Editorial: Special Issue on "IPTV and Multimedia Services"

1 Introduction

Nowadays, there is a growing interest in delivery of TV services via IP networks, known as IPTV (Internet Protocol Television). Operators and vendors are currently working on IPTV standardization efforts (e.g., ATIS/IIF, ITU-T IPTV-GSI, ETSI TISPAN) to bear wider availability and interoperability of IPTV as a secure, reliable, managed multimedia service. Although, technologies for packet video have been explored for some time, there are many remaining issues in the design, development and deployment of commercially viable IPTV services. These issues include mainly the standardization of architectural elements, content protection and service aspects including scalability, portability, interoperability, performance and accounting.

This special issue aims to bring together research work in the area of IPTV and multimedia services, investigate the novel solutions and discuss the future trends in this field. This special issue of the Informatica Journal invited authors to submit their original work that communicates current research on IPTV and multimedia services regarding both the novel solutions and future trends in the field.

In this special issue, we have five papers, which can demonstrate advanced works in the field including: IPTV evolution towards next-generation networks (NGN) and hybrid scenarios, IPTV services personalisation, implementation of the IPTV Media Function, and secure key exchange scheme for IPTV Broadcasting.

2 The papers in this special issue

The future evolution of IPTV architecture and services will depend on the acceptance of the NGN based IPTV concept by operators and vendors. In the first paper, entitled: "IPTV evolution towards NGN and hybrid scenarios" *E. Mikóczy*, *I. Vidal* and *D. Kanellopoulos* survey actual NGN-based IPTV standards and the development of several new technologies that can have an impact on content services in the next years.

Generally, the advances in IPTV technology enable a new user-centric and interactive TV model, in which context-awareness is promising in making the user's interaction with the TV dynamic and transparent. In the second paper, *S. Song*, *H. Moustafa* and *H. Afifi* present a solution for IPTV services personalization by introducing context-awareness on top of the IPTV architecture to gather different information of the user and his/her environment. The proposed solution allows each user to be distinguished to the system in a unique manner. The authors implemented the proposed solution on top of an IPTV platform considering the NGN IPTV architecture as a proof of concept and as a means to evaluate the performance.

From another perspective, recommendation services for IPTV should provide users with referrals of items they will appreciate based upon their personal preferences. In the third paper, *A. Elmisery* and *D. Botvich* introduce a framework for private recommender service based on *Enhanced Middleware for Collaborative Privacy* (EMCP). EMCP executes a two-stage concealment process that gives the user a complete control on the privacy level of his profile. The authors utilize a trust mechanism to augment recommendation's accuracy and privacy. Trust heuristic spot users whom are trustworthy with respect to the user requesting recommendation (target-user). Later, the neighbourhood formation is calculated using proximity metrics based on these trustworthy users. Finally, users submit their profiles in an obfuscated form without revealing any information about their data, and the computation of recommendations proceeds over the obfuscated data using secure multi-party computation protocol. The authors expand the obfuscation scope from single obfuscation level for all users to arbitrary obfuscation levels based on trustworthy between users. In particular, they correlate the obfuscation level with different trust levels, so the more trusted a target user is the less obfuscation copy of users' profile he can access. The authors also provide an IPTV network scenario and experimentation results. Their results and analysis show that their two-stage concealment process not only protects the users' privacy, but also can maintain the recommendations accuracy.

Multimedia in IPTV is handled by a separate unit, the *Media Function* (MF), which is made up of *Media Control* and *Media Delivery Functions* (MCF & MDF). According to the different specifications of an IP Multimedia Subsystem (IMS)-based IPTV architecture, the *User Equipment* (UE) is expected to use the Real Time Streaming Protocol (RTSP) protocol as a media control protocol to interact with the MCF, and gets the delivery of media from the MDF using the Real-time Transport Protocol (RTP) protocol. This also means that the streaming session can be initiated from the media controller on behalf of the user but the delivery of media is sent to the UE from the media server. Due to the lack of free and open source Media Servers and on the contrary, the availability of free and open source streaming servers; the ideal choice for the delivery of IPTV services by the research community is *Streaming Servers*. Nevertheless, because of denial of service attack and other issues, most streaming servers do not allow a different location for the session setup request and the delivery of media of the streaming session. Speaking more precisely, most streaming servers are not designed to be controlled by some other entity than the RTSP client that consumes the media. This makes it difficult to have a separate media control unit for IPTV service in

IMS, if one wants to use a streaming server as an MDF unit. Consequently, it is better to find a work around so as to use streaming servers to develop and test IPTV services in IMS environments than waiting for streaming servers to work in this manner.

For this purpose, in the fourth paper entitled: **"**An RTSP Proxy for implementing the IPTV Media Function using a streaming server", *Z. Shibeshi, A. Terzoli* and *K. Bradshaw* propose another component (an RTSP proxy and relay unit) to be part of the IPTV Media Function (MF) and mediate between the MFC and MDF. The proposed unit properly relays media control commands from the UE and MFC to the MDF and the RTP packets from the MDF to the UE. This unit also helps one to implement other streaming functionalities that are required for IPTV service delivery and which are not implemented in the current open source streaming servers. Additional services can also be easily implemented with the help of this unit. This facilitates the development of an IPTV service using the readily available open source streaming servers. The authors show how this RTSP proxy unit can be integrated into the Media Function of the IPTV architecture to ease the media delivery process of IMS based IPTV service.

In the last paper, *Ravi Singh Pippal, Jaidhar C. D. and Shashikala Tapaswi* present a secure mutual authentication and key exchange scheme between set-top box (STB) and smart card for IPTV broadcasting. The proposed scheme provides dynamic session key agreement and mutual authentication. Security analysis proves that the proposed scheme is strong against subscriber and STB impersonation attacks, replay attack, stolen verifier attack, smart card loss attack, man-in-the-middle attack and attack on perfect forward secrecy, which are considered as common threats in IPTV environment.

The list of the papers follows:

- E. Mikóczy, I. Vidal and D. Kanellopoulos. "IPTV evolution towards NGN and hybrid scenarios".
- S. Song, H. Moustafa and H. Afifi. "IPTV services personalization using context-awareness".
- A. Elmisery and D. Botvich. "Privacy aware recommender service using multi-agent middleware-an IPTV network scenario".
- Z. Shibeshi, A. Terzoli and K. Bradshaw. "An RTSP Proxy for implementing the IPTV Media Function using a streaming server".
- Ravi Singh Pippal, Jaidhar C.D. and Shashikala Tapaswi. "Secure key exchange scheme for IPTV Broadcasting".

Acknowledgments

The guest editors wish to thank Prof. Anton P. Zeleznikar (Editor-in-Chief of the Informatica Journal) and Prof. Matjaz Gams (Managing Editor) for providing the opportunity to edit this special issue on "IPTV and Multimedia Services". We would also like to thank the authors for submitting their works as well as the referees who have critically evaluated the papers within the short stipulated time. Finally, we hope the reader will share our joy and find this special issue very useful.

E. Mikóczy, I. Vidal, D. Kanellopoulos
Guest Editors