Name and abbreviation of the workshop.

First International Workshop on NEtwork programmabiliTy: From the data center tO the Ground (NetFoG) 2017

Names, addresses, and a short (200 words) bio of the Organizing Committee (OC) members.

- Roberto Bruschi, Consortium for Telecommunications (CNIT), Genova, Italy, roberto.bruschi@cnit.it
- Claudia Campolo, University Mediterranea of Reggio Calabria, Italy, claudia.campolo@unirc.it
- Florian Wamser, University of Würzburg, Germany, florian.wamser@informatik.uni-wuerzburg.de

Roberto Bruschi, Ph.D., is currently a CNIT research associate at the research unit of the University of Genoa. Roberto is the coordinator of the H2020 INPUT project, and he has been also the Principal Investigator of the FIRB FiR GreenNet project. He took part in the activities of many other national and European research projects (e.g., H2020 ARACADIA, FP7 IP ECONET, FP7 NoE TREND). In the ECONET project, he served as Coordination Project Manager. He has co-authored over 90 papers in international journals (among which Science, IEEE Transactions on Networking, IEEE Communication and Network Magazines, IEEE Internet Computing, etc.), book chapters and international conference proceedings, and he was the recipient of two Best Paper Awards at IEEE ICC 2009 and at the IEEE GreenComm 2010. He has been invited to a number of scientific international conferences and seminars for talks, tutorials and panels (e.g., IEEE INFOCOM 2012, IEEE HPSR 2011, etc.). He also chaired some scientific workshops (ITC EPFI 2014, TIWDC 2013, ITC PROCON 2016, etc.). He serves as editor in the IEEE Journal on Selected Areas in Communications and in the IEEE Transactions on Green Communications and Networking. His research interests cover cloud computing, fog computing, NFV, SDN, and ICT sustainability.

Claudia Campolo, Ph.D., is an Assistant Professor of Telecommunications at University Mediterranea of Reggio Calabria, Italy. Before her current appointment, she received a Laurea degree in Telecommunications Engineering (Oct. 2007) and a PhD degree (Feb. 2011) from the University Mediterranea of Reggio Calabria, Italy. Since March 2011 she has been with the same university as a Post-Doc researcher. In 2008 she was a visiting PhD student at Politecnico di Torino under the supervision of Prof. Carla-Fabiana Chiasserini and a DAAD fellow at University of Paderborn, Germany, under the supervision of Prof. Falko Dressler (March-April 2015). Her main research interests are in the field of vehicular networking, future Internet architectures and 5G systems. She has received three *best paper awards*, the *IEEE ComSoc EMEA Outstanding Young Researcher Award* in 2015, and she has given a tutorial at IEEE WCNC in 2012. She is involved in the organization of many international conferences/workshops as Steering Committee Member, Special Track Organizer, Publicity Chair, Tutorial Chair, TPC member (e.g., IEEE VNC, IEEE VTC). She is co-editor of the book "Vehicular ad hoc network: standards, solutions and research" (Springer-Verlag) and Guest Editor of the special issue on *Multi-radio, Multi-technology, Multi-system Vehicular Communications*", in Computer Communications.

Florian Wamser, Ph.D., is a research associate at the chair of Communication Networks at the University of Würzburg, Germany. He leads the group on Cloud Networks and Internet Applications at the Chair of Prof. Dr.-Ing. Phuoc Tran-Gia. Florian studied at the University of Würzburg and at the Helsinki University of Technology, Finland. In 2014, he worked during a research stay at Intel Labs in Oregon, US. He received his diploma in computer science in 2009. In 2015 he received his

Ph.D. The thesis was included in the collected edition of excellent German computer science dissertations of 2015 by the Gesellschaft für Informatik (German Informatics Society). In addition, it was awarded by the Unterfränkischen Gedenkjahrstiftung für Wissenschaft (Franconian Foundation for Science). He took part in many activities of national and European research projects (e.g., BMBF G-Lab, H2020 INPUT, H2020 MONROE). He lectures annually at the Hanoi University of Science and Technology in Vietnam, organizes workshops, and is involved in conference committees. His current research is focused on the analytical and simulative performance evaluation and optimization of cloud networks and related fields.

A brief description of the technical focus addressed by the workshop, reasons why the workshop is of interest at this time, and reasons why this area is important in the context of NetSoft2017.

The ICT domain has experienced many key trends in the past years, including the *rapidly growing cloud computing*, providing virtually unlimited resources for enterprises and end-users, and the proliferation of *mobile devices* (such as sensors, smartphones, and tablets) getting involved in human's life and generating big amount of data to be stored and processed.
Additionally, *Software Defined Networking (SDN)* and *Network Function Virtualization (NFV)* technologies are gaining momentum which promote the deployment of network functions and applications as software components on top of cloud infrastructures, to overcome the well-known limitations of traditional vertically-integrated networks.
As a result of the broad paradigm shift to the *everything-as-a-Service* (XaaS) model from both the IT and networking communities, cloud alone is encountering growing challenges in coping with the huge computing and networking needs of many emerging applications and systems, such as the Internet of Things (IoT), 5G systems, big data analytics, augmented and virtual reality.
Several research initiatives have been launched worldwide and standardization activities are mushrooming which bring the promise of solving those challenges (e.g., poor scalability, high latency, rigid orchestration and management, lacking mobility support and location awareness).
However, solutions in those directions are still at their infancy and contributions are highly required which encompass: *(i)* the development of innovative *architectures, algorithms, and abstractions for more flexible, scalable and configurable provisioning and orchestration of programmable networks*; *(ii)* the design of *novel (mobile) edge/fog computing solutions* meeting the growing local and distributed low-latency computing requirements, by leveraging the available resources in the edge networks and sometimes diffused onto end user devices (e.g., smartphones, vehicles, IoT devices); *(iii)* the deployment of new technologies for *high-performance processing*, among which solutions tackling sustainable virtualization technologies; *(iv)* the design of *new cloud service models beyond typical Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS)*, e.g., inspired by the edge/fog computing paradigms, and their prototyping and implementation, especially as open source projects.
In this respect, NetFoG aims at bringing together researchers, engineers, and practitioners to present and discuss the latest advances on both *theoretical and practical key technology enablers for the network programmability, spanning the data centers and descending to the edge and the ground, in upcoming future Internet and 5G systems*.

Topics of interest include, but are not limited to, the following:

- extensions to IaaS, PaaS and SaaS concepts, interfaces and platforms
- management and monitoring of QoS/QoE over programmable networks
- architectures for virtualization and programmability in legacy and 5G networks
- orchestration and management frameworks for SDN/NFV

- big data for orchestration and management operations in programmable networks
- fog/mobile edge computing architectures and solutions
- SDN/NFV enablers for fog/mobile edge computing
- addressing, discovery and networking techniques for fog/edge computing
- fog/mobile edge computing support to IoT, 5G, autonomous and connected vehicles
- innovative fog/edge cloud services and applications
- incentives/business models for fog/edge cloud services
- security in fog/mobile edge computing scenarios
- SDN/NFV solutions to support user mobility and application/service proximity
- sustainability and energy efficiency for programmable networks
- microservices and containerization technologies
- emulation/simulation platforms, experimental testbeds, open source projects, prototypes implementation, modeling and performance analysis

The workshop will be technically co-sponsored by the EC H2020 INPUT (In- Network Programmability for next-generation personal cloUd service supporT) project (http://www.input-project.eu/) funded under the call H2020-ICT-2014-1.

As it clearly emerges from the previous discussion, the topics addressed by the workshop are highly topical and still-becoming, hence expected to catalyze a keen interest from professionals of the academic and industrial networking and computer science communities. Additionally, the workshop is expected to attract the interest of typical NetSoft attendees, since its topics partially overlap and largely complement the ones covered in the context of NetSoft 2017. In particular, compared the main conference, it encourages with more emphasis contributions concerning *practical key technology enablers for the network programmability* (e.g., high performance sustainable and energy-efficient processing solutions, microservices and containerization technologies) and the design of *beyond IaaS, PaaS and SaaS service models*. Moreover, its scope is more focused on *fog/edge computing approaches from both the cloud and networking perspectives*.

A tentative list of potential TPC members.

- Chiara Lombardo, Consortium for Telecommunications (CNIT), Italy
- Michael Seufert, University of Würzburg, Germany
- Giovanni Schembra, University of Catania, Italy
- Manzalini Antonio, Telecom Italia, Italy
- Alessandro Rossini, SINTEF, Oslo, Norway
- Robert Birke, IBM Research, Zurich, Switzerland
- Matteo Repetto, Consortium for Telecommunications (CNIT), Genova, Italy
- Paolo Lago, Consortium for Telecommunications (CNIT), Genova, Italy
- Panagiotis Gouvas, Ubitech, Greece
- Constantinos Vassilakis, Ubitech, Greece
- Thomas Zinner, University of Würzburg, Germany
- Martin Collier, Dublin City University, Ireland
- Stefan Covaci, Technical University of Berlin, Germany
- Antonio Jara, HOP Ubiquitous, Spain
- Maciej Mühleisen, Hamburg University of Technology, Germany
- Dario Rossi, Télécom ParisTech (ENST), France
- Roberto Riggio, CREATE-NET, Italy
- Christian Esteve Rothenberg, University of Campinas, Brasil

- Daniel Corujo, Instituto de Telecomunicações, Aveiro (Portugal)
- Ivan Farris, University Mediterranea of Reggio Calabria (Italy)
- Krzysztof Wajda, AGH University of Science and Technology, Kraków, Poland
- Özgü Alay, Simula Research Laboratory
- Florian Metzger, University of Duisburg-Essen

The planned format of the workshop, including a strategy to facilitate lively and interactive discussions

The workshop will be *full-day* and featuring one or two *keynote speeches*, two sessions with 30 minutes-long technical papers presentations (20 minutes for presentations and a 10 minutes-long slot for questions and answers to accommodate fruitful discussions), and invited live-demonstrations in-between them.

If applicable, a description of past events of the workshop, including statistics of submitted/accepted .papers and attendee numbers. If the workshop does not have past editions, please provide estimates and explain a strategy on how to reach the targets of paper submissions and attendees.

The workshop is in its first edition. However, two of the co-chairs were involved in the organization of a workshop on similar topics, PROCON (Programmability for Cloud Networks and Applications), http://procon-workshop.com/, organized in the context of ITC 28 in Würzburg, technically co-sponsored by IEEE Communications Society (IEEE ComSoc) and the Information Technology Society within VDE (ITG VDE), and in-cooperation with ACM SIGCOMM (12-16 September 2016). They will leverage the experience matured in organizing PROCON to ensure the success of the NetFoG workshop. The NetFoG workshop is expected to receive around 20-25 papers (some of them selected from a public call, while others will be invited contributions) and to attract around 30-40 people among the typical IEEE Netsoft attendees, e.g., industry professionals, skilled researchers from academia, Ph.D. students.

Besides technical presentations, the workshop will feature one or two keynote speeches by worldwide recognized experts in the topical fields of interest of the workshop, to facilitate interactive discussions. Moreover, to attract the interest of the audience, it will foresee invited live demonstrations.

Publicity and advertising plan to attract paper submissions and attendees.

The workshop will be advertised through traditional channels. In particular, the CFP will appear on the NetSoft website and a dedicated website will be created for the workshop. In addition, the CFP will be disseminated through the main mailing lists of the ICT research community at large, will be spread to specific research groups/open source projects tackling the topics of the workshop and to national consortia and groups the workshop co-chairs, respectively, belong to. Moreover, besides being distributed among the partners of the INPUT Project, the CFP of the workshop will be also sent to the coordinators of EC projects addressing similar topics and distributed on LinkedIn groups to also attract the interest of industry professionals. Such a publicity plan will ensure a proper dissemination of the NetFoG CFP to a wide and potentially interested audience with the aim to bring together both researchers and practioners, to present their latest achievements and innovations in the area of network programmability, *spanning the data centers and descending to the edge and the ground, in upcoming future Internet and 5G systems*.

A draft of 1-page "Call for Papers (CfP)" including title, description, topics and important dates.

First International Workshop on NEtwork programmabiliTy: From the data center tO the Ground (NetFoG) 2017, July 2017, Bologna, Italy

Description

The proliferation of pervasive *mobile devices* (such as sensors, smartphones, and tablets) generating big amount of data to be stored and processed, coupled with emerging *virtualization and programmability* technologies promoting the softwarized deployment of network functions and applications on top of cloud infrastructures, highly challenge the cloud. Several research initiatives are mushrooming worldwide which promise to cope with the huge computing and networking needs (e.g., high scalability, low latency, flexible orchestration and management, mobility support and location awareness) of many emerging applications and systems, such as the Internet of Things (IoT), 5G systems, big data analytics. Solutions in those directions are still at their infancy and contributions are highly required which encompass: *(i)* the development of innovative *architectures, algorithms, and abstractions for more flexible, scalable and configurable provisioning and orchestration of programmable networks*; *(ii)* the design of *novel (mobile) edge/fog computing solutions* meeting the growing local and distributed computing requirements, by leveraging the available resources in the edge networks and sometimes diffused onto end user devices (e.g., smartphones, vehicles, IoT devices); *(iii)* the deployment of new technologies for *high-performance processing*, among which solutions tackling sustainable virtualization technologies; *(iv)* the design of *new cloud service models beyond typical IaaS, PaaS and SaaS*, e.g., inspired by the edge/fog computing paradigms, and their prototyping and implementation, especially as open source projects.
In this respect, NetFoG aims at bringing together researchers, engineers, and practitioners to present and discuss the latest advances on both *theoretical and practical key technology enablers for the network programmability, spanning the data centers and descending to the edge and the ground, in upcoming future Internet and 5G systems*.

Topics of interest

Authors are invited to submit papers that fall in the area of programmability of cloud networks and applications. Topics of interest include, but are not limited to, the following:

- extensions to IaaS, PaaS and SaaS concepts, interfaces and platforms
- management and monitoring of QoS/QoE over programmable networks
- architectures for virtualization and programmability in legacy and 5G networks
- orchestration and management frameworks for SDN/NFV
- big data for orchestration and management operations in programmable networks
- fog/mobile edge computing architectures and solutions
- SDN/NFV enablers for fog/mobile edge computing
- addressing, discovery and networking techniques for fog/edge computing
- fog/mobile edge computing support to IoT, 5G, autonomous and connected vehicles
- innovative fog/edge cloud services and applications
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- sustainability and energy efficiency for programmable networks
- microservices and containerization technologies
- emulation/simulation platforms, experimental testbeds, open source projects, prototypes implementation, modeling and performance analysis

Important dates[1]

[1] To be checked with the Netconf organizing commitee.

- Submission deadline: 15 March 2017
- Acceptance notification: 15 April 2017
- Camera ready due: 15 May 2017

Workshop co-chairs

- Roberto Bruschi, Consortium for Telecommunications (CNIT), Genova, Italy, roberto.bruschi@cnit.it
- Claudia Campolo, University Mediterranea of Reggio Calabria, Italy, claudia.campolo@unirc.it
- Florian Wamser, University of Würzburg, Germany, florian.wamser@informatik.uni-wuerzburg.de