization, low bandwidth.
- Apple TV (IOS iPad, iPhone)
- Google Chromecast (Andrioid)
- Roku
- Netgear
- Bravia (Sony smart TV)
- Samsung
- etc.

Advantages and challenges

Advantages	Challenges
Advanced multimedia program guide	Assured quality of service
Integrated broadcast, VoD and DVR	High network availability for always-on services
Fast scrolling and navigation	Single infrastructure for multi play and future services
Live picture-in-picture	Simplified service and network provisioning
Channel slide show	Scalable design for growth and changes
Multiple picture-in-picture	Security against attack
Instant channel changing	Lowest costs- focus on the access network
Quick EPG for HDTV and SDTV	Regulatory issues
Integrated Web based services	Competition with cable operators

Conclusion

- An overview of recent state of the art research and technology development, appropriate architectures, design issues, upgrades and hot topic features.
- Emerging new technology
- Application in education, medicine, etc.
- Existence of three main approaches to state of the art IPTV research: IPTV Channel Control and Management, P2P IPTV systems and Technology Assisted Living.