



**IFIP NETWORKING 2018**  
May 14-16, 2018 – Zurich, Switzerland



# IFIP Networking 2018

May 14-16, 2018  
Zürich, Switzerland

## Program

IFIP Networking 2018 is technically co-sponsored by as well as hosted by:



**Universität  
Zürich<sup>UZH</sup>**

IFIP Networking 2018 gratefully acknowledges the support from the following patrons:



**Stadt Zürich**

# IFIP Networking 2018 Organizing Committee

## **General Chair**

Burkhard Stiller, University of Zürich, Switzerland

## **Technical Program Co-chairs**

Claudio Casetti, Politecnico di Torino, Italy

Fernando Kuipers, Delft University of Technology, The Netherlands

James P. G. Sterbenz, The University of Kansas, U.S.A., and Lancaster University, U.K.

## **Publication Chairs**

Christian Doerr, Technische Universiteit Delft, The Netherlands

## **Local Arrangements**

Barbara Jost, University of Zürich, Switzerland

## **Web and Publicity Chair**

Corinna Schmitt, University of Zürich, Switzerland

## **Local Team**

Bruno Rodrigues, University of Zürich, Switzerland

Eder Scheid, University of Zürich, Switzerland

Sina Rafati, University of Zürich, Switzerland

Dominik Bünzli, University of Zürich, Switzerland

Erica Maurer, University of Zürich, Switzerland

## **Steering Committee**

Jordi Domingo-Pascual, Universitat Politècnica de Catalunya (UPC), Spain (Chair)

Andrea Passarella, IIT-CNR Pisa, Italy

Aiko Pras, University of Twente, The Netherlands

Henning Schulzrinne, Columbia University, U.S.A.

Jozef Wozniak, Gdansk University of Technology, Poland

# IFIP Networking 2018 General Chair's Welcome Message

*Dear Participants of the 17th IFIP Networking 2018!*

Exactly eighteen years ago the IFIP Networking conference history took off with its first instance on May 14, 2000 in Paris, France, forming at that point for the first time a joint event on formerly separated and since then integrated conferences on Broadband Communications (1995-1999), Performance of Communication Networks (1981-1998), and High Performance Networking (1987-1998). While IFIP Networking took place in the past for 11 times in Europe, for 3 times in North America, and twice in Asia, now the 17th IFIP Networking instance starts in Zürich, Switzerland. Thus, it is my pleasure to welcome you in my position as the IFIP Networking 2018 General Chair – and on behalf of the entire IFIP Networking Organizing Committee and Local Arrangements Team – to the 17th IFIP Networking 2018!

Since you are already holding this program in your hands, you have arrived by now safely to the beautiful location of Zürich, either by plane, train, or even car. Therefore, please find this program now at your hands as a guideline to your technical session planning for IFIP Networking 2018, the conference venue, information on the social event, conference services, and last but not least on lots of activities in and around Zürich. As you will have noted, the public transport toward the Swissôtel in Zürich-Oerlikon is most likely the very shortest one you may have ever seen for any conference you may participate in! The 8 minutes travel by train or S-Bahn (so called fast, short distance trains in Switzerland) from the train station of the Zürich Unique Airport (ZRH) to Oerlikon Bahnhof (station) and only an additional 60 m foot-path from there to the hotel's entrance is not only a great coincidence, it is Zürich's dedication to offer a frequent, timely, reliable, and efficient public transport, running besides trains, S-Bahn, and tram lines also buses and boats on the same ticket!

And you will learn during IFIP Networking 2018 that this public transport is also working for IFIP Networking's social program, supported by IFIP Networking's provision of sponsored local transport ticket for 24 hours. Besides for its use for the social event, please check out on such ticket-wide travel options within Zürich's travel zone 110! Main details are available on the route map provided in your participants' welcome package. And for sure, do not hesitate to talk to the Zürich local team or the reception desk for more detailed inquiries.

During IFIP Networking 2018 you can enjoy as a registered participant (please wear always your badge for room access) the welcome and key note sessions, technical sessions, the poster and demo session, the panel, a modern hotel of up-to-date conference facilities, complimentary WLAN access, and a great setting for work, coffee breaks, and joint lunches.

Such an event would not be possible without you, the attendees and paper authors! Thus, thank you for being with us and presenting your work. But additionally, it is the great help and drive of the IFIP Networking 2018 Organizing Committee, who made sure that all of you do see this great program and nice location. Special thanks go here to the three TPC Co-chairs of IFIP Networking 2018: Claudio Casetti, Fernando Kuipers, and James P. G. Sterbenz.

Last but not least it is my pleasure to address many thanks to the sponsors of IFIP Networking 2018 especially the Communication Systems Group CSG of the Department of Informatics IIf, the University of Zürich UZH, the Canton of Zürich, and the City of Zürich, who help to make your experience of IFIP Networking 2018 a unique one! Also, IFIP Networking 2018 is pleased to acknowledge the support by IFIP TC6 and the technical co-sponsoring by the IEEE Computer Society. Thus again, the entire Zürich local arrangements team wishes you a very warm welcome, a highly successful conference, productive "in-between" meetings, new contacts and ideas, and some great days out in and around the city of Zürich!

Burkhard Stiller  
*IFIP Networking 2018 General Chair*

## **IFIP Networking 2018 Program Chairs' Welcome Message**

It is with great pleasure that we welcome all attendees of the 17th edition of IFIP Networking in Zürich, Switzerland. The main objective of IFIP Networking is to bring together members of the networking community from both academia and industry, to discuss recent advances in the broad and quickly evolving fields of computer and communication networks, to highlight key issues, identify trends, and develop a vision for Future Internet technology, operation, and use.

As in the past editions, IFIP Networking 2018 has attracted a large number of papers in four main areas: (1) Network Architectures, Applications and Services, (2) Network Modeling and Analysis, (3) Network Security and Privacy, and (4) Wireless Networking.

This year, we received 225 submissions from a total of 41 countries. At a time when all major conferences are vying to attract research works, the high number of this year's submissions confirms that IFIP Networking is a well-established, reputed venue for high quality papers.

The main technical program is the result of a very selective, rigorous two-step peer-review process by experts in the areas of the conference. With all papers receiving an average of 4.4 reviews (at least 3 reviews and some of them up to 6 reviews) plus a meta-review summarizing the online discussion, we were able to guarantee that the works that made it into the main program are of outstanding quality. Overall, we accepted 55 full papers, which corresponds to an acceptance ratio of around 24%. In addition, 8 papers were accepted as short presentation papers.

The technical program is complemented by three keynotes, namely "Blockchain for Cyber Physical Systems", "Flexibility Matters: On the Design and Evaluation of Softwarized Networks", and "Artificial Intelligence in Network Operations and Management", and a panel on "Security and Privacy in the Internet of Things", as well as by a poster/demo session.

We would like to thank all the members of the Organizing Committee who worked hard to make this conference a real success. First and foremost, we express our gratitude to Burkhard Stiller, the General Chair of IFIP Networking 2018, for his unflagging support and constant input. Of course, a special thanks is due to all authors who selected IFIP Networking 2018 as a platform to present their latest research results. Last, but not least, we would also like to acknowledge all TPC members and reviewers for their time in providing their rigorous, high-quality 1009 reviews.

Hopefully, you will find this program a source of inspiration of new ideas for your research and work. We encourage you to use the three days of the conference to discuss and create new connections with colleagues from all over the world. Finally, besides attending intellectually inspiring talks and discussions, make sure to enjoy Zürich!

Claudio Casetti  
Fernando Kuipers  
James P. G. Sterbenz

*IFIP Networking 2018 Technical Program Co-chairs*

# IFIP Networking 2018 Program

**Monday May 14, 2018**

## **9.00 – 9.30 Welcome Session**

General Chair: Burkhard Stiller

Dean of Faculty of Business, Economics, and Informatics, University of Zürich: Harald Gall

IFIP Networking TPC Co-chairs: Claudio Casetti, Fernando Kuipers, James P. G. Sterbenz

## **9.30 – 10.30 Keynote Session I**

Salil Kanhere: *Blockchain for Cyber Physical Systems*

## **10.30 – 11.00 Coffee Break**

## **11.00 – 12.40 Session 1A - Security and Resilience**

George Geoffrey Michaelson, Matthew Roughan, Jonathan Tuke, Matt Wand, Randy Bush:  
*Rasch Analysis of HTTPS Reachability*

Lumin Shi, Mingwei Zhang, Jun Li, Peter Reiher:

*PathFinder: Capturing DDoS Traffic Footprints on the Internet*

Jun Wu, Patrick Pak-Ching Lee, Qi Li, Lujia Pan, Jianfeng Zhang:

*CellPAD: Detecting Performance Anomalies in Cellular Networks via Regression Analysis*

Elias A. Doumith, Sawsan Al Zahr:

*An M:N Shared Regenerator Protection Scheme in Translucent WDM Networks*

## **11.00 – 12.40 Session 1B - Service Function Chaining**

Fabien Duchene, David Lebrun, Olivier Bonaventure:

*SRv6Pipes: Enabling In-network Bytestream Functions*

Ahmed Abdelsalam, Stefano Salsano, Francois Clad, Pablo Camarillo, Clarence Filmsils:

*SERA: SEgment Routing Aware Firewall for Service Function Chaining Scenarios*

Matthias Rost, Stefan Schmid:

*Charting the Complexity Landscape of Virtual Network Embeddings*

Sara Ayoubi, Shihabur Rahman Chowdhury, Raouf Boutaba:

*Breaking Service Function Chains with Khaleesi*

## **12.40 – 13.40 Lunch Break**

## **13.40 – 15.20 Session 2A - Measurements and Analysis**

Ermias Andargie Walelgne, Setälä Kim, Vaibhav Bajpai,

Stefan Neumeier, Jukka M J Manner, Jörg Ott:

*Factors Affecting Performance of Web Flows in Cellular Networks*

Qian Zhou, Yang Chen, Chuanhao Ma, Fei Li, Yu Xiao, Xin Wang, Xiaoming Fu:

*Measurement and Analysis of the Reviews in Airbnb*

Meenakshi Syamkumar, Sathiya Kumaran Mani,

Ramakrishnan Durairajan, Paul Barford, Joel Sommers:

*Wrinkles in Time: Detecting Internet-wide Events via NTP*

Ruairí de Fréin:

*State Acquisition in Computer Networks*

### **13.40 – 15.20 Session 2B - Congestion Control**

Dominik Scholz, Benedikt Jaeger, Lukas Schwaighofer,  
Daniel Raumer, Fabien Geyer, Georg Carle:

*Towards a Deeper Understanding of TCP BBR Congestion Control*

Soheil Abbasloo, Tong Li, Yang Xu, H. Jonathan Chao:

*Cellular Controlled Delay TCP (C2TCP)*

Tristan Braud, Martin Heusse, Andrzej Duda:

*The Virtue of Gentleness: Improving Connection Response Times  
with SYN Priority Active Queue Management*

Roland Bless, Mario Hock, Martina Zitterbart:

*Policy-Oriented AQM Steering*

### **15.20 – 15.50 Coffee Break**

### **15.50 – 17.30 Session 3A - Traffic Engineering**

Davide Sanvito, Ilario Filippini, Antonio Capone, Stefano Paris, Jeremie Leguay:

*Adaptive Robust Traffic Engineering in Software Defined Networks*

Adriana Fernández-Fernández, Cristina Cervelló-Pastor,

Leonardo Ochoa-Aday, Paola Grosso:

*An Online Power-Aware Routing in SDN with  
Congestion-Avoidance Traffic Reallocation*

Reuven Cohen, Yuval Dagan, Gabi Nakibly:

*Proactive Rerouting in Network Overlays*

Seppo Hätonen, Petri Savolainen, Ashwin Rao, Hannu Flinck, Sasu Tarkoma:

*SWIFT: Bringing SDN Based Flow Management to Commodity Wi-Fi Access Points*

### **15.50 – 17.30 Session 3B - Multipath Communications**

Liyang Sun, Guibin Tian, Guanyu Zhu, Yong Liu, Hang Shi, David Dai:

*Multipath IP Routing on End Devices: Motivation, Design, and Performance*

Tanya Shreedhar, Nitinder Mohan, Sanjit K Kaul, Jussi Kangasharju:

*QAware: A Cross-Layer Approach to MPTCP Scheduling*

### **17.45 Travel to Reception and Social Event**

(by public transport in groups from the Swissôtel or privately at any time before)

### **18.15 – 19.00 Reception at “Zunfthaus zur Waag”**

(see page 15 in this program booklet below for details)

### **19.00 – 22.00 Social Event at “Zunfthaus zur Waag”**

## **Tuesday May 15, 2018**

### **9.00 – 10.00 Keynote Session II**

Wolfgang Kellerer: *Flexibility Matters: On the Design and Evaluation of Softwarized Networks*

### **10.00 – 10.30 Coffee Break**

### **10.30 – 12.10 Session 4A - SDN Architectures**

Viktoria Fodor, Muhammad Zeshan Naseer:

*The Effect of Network Topology on the Control Traffic in Distributed SDN*

Levente Csikor, Laszlo Toka, Márk Szalay, Gergely Pongrácz,

Dimitrios P. Pezaros, Gábor Rétvári:

*HARMLESS: Cost-Effective Transitioning to SDN for Small Enterprises*

Robert Krösche, Kashyap Thimmaraju, Liron Schiff, Stefan Schmid:

*I DPID It My Way! A Covert Timing Channel in Software-Defined Networks*

### **10.30 – 12.10 Session 4B - 5G Communications**

Mohammad Nourifar, Francesco Devoti, Ilario Filippini:

*Blockage-Robust 5G mm-Wave Access Network Planning*

Chrysa Papagianni, Panagiotis Papadimitriou, John Baras:

*Rethinking Service Chain Embedding for Cellular Network Slicing*

Safwan Alwan, Ilhem Fajjari, Nadjib Aitsaadi:

*D2D Multihop Energy-Efficient Routing and OFDMA Resource Allocation in 5G Networks*

Misikir Gebrehiwot, Pasi Lassila, Samuli Aalto:

*Dynamic Load Balancing in 5G HetNets for Optimal Performance-Energy Tradeoff*

### **12.10 – 13.40 Lunch Break**

### **13.40 – 15.20 Session 5A - Named Data Networking**

JJ Garcia-Luna-Aceves, Ehsan Hemmati:

*Making Name-Based Content Routing More Efficient than Link-State Routing*

Jonnahtan Saltarin, Torsten Ingo Braun, Eirina Bourtsoulatze, Nikolaos Thomos:

*PopNetCod: A Popularity-based Caching Policy for*

*Network Coding-enabled Named Data Networking*

Karim A. Khalil, Azeem Aqil, Srikanth V. Krishnamurthy, Tarek Abdelzaher, Lance Kaplan:

*NEST: Efficient Transport of Data Summaries over Named Data Networks*

Chavoosh Ghasemi, Hamed Yousefi, Kang Shin, Beichuan Zhang:

*MUCA: New Routing for Named Data Networking*

### **13.40 – 15.20 Session 5B - Wireless and Mobile Networks**

Mohammed Amer, Anthony Busson, Isabelle Guérin Lassous:

*Association Optimization in Wi-Fi Networks based on the Channel Busy Time Estimation*

Marcelo M Carvalho, JJ Garcia-Luna-Aceves:

*Carrier-Sense Multiple Access with Transmission Acquisition (CSMA/TA)*

Alberto Ceselli, Marco Fiore, Angelo Furno, Marco Premoli, Stefano Secci, Razvan Stanica:

*Prescriptive Analytics for MEC Orchestration*

Nesrine Ben Khalifa, Amal Benhamiche, Alain Simonian, Marc Bouillon:

*Profit and Strategic Analysis for MNO-MVNO Partnership*

### **15.20 – 15.50 Coffee Break**

### **15.50 – 17.30 Session 6A - Data Center and Overlay Networks**

Soheil Abbasloo, Yang Xu, H. Jonathan Chao:

*HyLine: A Simple and Practical Flow Scheduling for Commodity Datacenters*

Céline Comte:  
*Dynamic Load Balancing with Tokens*

Pradeeban Kathiravelu, Marco Chiesa, Pedro de B Marcos, Marco Canini, Luís Veiga:  
*Moving Bits with a Fleet of Shared Virtual Routers*

Martijn De Vos, Johan Pouwelse:  
*Real-time Money Routing by Trusting Strangers with Your Funds*

### **15.50 – 17.30 Session 6B - Virtualization and Resource Sharing**

Matthias Rost, Stefan Schmid:  
*Virtual Network Embedding Approximations: Leveraging Randomized Rounding*

Johannes Zerwas, Patrick Kalmbach, Carlo Fuerst, Arne Ludwig,  
Andreas Blenk, Wolfgang Kellerer, Stefan Schmid:  
*Ahab: Data-Driven Virtual Cluster Hunting*

Vamsi Addanki, Leonardo Linguaglossa, James Roberts, Dario Rossi:  
*Controlling Software Router Resource Sharing by Fair Packet Dropping*

## **Wednesday May 16, 2018**

### **9.00 – 10.00 Keynote Session III**

Jürgen Quitteck: *Artificial Intelligence in Network Operations and Management*

### **10.00 – 11.00 Panel Session**

Organized by James P. G. Sterbenz: *Security and Privacy in the Internet of Things*

### **11.00 – 12.10 Demonstration and Poster Session combined with Coffee Break**

Ahmed Abdelsalam:  
*Demo: Chaining of Segment Routing Aware and Unaware Service Functions*

Fred Aklamanu, Sabine Randriamasy, Eric Renault, Imran Latif, Abdelkrim Hebbar,  
Alberto Contem Bilal Al Jamal, Warda Hamdaoui:  
*Demo: Intent-Based 5G IoT Application Slice Energy Monitoring*

The An Binh Nguyen, Christian Klos, Christian Meurisch, Patrick Lampe:  
*Demo: Enabling In-Network Processing utilizing Nearby Device-to-Device Communication*

Vamsi Addanki, Leonardo Linguaglossa, Jim Roberts, Dario Rossi:  
*Demo: Controlling Software Router Resource Sharing by Fair Packet Dropping*

Marie Schaeffer, Roman Naumann, Stefan Dietzel, Björn Scheuermann:  
*Poster: Impact of Prioritized Network Coding on Sensor Data Collection in Smart Factories*

Sina Rafati Niya, Burkhard Stiller:  
*Poster: Design and Evaluation of a Time Efficient Vertical Handoff Algorithm  
between LTE-A and IEEE 802.11ad Wireless Networks*

Corinna Schmitt, Dominik Bünzli, Burkhard Stiller:  
*Poster: WebMaDa 2.0 - Automated Handling of User Requests*

### **12.10 – 13.40 Lunch Break**



### **13.40 – 15.20 Session 7A - Network Models and Algorithms**

Fang Dong, Kui Wu, Venkatesh Srinivasan:

*A New Dependence Model for Heterogeneous Markov Modulated Poisson Processes*

Paul Nikolaus, Jens Schmitt:

*Improving Output Bounds in the Stochastic Network Calculus Using Lyapunov's Inequality*

Marie Schaeffer, Roman Naumann, Stefan Dietzel, Björn Scheuermann:

*Hierarchical Layer Selection with Low Overhead in Prioritized Network Coding*

Kelong Cong, Zhijie Ren, Johan Pouwelse:

*A Blockchain Consensus Protocol With Horizontal Scalability*

### **13.40 – 15.20 Session 7B - Content Distribution**

Tilak Varisetty, Markus Fidler, Matthias Ueberheide, Marcus Magnor:

*On the Delay Performance of Browser-based Interactive TCP Free-viewpoint Streaming*

Felix Weinrank, Irene Rüngeler, Michael Tüxen, Erwin P. Rathgeb:

*Alternative Handshake Mechanism for the Stream Control Transmission Protocol*

Eman Ramadan, Pariya Babaie, Zhi-Li Zhang:

*A Framework for Evaluating Caching Policies in a Hierarchical Network of Caches*

Sukhpreet Kaur Khangura, Markus Fidler, Bodo Rosenhahn:

*Neural Networks for Measurement-based Bandwidth Estimation*

### **15.20 – 15.50 Coffee Break**

### **15.50 – 16.50 Session 8A - Short Presentation Papers I**

Slađana Jošilo, György Dán:

*Decentralized Scheduling for Offloading of Periodic Tasks in Mobile Edge Computing*

Yue Cao, Laiping Zhao, Rongqi Zhang, Yanan Yang, Xiaobo Zhou, Keqiu Li:

*Experience-Availability Analysis of Online Cloud Services using Stochastic Models*

Quentin De Coninck, Olivier Bonaventure:

*Tuning Multipath TCP for Interactive Applications on Smartphones*

Saeed Akhoondian Amiri, Klaus-Tycho Foerster,

Riko Jacob, Mahmoud Parham, Stefan Schmid:

*Waypoint Routing in Special Networks*

### **15.50 – 16.50 Session 8B - Short Presentation Papers II**

The An Binh Nguyen, Marius Rettberg-Päplow, Christian Meurisch, Tobias Meuser:

*Complex Services Offloading in Opportunistic Networks*

Sanaz Taheri Boshrooyeh, Alptekin Küpçü, Ozgur Ozkasap:

*PPAD: Privacy Preserving Group-Based ADvertising in Online Social Networks*

Jawad Manzoor, Ramin Sadre, Idilio Drago, Llorenç Cerdà-Alabern:

*Is There a Case for Parallel Connections with Modern Web Protocols?*

Vadim Kirilin, Sergey Gorinsky:

*A Protocol-Ignorance Perspective on Incremental Deployability of Routing Protocols*

### **16.50 End of IFIP Networking 2018 in Zürich, Switzerland**