

Title

Towards 5G: Carrier-Grade Programmable Virtual Mobile Networks

Abstract

The telecom industry keeps reinventing itself. Soon, the world will be experiencing the 5th generation mobile networks (5G), also referred to as beyond 2020 mobile communication systems. In addition to increased peak bit rates, higher spectrum spectral efficiency, and better coverage, 5G systems are required to be scalable, supporting potential numbers of diverse connectable devices, including Machine Type Communications (MTC) devices, and handling mobile traffic 1000 times larger than the current one. The need to cope with such an ever-increasing mobile traffic, most importantly in a cost-efficient way, has become critical for the sustainability of mobile operators worldwide, mainly in light of the stagnant (rather falling) Average Revenue per User (ARPU).

Major obstacles to overcome are principally the highly centralized architecture of mobile networks along with the static provisioning and configuration of network nodes built on dedicated hardware components. This has resulted in lack of elasticity and flexibility in deployment of mobile networks; rendering their run-time management costly, cumbersome and time-consuming.

Software Defined Networking, Network Function Virtualization, and Cloud Computing, along with the principles of the latter in terms of service elasticity, on-demand features, and pay-per-use, could be important enablers for various mobile network enhancements, to specifically virtualize and decentralize mobile networks using general-purpose COTS hardware. For this purpose, different requirements have to be met and numerous associated challenges have to be subsequently tackled.

This talk will touch upon the recent trends the mobile telecommunications market is experiencing and discuss the challenges these trends are representing to mobile network operators. To cope with these trends, the talk will then showcase the feasibility of on-demand creation of cloud-based elastic mobile networks, along with their lifecycle management. The talk will introduce a set of technologies and key architectural elements to realize such vision, turning end-to-end mobile networking into software engineering. The talk will also touch upon the current congestion management approaches and their limitation to cope with the required scalability of 5G systems. In this vein, this talk will be highlighting the challenges current and future mobile systems are/will be facing and will be then showcasing how programmable virtual mobile networks can be used as an efficient solution to revolutionize the congestion management concept and to deal with the ever-growing mobile traffic.

About the Speaker

Dr. Tarik Taleb is an IEEE Communications Society (ComSoc) Distinguished Lecturer and a senior member of IEEE. He is currently a Professor at the School of Engineering, Aalto University, Finland. He has been working as Senior Researcher and 3GPP Standards Expert at NEC Europe Ltd, Heidelberg, Germany. He was then leading the NEC Europe Labs Team working on R&D projects on carrier cloud platforms. He was also serving as technical leader of the main work package, Mobile Core Network Cloud, in EU FP7 Mobile Cloud Networking project, coordinating among 9 partners including NEC, France Telecom, British Telecom, Telecom Italia, Portugal Telecom Innovation, SAP, & Intel. Prior to his work at NEC and till Mar. 2009, he worked as assistant professor at the Graduate School of Information Sciences, Tohoku University, Japan, in a lab fully funded by KDDI, the second largest network operator in Japan. From Oct. 2005 till Mar. 2006, he was working

as research fellow with the Intelligent Cosmos Research Institute, Sendai, Japan. He received his B. E degree in Information Engineering with distinction, M.Sc. and Ph.D. degrees in Information Sciences from GSIS, Tohoku Univ., in 2001, 2003, and 2005, respectively.

Dr. Taleb's research interests lie in the field of architectural enhancements to mobile core networks (particularly 3GPP's), mobile cloud networking, mobile multimedia streaming, congestion control protocols, handoff and mobility management, inter-vehicular communications, and social media networking. Dr. Taleb has been also directly engaged in the development and standardization of the Evolved Packet System as a member of 3GPP's System Architecture working group. Dr. Taleb is a board member of the IEEE Communications Society Standardization Program Development Board. As an attempt to bridge the gap between academia and industry, Dr. Taleb has founded and has been the general chair of the "IEEE Workshop on Telecommunications Standards: from Research to Standards", a successful event that got awarded "best workshop award" by IEEE Communication Society (ComSoC). Based on the success of this workshop, Dr. Taleb has also founded and has been the steering committee chair of the IEEE Conference on Standards for Communications and Networking (IEEE CSCN).

Dr. Taleb is/was on the editorial board of the IEEE Transactions on Wireless Communications, IEEE Wireless Communications Magazine, IEEE Transactions on Vehicular Technology, IEEE Communications Surveys & Tutorials, and a number of Wiley journals. He is serving as chair of the Wireless Communications Technical Committee, the largest in IEEE ComSoC. He also served as Secretary and then as Vice Chair of the Satellite and Space Communications Technical Committee of IEEE ComSoC (2006 - 2010). He has been on the technical program committee of different IEEE conferences, including Globecom, ICC, and WCNC, and chaired some of their symposia.

Dr. Taleb is the recipient of the 2009 IEEE ComSoC Asia-Pacific Best Young Researcher award (Jun. 2009), the 2008 TELECOM System Technology Award from the Telecommunications Advancement Foundation (Mar. 2008), the 2007 Funai Foundation Science Promotion Award (Apr. 2007), the 2006 IEEE Computer Society Japan Chapter Young Author Award (Dec. 2006), the Niwa Yasujirou Memorial Award (Feb. 2005), and the Young Researcher's Encouragement Award from the Japan chapter of the IEEE Vehicular Technology Society (VTS) (Oct. 2003). Some of Dr. Taleb's research work has been also awarded best paper awards at prestigious conferences.