

The Design of Efficient and Secure P2PSIP Systems

Recently, both academia and industry have initiated research projects directed on integration of P2PSIP paradigm into communication systems. In this paradigm, P2P network stores most of the network information on each participating peer without help of the central servers. The concepts of self-configuration and self-establishment greatly improve the robustness of the network systems comparing with the traditional Client/Server based systems. Unfortunately, P2PSIP is far from mature and still needs time for solving critical technical challenges, such as system efficiency, security, interworking, etc.

In the thesis, the candidate mainly answers four critical questions. Firstly, he proposes and analyzes a few approaches to reduce delays during session initiation, and therefore improve system efficiency. The improvement includes revision of lookup algorithm, geographical association, cache mechanism, hierarchical architecture, optimized routing, etc. Secondly, he considers security issues and proposes new solutions to enhance the system security. Solutions include centralized proxy based approach, and subjective logic based trust enhancement. The candidate also combines these two solutions to achieve optimal security protection. Additionally, a possible inter-working system model is introduced to interconnect P2PSIP network and future All-IP based IMS network. The system architecture includes the inter-working solution, and use security mechanisms according to previous proposals. Finally, he illustrates shortcoming of current proposal of “client” protocol and studies an alternative solution, which is based on Thin Client architecture. The proposed Thin Client P2PSIP Gateway (TC-PPSG) acts as a gateway for handling translation tasks between P2PSIP overlay and Internet.

Xianghan Zheng received his BSc in Computer Science (2005) from Wuhan University of Technology, P. R. China and MSc in Information and Communication Technology (2007) from University of Agder, Norway. At the same time, from 2005 to 2006 he worked part-time as a research assistant at Agder Mobility Lab (AML), doing the research on WiFi-based mobile home network applications. As part of his master's study, from 2006 to 2007, he joined Ericsson Research Germany, on the research of fixed/mobile based SIP/IMS future network design and validation. From 2007 to 2010, Xianghan Zheng did his PhD study at the University of Agder, Norway, working towards his PhD dissertation entitled ”The Design of Efficient and Secure P2PSIP Systems”. The outcome of the research carried out since 2007 is one monograph, one book chapter, three published journal articles, and eight conference papers.

Xianghan Zheng is now working as an associate professor in ICT department of Fuzhou University, P.R. China. His current research interests include Next Generation Network (NGN) and communication security.

Telephone:

Home: +86 (0)595 873 93 118

Mobile: +86 159 6003 7711

E-post: xianghan.zheng@fzu.edu.cn
xianghan.zheng@hotmail.com

Supervisor: Vladimir A. Oleshchuk

Telephone: +47 3723 3212

E-post: vladimir.oleshchuk@uia.no

