IEEE Netsoft 2017

Distinguished Expert Panel: "Moving Frontiers in Network Softwarization"

In the recent moves of network soft re-architecture, significant attention is currently given to Network Softwarization and Enablers which are aiming at providing networking and communication functionality through programmable software that is separable from hardware and that would not be restricted to run only as part of a firmware image. Important examples of such technology include Software-Defined Networking, Network Function Virtualization, Service Function Chaining, Network Slicing and Network Virtualization. More generally, it includes any networking and communications technology that features open programmable interfaces accessible to third parties, extensibility through software, software development kits, and separation of data forwarding, control, and management planes.

The panel will address some new challenges and frontiers that stem from the new model based of significant native network softwarization in the network.

Moderator: **Alex Galis** – University College London – United Kingdom

Panel Members:

        James Won-Ki Hon – POSTECH - South Korea

        Emmanuel Dotaro – Thales - France

        Sławomir Kukliński – Orange - Poland

        Roberto Riggio – Create-Net - Italy

        Stefano Secci - UPMC Sorbonne – France

Date: **Thursday 6th July 2017 16:00 - 17:30**

Moderator:

Alex Galis, *University College London, UK*

Alex Galis is a Professor In Networked and Service Systems at University College London (UCL). He has co-authored 10 research books and more that 250 publications in the Future Internet areas: system management, networks and services, networking clouds, 5G virtualisation and programmability. He participated in a number of EU research projects including overall technical leadership of the MISA - Management of IP networks, FAIN – programmable networks, CONTEXT – context aware networking and AUTONOMIC INTERET – autonomic networking projects. He was a member of the Steering Group of the Future Internet Assembly (FIA) and he led the Management and Service–aware Networking Architecture (MANA) working group at FIA. He acted as PTC chair of 14 IEEE conferences including TPC co-chair of IEEE Network Softwarization 2015 (NetSoft 2015) and reviewer in more than 100 IEEE conferences. He is also a co-editor of the IEEE Communications Magazine feature topic on Advances In Networking Software. He acted as a Vice Chair of the ITU-T SG13 Group on Future Networking. He is involved in IETF and ITU-T SG13 network slicing activities and he is also co-chair of IEEE SDN initiative publication committee. He is currently editor of the IEEE Journal on Selected Areas in Communications series on Softwarization & Enablers.

Panel Members:

James Won-Ki Hong, *POSTECH, South Korea*

James Won-Ki Hong is Dean of Graduate School for Information Technology and Professor in the Dept. of Computer Science and Engineering at POSTECH, Pohang, Korea. James worked as CTO and Senior Executive Vice President for KT from March 2012 to Feb. 2014, where he was responsible for leading the R&D effort of KT and its 50 subsidiary companies, and where he initiated R&D on SDN. He was Chairman of National Intelligence Communication Enterprise Association, and Chairman of Telecommunications Technology Association (TTA) Standardization Board in Korea. He is a co-founder and Executive Director of SDN/NFV Forum in Korea. His interests include network innovation (such as SDN and NFV), cloud computing, mobile services, Smart IPTV, and ICT convergence (such as Smart Home, Smart Grid, e-Health). He was co-founder and CTO of Netstech, a Palo Alto, USA-based startup developing network integrated ultra-dense, blade servers from 2000 to 2002. Over the past 25 years, James has been an active volunteer in various committees in IEEE, ComSoc, and KICS. He has served as Steering Committee Chair of IEEE NOMS, IM and APNOMS, as well as Chair of CNOM and KNOM. He has also been serving as EiC of Wiley's International Journal of Network Management (IJNM) as well as an editorial member of the IEEE TNSM, JNSM and JCN. He was the General Chair of IEEE NetSoft 2016 and is General Co-Chair of IEEE NOMS 2018 (http://noms2018.ieee-noms.org). James received his HBSc and MSc degrees in Computer Science from the University of Western Ontario, Canada in 1983 and 1985, respectively, and the Ph.D degree in Computer Science from the University of Waterloo, Canada in 1991.

Frontier Topic: "**Evolving a proprietary middlebox solution to an open-source based NFV solution**"

Over the past few years, R&D on network softwarization has been quite active around the world. At the same time, open source projects on various aspects of networks have also been very actively. Recently, network softwarization is being realized with the convergence of these activities in data centers and service provider networks. We present some of these activities and present a real industry use case in evolving a proprietary middlebox solution to an open-source based NFV solution.

Emmanuel Dotaro, *Thales, France*

Emmanuel Dotaro is the head of ICT & Security labs at Thales Secure Communications & Information Systems. He is also leading the Network of Experts in communications across the Thales group. Emmanuel Dotaro received an M.S. degree in Computer Science from the University of Versailles, France in 1996. He was three years with the Institut National des Telecommunications Performance Evaluation lab. while holding a teaching position at the University of Versailles. He joined in 1999 the Alcatel Research and Innovation lab. at Marcoussis, France. He directed the research on networking topics at Bell Labs including Packet Transport Infrastructure and Semantic and Autonomic Technologies. He joined Thales in 2009 as director of innovation for C4I systems and is now leading ICT and Security labs. He holds more than 30 papers as author or co-author as well as more than 30 patents in the ICT field. He is at the initiative, contributor or leader of various major European and national collaborative research

projects. He is serving at various conference or journal Technical Committees as well as regional or national clusters of the digital ecosystem. His current research interests are network softwarization, radio and mobile networks, cloud brokering, security as a service, Software Defined security for security enforcement in 5G and IoT systems as well as detection and remediation related cybersecurity topics.

Frontier Topic: "Software Defined Security"

Beyond "softwarization" and virtualization, 5G is coming with potentially more technical and architectural disruptions which in turn, result in resilience and security issues. Slicing is a promise of ultimate abstraction of the system & service complexity. The 5G scope can't be wider as it combines any type of networking segments, both convergences with Information Technologies and Operational Technologies coming from vertical markets. Among others, it means that security issues related to the horizontal integration (End-to-End), and the vertical one across remaining layers plus the unprecedented tenant slices are even more complex than before encompassing unprecedented architectures and dynamics. Assuming that those questions will subsist even beyond the 5G era, a set of challenges but also promising transformations will be introduced such as new needs in terms of regulation/certification, the new threats inherent to the 5G architectures, the emerging and promising Software Defined Security (from protection towards remediation) as well as other research directions in security impacting the development and deployment of SDN/NFV.

Sławomir Kukliński, *Orange, Poland*

Sławomir Kukliński received Ph.D. with honors from Warsaw University of Technology (94') and since then he is Assistant Professor there. He is teaching about mobile and wireless systems. From 2003 he is also working for Orange Polska as research expert focused on mobile and wireless systems with emphasis to self-managed solutions. At present he is interested in application of cognitive techniques to control, management and orchestration of SDN and 5G networks. He led many national research projects as principal investigator and was involved in many international projects, including FP6 MIDAS, FP7 EFIPSANS, FP7 4WARD, FP7 ProSense, Celtic COMMUNE, he coordinated Polish-Luxembourgish project on Cognitive SDN (CoSDN). At present he is involved EU-Japan project 5G!Pagoda. He was working on SDN standardization in ITU-T (Study Group 13) and now is involved in IETF activities on network slicing. Slawomir Kukliński has published more than 50 conference and journal papers, served as a member of TPC of many conferences and gave several invited keynotes.

Frontier Topic: "Why we shouldn't replicate hardware in software"

The shift from hardware towards software based solutions is widely accepted in the networking community. It seems however that some of the new approaches can be seen as implementation of the existing hardware based solution with similar ones but with software based nodes (cf. the ETSI NFV approach). It seems that such approach doesn't allow for the exploitation of the full potential of software technologies that can be applied to network implementation. During the talk some examples of the mentioned problem will be given.

Roberto Riggio, *Create-Net, Italy*

Dr. Roberto Riggio is currently Chief Scientist at FBK CREATE-NET where he is leading the Future Networks Research Unit efforts on 5G Systems. His research interests include Mobile Network Operating Systems for 5G Networks, Performance Isolation in Multi-tenant 5G Networks, 5G Radio Access Network Slicing, and Multi-domain Network Service Orchestration. He is the creator of 5G-EmPOWER the first Network Operating System for Mobile Networks which is now used in several 5G-PPP Projects. He has 1 granted patent, 79 papers published in internationally refereed journals and conferences, and has generated more than 1.5 M€ in competitive funding. He received several awards including: the IEEE INFOCOM 2013 Best Demo Award, the IEEE ManFI 2015 Best Paper Award, and the IEEE CNSM 2015 Best Paper Award. He serves in the TPC/OC of leading conferences in the networking field and he is associate editor for the Wiley International Journal of Network Management, the Springer Wireless Networks journal, and the IEEE Transactions on Network and Service Management. He has extensive experience in the technical and project management of european and industrial projects and he is currently Project Manager of the H2020 Vital Project. He is the co-founder of the IEEE 5GMan workshop. He is a member of the ACM and a Senior Member of the IEEE.

Frontier Topic: "Converging SDN and NFV at the network edges: the lightMANO approach"

NFV is a potential candidate for deploying and managing future networks. Indeed by turning network functions into software modules and by deploying them on top of general purpose computing and networking infrastructure NFV can make networks cheaper to deploy and to manage. At the same time SDN essentially proved to be a little more than a network reconfiguration tool enabling only simplistic interplay models with NFV. An opportunity here exists for re-factoring of functionalities avoiding mirroring hardware functions in software and moving toward a flexible microservice architecture.
However, in order to achieve their full potential in 5G networks, NFV and SDN need to be converged into a single network operating system for distributed multi-access edge computing architectures.
Such operating system will be required to leverage on lightweight virtualization technologies and orchestration platforms (possibly collapsing VIM and Orchestrator into a single entity) and to interface with legacy systems and heterogeneous infrastructures enabling coexistence of physical and virtual network function. Finally, edge network service need to become slice aware and to allows for slice composition.

Stefano Secci, *UPMC Sorbonne, France*

Stefano Secci is associate professor at UPMC Sorbonne since 2010. He holds a Ph.D. from Telecom ParisTech, France, and a M.Sc. and a Ph.D. from Politecnico di Milano, Italy. His professional experience includes postdoctoral appointments in Norway and USA and a position as network management engineer in Fastweb, Italy. He is chairing the IEEE/ISOC Internet Technical Committee. His research activities currently cover network virtualization and mobile edge computing.

Frontier Topic: "Orchestration challenges in mobile edge computing"

This talk will present a number of challenges in mobile edge computing, ranging from adaptive migration of virtualization resources, the automated offloading of computation tasks from mobile devices to edge computing facility, and the adaptation of network capacity to mobile traffic variations, adequately supported by data analytics elements. Recent and future research in the area will be described along with some preliminary results.