



Technical Program
IFIP Networking 2019 Conference
May 20-22, 2019 – Warsaw, Poland

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IFIP Networking 2019 General Chair's Welcome Message

Welcome to IFIP Networking 2019!

It's an honour and a pleasure to welcome everyone to IFIP Networking 2019 – the 18th event of the series, sponsored by the IFIP Technical Committee on Communication Systems (TC6). This year's conference is being held on the campus of Warsaw University of Technology in beautiful and exciting Warsaw – a capital of Poland. We hope that this conference facilitates a stimulating exchange of ideas among many of the members of our international research community.

IFIP Networking 2019 has been made possible only through the hard work of many people. Alex X. Liu, Jacek Rak, and Steve Uhlig assembled an absolutely outstanding technical program committee that reviewed submitted papers and selected the final program. A huge debt of thanks is due to our program committee members and external reviewers for helping to assemble such a strong technical program – everything was perfect and on time! Lu Su did a wonderful job of organizing the student travel grant. Shuyu Shi handled aspects of publications and Ali Munir and Fu Xiao took care about conference publicity. Ali also was our EDAS guru to carry all difficult situations. Paweł Tomaszewicz was responsible for graphic design and maintaining of our website with help of Katarzyna Kamińska. Warm thanks also to Jędrzej Bieniasz and Mirosław Stando for all local organizing issues.

We are also very grateful to our sponsors: Centre for Advanced Studies of the Warsaw University of Technology, Cryptomage S.A., and NASK – Research and Academic Computer Network. Their generosity mostly has funded support for our keynote sessions and has helped keep the costs of this conference moderate. Warm thanks also to the National Science Foundation and IFIP for funding travel grants.

Welcome again to IFIP Networking 2019 and to Warsaw! We hope you find IFIP Networking a stimulating and exciting conference.

Krzysztof Szczypiorski
General Chair, IFIP Networking 2019

IFIP Networking 2019 TPC Co-Chairs' Welcome Message

On behalf of the IFIP Networking 2019 conference organizing committee, we would like to extend a very warm welcome to you. Over the past years, IFIP Networking conference has established itself as a prestigious international forum for researchers and practitioners to discuss recent advances in the field of computer and communication networks. We are delighted to present an exciting technical program with 32 papers. This year, the technical sessions at IFIP Networking 2019 are structured around four key areas namely, Network Architectures, Applications and Services, Network Modeling and Analysis, Network Security and Privacy, and Wireless Networking.

IFIP Networking 2019 call for papers attracted 112 submissions from 26 different countries in Asia, Australia, Europe, North America, and South America. The main technical program is the result of the rigorous review and online discussion by the Program Committee members and additional reviewers. The average number of reviews per paper were 4.4 plus a meta review summarizing the online discussion. All the papers received at-least three reviews, and 42% of the papers received more than five reviews, and 22% of papers received more than six reviews. Furthermore, most papers were discussed online among the reviewers extensively. A high-quality selection of 32 full papers, which corresponds to an acceptance rate of 28.5%, and 15 poster papers, organized into 7 regular sessions, makes up the IFIP Networking 2019 main technical program, which covers 5G Networks, Datacenter Networks and Transport, Measurement and Modelling, Network and traffic Engineering, Software Defined Networks and Network Function Virtualization, Security, and Wireless Networks.

The program of IFIP Networking this year would not have been possible without the dedicated effort of many people. First, we would like to thank the 125 TPC members for their hard work on providing high-quality reviews and participating in the online discussion. Second, we would like to thank the entire organizing committee for their generous hard work. In particular, we thank Ali Munir for his hard work as EDAS Chair and TPC Co-Chair Assistant for many requests from authors and TPC Co-Chairs, and Professor Lu Su for obtaining the NSF Student Travel Award. We are grateful to the IFIP Networking Steering Committee, especially Jordi Domingo-Pascual, for the opportunity to serve as TPC Co-Chairs and their continuous guidance along

the way. Finally, we thank all authors for choosing IFIP Networking 2019 as a venue for presenting their work, and all attendees for making IFIP Networking 2019 a premier and exciting forum for exchanging ideas and promoting future research on computing networks. In addition to the technical papers, we are extremely fortunate to have three exceptional keynote speakers: Professor J.J. Garcia-Luna-Aceves, UC Santa Cruz - Xerox PARC, U.S.A.; Professor Stefan Schmid, University of Vienna, Austria; Professor Silvia Giordano, University of Applied Science and Arts - SUPSI in Ticino, Switzerland.

Alex X. Liu
Michigan State
University, US

Jacek Rak
Gdansk University
of Technology, PL

Steve Uhlig
Queen Mary University of
London, UK

In memory of James P.G. Sterbenz (1956-2019)

David Hutchison¹, Jacek Rak², Burkhard Stiller³

¹ Lancaster University, UK, ² Gdansk University of Technology, PL, ³ University of Zürich UZH, CH

James P.G. Sterbenz received a B.S. in Electrical Engineering, a B.S. in Computer Science, and an A.B. in Economics – minors in Anthropology and Asian Studies – from 1976 to 1980 at Washington University in St. Louis, Missouri, USA. James was later awarded a M.S. and a D.Sc. in Computer Science, in 1986 and 1991 respectively, also from Washington University.

Initially James worked as an engineer for NCR and IBM at various locations (later as an Advisory Engineer Scientist) between 1980 and 1994. He then joined as a Senior Member of Technical Staff at GTE Laboratories in Waltham, Massachusetts, in 1994, moving on to become a Principal Member of GTE's Technical Staff in 1998 and as a Research Group Manager on Mobile, Wireless, and Active Networking – formally at BBN Technologies - and finally as a Senior Network Scientist. James then moved into academia in 2003 at the University of Massachusetts, Amherst, as a Visiting Research Scientist. After becoming a part-time lecturer at Northeastern University in Boston, James joined the Department of Electrical Engineering and Computer Science at The University of Kansas (KU), at Lawrence, in 2005 as an Associate Professor, where was promoted to Full Professor in 2014. He also had, from 2004, adjunct/visiting professor appointments at Lancaster University in the UK, the Hong Kong Polytechnic University in Hong Kong, and the Chinese Academy of Sciences in Beijing, China.

James' Ph.D. thesis was on "Axon: A Host–Network Interface Architecture for Gigabit Communications", supervised by Guru Parulkar, indicating his field of future work and research, namely communication networks. James was part of several projects related to high performance networking – notably a TCP project with NASA Glenn and a PetaWeb optical infrastructure. He co-led an innovative project in survivable wireless networks. Additionally, in collaboration with David Hutchison at Lancaster University he started to work on Active Networks for network management and foreshadowing ideas such as SDN and P4. During the last decade of his active, technically precise, and highly motivated work James focused his research on network resilience.

James was an internationally known expert in key aspects of communication networks, and was an author of two books and over 120 journal and conference papers in the area. We

remember James as a wonderful colleague with a passion for research, active in IFIP TC6, with his Nikon camera ready to take photographs, especially of trains and railway signalling.

DH, JR, BS
15 May 2019



James always started his presentation with a short geography lesson about Kansas (here at RNDM 2018 in August 2018 in Longyearbyen, Svalbard – Norway)



James at KU's Edward Campus in Overland Park, Kansas, USA on September 11, 2018

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IFIP Networking 2019 Keynote Speakers

Keynote I

Topic

“New Research Directions in Routing: Beyond Sequence Numbering, Routing Modalities, and Destination-Based Routing Table”

Presenter

J.J. Garcia-Luna-Aceves

Distinguished Professor of Computer Science and Engineering, UC Santa Cruz

Principal Scientist, Xerox PARC

Abstract

The emergence of large-scale deployments of the Internet of Things (IoT) and distributed cyber-physical systems should renew interest in the design of routing protocols that can operate correctly and efficiently in networking environments where routers may be very small devices and lose routing state, and where messages may be lost or corrupted many reasons. With this motivation, we discuss the limitations of using sequence numbers to ensure loop-free routing, and discuss new approaches to loop-free multi-path routing, a way to attain on-demand and proactive routing dynamically on a per-destination basis, and routing approaches that do not need destination-based routing tables to operate.

Bio



JJ Garcia-Luna-Aceves is a Distinguished Professor of Computer Science and Engineering at the University of California, Santa Cruz (UCSC). He holds the Jack Baskin Chair of Computer Engineering at UCSC, serves as the UCSC campus director of CITRIS (Center for Information Technology Research in the Interest of Society) and The Banatao Institute, and is also a Principal Scientist at the Palo Alto Research Center (PARC). He is a Fellow of the ACM, IEEE, and AAAS, and is a Corresponding Member of the Mexican Academy of Sciences. He received the 2016 IEEE MILCOM Technical Achievement Award, the IEEE Computer Society Technical Achievement Award in 2011, and Technical Recognition Award from the IEEE Communications Society Ad Hoc and Sensor Networks Technical Committee (AHSN TC) in 2012. He is the co-recipient of the George E. Pake Golden Oak Award from PARC in 2017, and co-recipient of Best Paper Awards at IEEE IPCCC 2018, the European Wireless Conference 2010, IEEE MASS 2008, IEEE MILCOM 2008, SPECTS 2007, IFIP Networking 2007, and IEEE MASS 2005. He directs the Computer Communication Research Group (CCRG) and his research focuses on computer communication in the Internet, wireless networks, information-centric networks, the IoT, and cyber-physical systems. He holds 65 U.S. patents and has published more than 500 papers in journals, conferences, and books. His published work has received more than 37,000 citations and a 99 h-index. He has directed more than 40 Ph.D. theses and more than 30 M.S. theses since joining UCSC in 1993. He has served as the inaugural chair of the ACM Special Interest Group on Multimedia, and as General Chair of

numerous conferences, including IEEE ICNC 2016, ACM MSWIM 2015, ACM MobiCom 2008, IEEE SECON 2005, ACM Multimedia '93, and ACM SIGCOMM '88. He has also served as Program Chair of ACM MobiHoc 2002, ACM MobiCom 2000, IEEE Multimedia '92, ACM SIGCOMM '87, and ACM SIGCOMM '86. He has served in the IEEE Internet Technology Award Committee, the IEEE Richard W. Hamming Medal Committee, and the National Research Council Panel on Digitization and Communications Science of the Army Research Laboratory Technical Assessment Board.

Keynote II

Topic

"Toward Self-* Networks

Presenter

Stefan Schmid

Full Professor at the University of Vienna, Austria

Abstract

Communication networks are becoming increasingly flexible, along three main dimensions: routing (enabler: software-defined networking), embedding (enabler: virtualization), and topology (enabler: reconfigurable optical technologies). This introduces great optimization opportunities but also new challenges, e.g., related to a more complex network management and operation. In this talk, I will sketch a vision of "self-* networks": networks which optimize and repair themselves in a more autonomous manner, disburdening human operators of their most difficult tasks. I will illustrate self-adjusting networks using two case studies: (1) a network which performs automated what-if analysis to efficiently test the policy-compliance of its configurations, even under failures; and (2) a demand-aware network which optimizes itself toward the workload it serves, in an online and self-adjusting manner.

I will then discuss some fundamental research challenges introduced by such self-* networks more generally, and ask: what are the risks and limitations of such networks? And can self-* networks realize themselves when they reach their limits?

Bio



Stefan Schmid is a Full Professor at the University of Vienna, Austria. MSc and PhD at ETH Zurich, Postdoc at TU Munich and University of Paderborn. Senior Research Scientist at T-Labs in Berlin, and Associate Professor at Aalborg University, Denmark. Stefan Schmid received the IEEE Communications Society ITC Early Career Award 2016.

Webpage: <https://www.univie.ac.at/ct/stefan/>