Editorial

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Biographical notes: Kurt Tutschku holds the Chair of 'Future Communication' (endowed by Telekom Austria) at the University of Vienna. Before that, he was an Assistant Professor at the Department of Distributed Systems, University of Wuerzburg. He led the department's group on Future Network Architectures and Network Management until 2007. From 2008 to 2008, he worked as an Expert Researcher at the National Institute for Information and Communication Technology (NICT), Japan. He received his diploma and Doctoral in Computer Science from the University of Wuerzburg in 1994 and 1999, respectively and completed his Habilitation ('State Doctoral Degree') at the University of Wuerzburg in 2008. His main research interest include future generation communication networks, quality-of-experience and the modelling and performance evaluation of future network control mechanisms and services in the emerging Future Internet, particular of P2P overlay networks. He has accomplished and is leading multiple industry cooperations in the field of Future Internet, P2P and Network Management with Telekom Austria, Nokia Siemens Networks, BTexact, DATEV e.G., Bosch and Bertelsmann AG. In addition, he currently coordinates the work package on 'Overlays for network control and support of evolved services infrastructures' of the European FP7 framework project 'EuroNF'. This work package includes network virtualisation and network federation. Furthermore,

he is currently a Reviewer of the European Commission for FP7 projects in the area of the 'Future Internet' and a member of the advisory board of the European Commission for the involvement of R&D institutions in the upcoming public-private partnership project on the 'Future Internet'. He is author of nine patent applications and around 60 publications presented in books or refereed international conferences or journals.

Paul Müller worked as an Engineer for SEL (Alcatel) with a focus on telecommunication before studying mathematics, information-technology and economics at the University of Bochum. He started his scientific career as a Researcher at the University of Tuebingen where he developed a large scale computer-based statistical information system in 1975. In 1981, he joined the Federal Statistical Office of Germany in Wiesbaden, where he was responsible for the further development and implementation of this statistical system. Furthermore, he designed and implemented several statistical software packages during his time there. In 1982, he started working with the University of Ulm where he obtained his Doctoral in Mathematics in 1983. Thereafter, he was responsible for various research projects and the development of a state-wide computer network. In 1995, he accepted an offer from the University of Kaiserslautern on a Full Professor position in the Department of Computer Science in conjunction with heading the university's central computing department. His research group 'Integrated Communications Systems Lab. (ICSY)' within the Department of Computer Science is aiming at the development of services to implement integrated communication within heterogeneous environments especially in the context of the emerging discussion about Future Internet. This is achieved by using service-oriented architectures (SOA), grid technology and communication middleware within a variety of application scenarios ranging from personal communication (multimedia) to ubiquitous computing.

Frédéric Dang Tran is a Research Engineer at Orange Labs-France Telecom. His main research interests include distributed computing, SLA management, and network and server virtualisation. He received his Engineering degree from Ecole Nationale Supérieure des Télécommunications of Paris (ENST Paris now Telecom ParisTech) in 1990 and a Postgraduate degree in distributed computing in 1991 from the University of Paris 6. He joined the then Centre National d'Études des Télécommunications (now Orange Labs) in 1991. He has co-led research projects on intelligent networking and telecommunication-oriented middleware architecture in the context of international consortia and standardisation bodies (notably the TINA consortium and the Object Management Group). His current research activities revolve around cloud computing management infrastructures encompassing end-to-end compute, storage and network virtualisation technologies with a particular focus on the design of modular software stacks and on the promotion of open-source solutions.

Network virtualisation (NV) is the technology that allows the simultaneous operation of multiple logical networks (also known as overlays) on a single physical platform. NV permits distributed participants to create almost instantly their own network with application-specific naming, routing, and resource management mechanisms. Thus, NV is comparable to server virtualisation which enables users to use even a whole computing center arbitrarily as their own personal computer. Recently, NV received

tremendous attention since it is expected to be one of the major paradigms for the future Internet as proposed by numerous international initiatives on future networks, e.g., PlanetLab (USA, International), GENI (USA), AKARI (JAPAN), OneLab2 (Europe) and G-Lab (Germany).

A major objective of this special issue is to identify future performance issues and to provide methodologies and mechanisms to address the various aspects of performance in NV. This volume of the *International Journal of Communication Networks and Distributed Systems (IJCNDS)* is intended as a first overview on the latest research results in the area of NV and performance. This issue discusses NV techniques and architectures with a focus on performance models and engineering methods, which will hopefully lead soon to real world NV solutions. Thus, the discussion of performance issues is expected to provide users with efficient methologies for creating and operating their own high performance virtual network.

The Call for Paper for this issue of the IJCNDS resulted in a submission of 13 papers from Europe, the USA and the Asian-Pacific region. The editor team has selected six of these submissions after a thorough review process and extensive discussions for publication in this special issue.

The guest editor team of this *IJCNDS* special issue would also like to thank the publisher, the reviewers and the authors for their efforts and flexibility to produce, review and finalise this special issue. We hope that this volume also may serve a promotion for further research in this new area of telecommunication.

The contribution of Fiedler on 'On resource sharing and careful overbooking for network virtualisation' discusses fundamental performance issues in sharing virtualised resources. Luo, Zhang, Ficarra and Murray investigate the 'design and performance of virtualised programmable edge node (PEN) for network innovations'. The PEN element is equipped with both general-purpose multicore processors at the host and application-specific multicore processors at the network interfaces, providing effective isolation of experiments and measurements. Bourguiba, Haddadou and Pujolle evaluate the 'performance of Xen-based virtual routers' on top of commodity hardware. Miyamura, Masuda and Shiomoto propose an architecture for 'High-performance network virtualisation for multilayer GMPLS networks'. They demonstrated the interplay of the proposed high-performance lower-layer NV technologies with commercially available routers and OXCs. Corin, Riggio, Miorandi and Salvadori discuss how to transfer the concept of NV to the wireless communication systems. They propose the 'AiroLAB framework' which is an effective virtualisation concept for multi-hop wireless networks. Finally, Zinner, Tran-Gia, Tutschku and Nakao introduce the concept of 'concurrent multipath transmissions for transport virtualisation' and discuss the performance issue of aggregation of resources in virtualised networks.

Acknowledgements

The editors want to thank the following reviewers: M. Brunner, O. Cherkaoui, M. Duelli, M. Fiedler, T. Friedman, R. Henjes, R. Kawahara, J. Kim, A. Klein, R. Krishnaswamy, J. Lattmann, M. Menth, M. Murata, A. Nakao, S. Oechsner, R. Ozaki, B. Reuther, H. Saito, A. Siddiqui, M. Sidi, J-L. Simon, K. Shiomoto, R. Steinmetz, M. Steichen, M. Stiemerling, N. Takahashi, P. Vicat-Blanc Primet, T. Zinner and D. Zeghlache.