ITC 28 in Würzburg
12–16 September 2016
University of Würzburg, Germany

Preface

Proceedings of the 28th International Teletraffic Congress

ITC 28

Tobias Hoßfeld, Brian Mark, Gary Chan, Andreas Timm-Giel
(ITC 28 TPC Co-Chairs)

Volume Editors

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Proceedings of the 28th International Teletraffic Congress (ITC 28). The meeting is held during 12-16 September 2016 at the University of Würzburg, Germay. ITC 28 is technically co-sponsored by IEEE Communications Society (IEEE ComSoc) and the Information Technology Society within VDE (ITG VDE), and in-cooperation with ACM SIGCOMM.

ITC is the first international conference in networking science & practice, first held in 1955.

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Welcome Message from General Co-Chairs

On behalf of the Organizing Committee, we are delighted to welcome you to the 28th International Teletraffic Congress (ITC 28) to be held on September 12-16, 2016 in lovely Würzburg, Germany!

Since its inception in 1955, ITC has witnessed the evolution of communications and networking: the influence of computer science on telecommunications, the advent of the Internet and the massive deployment of mobile communications and optics, the emergence of peer-to-peer networking and social network services, the ever increasing speed and flexibility of new communication technologies, networks, devices, and applications, and the ever changing operational challenges arising from these developments. ITC has also documented this evolution with state-of-the-art measurement studies, performance analyses of new technologies, recommendations for provisioning and configuration, and greatly contributed to the advancement of methodologies for network design and analysis.

Its inherent roots in solid methodological foundations have allowed ITC to constantly adapt its technological focus without losing its original identity. ITC continues to serve as a broad and lively community for researchers and practitioners dedicated to advancing the limits of knowledge in networking. As such, ITC regularly organizes such events as congresses, specialist seminars and workshops for experts to gather and discuss the latest developments in design, modelling, and performance evaluation of communication systems, networks, and services.

This year's ITC technical program is composed of 37 contributed full papers and 6 short demo papers to be presented in two parallel sessions, three keynote addresses and a demo session. We also sponsor three workshops dedicated to timely topics: Workshop on Programmability for Cloud Networks and Applications (PROCON), 2016 International Workshop on Quality of Experience Centric Management (QCMan), COST Action ACROSS Workshop on "Quality Engineering for a Reliable Internet of Services".

We are especially grateful to our keynote speakers: Dr. Nikhil Jain (Qualcomm Technologies), who will talk on "Internet of Everything: Engineering Challenges and Opportunities"; Prof. Wolfgang Kellerer (Technische Universität München), who will talk on "Towards flexible networking in dynamically changing environments"; and Dr. Eitan Altman (INRIA Sophia Antipolis), who will talk on "Dynamic games for analyzing competition in the Internet".

We also thank ITC's International Advisory Committee (IAC) for their support of student travel grants and best paper awards. The IAC has graciously decided to offer a number of travel grants available to full-time students. ITC 28 has set up three prestigious awards. The Best Paper Award will be granted to the best contribution presented at ITC 28. The Best Student Paper Award will be conferred upon the best paper whose first author is a full-time student at the time of submission of the paper and is the presenter. The Best Demo Award will be granted to the best demo presented during the ITC 28 meeting. These awards will be selected based on scientific merit and oral presentation or demo presentation quality.

A successful conference requires dedication and engagement of many people. We would like to recognize the efforts of the TPC Co-Chairs, Professors Tobias Hoßfeld, Brian Mark, Gary Chan and Andreas Timm-Giel, who put together this excellent technical program. We thank Mrs. Alison Wichmann for the local arrangements, Dr. Matthias Hirth and Dr. Florian Wamser, Local Organization Co-Chairs, as well as Mr. Christopher Metter and Dr. Florian Metz-

ger, Web & EDAS Co-Chairs. Dr. Prosper Chemouil as Award Chair reviewed the student travel grant applications and will lead the best paper award selection process. Our Publicity Co-Chairs, Prof. Florin Ciucu and Prof. Sheng Zhou, disseminated information about ITC 28 throughout the world. Our Publication Co-Chairs, Prof. Jörg Liebeherr and Prof. Michael Menth, organized the publications with the CPS publisher.

Our thanks also go to Dr. Florian Wamser, Dr. Roberto Bruschi and Dr. Anastasios Zafeiropoulos for organizing the PROCON workshop; Dr. Thomas Zinner, Dr. Oliver Hohlfeld, Dr. Raimund Schatz, and Prof. Prasad Calyam for organizing the QCMan workshop; Prof. Hans van den Berg and Prof. Rob van der Mei for organizing the ACROSS workshop. We greatly appreciate everyone who submitted papers to the conference, particularly those who will be presenting their work at ITC 28. The IEEE, IEEE Communications Society, and the Information Technology Society within VDE (ITG VDE) kindly agreed to technically co-sponsor ITC 28, and ACM SIGCOMM helped us through their in-cooperation agreement. Last, but not least, we are grateful to our corporate patrons: Infosim, kubusIT, and Orange, who generously provided financial support to ITC 28,as well as the Julius Maximilian Universität Würzburg for their support in organizing and hosting the conference.

Phuoc Tran-Gia (University of Würzburg, Germany)
Hisashi Kobayashi (Princeton University, USA)

September 2016

Welcome Message from Technical Program Co-Chairs

Welcome to Würzburg and the 28th International Teletraffic Congress (ITC 28)!

The evolution of communication and networking is changing the world we are living in. The digital connected world is triggered by the advances on telecommunications, the penetration of the Internet, the massive deployment of mobile communications and optics, the adoption of collaborative networking and social networks, the ever-increasing speed and flexibility of new communication technologies, networks, user devices, and applications, and various operational challenges arising from this development.

ITC was established as the first international conference on networking science and practice. It gathers a wide and lively community of researchers and practitioners dedicated to pushing the envelope in the area of networking. As such, ITC has provided a forum for leading researchers from academia and industry to present and discuss the latest changes and developments in design, modelling, measurement, and performance evaluation of communication systems, networks, and services.

ITC 28 has continued this tradition, while employing some new approaches to attract high-quality papers and researchers. In particular, ITC 28 introduced the concept of areas and a demo session. ITC 28 is structured into eight different areas which address hot topics in networking. Each area is chaired by two internationally well recognized experts in that area. The area chairs organized a smaller TPC per area. The idea was that the area chairs invited experts for their areas from the ITC community as well as other well-known experts worldwide. On the one hand, the concept was aimed at expanding the ITC community and attracting high-quality submissions. On the other hand, the areas helped to improve the quality of the review process. The area chairs assigned the reviews to experts in their domain and evaluate all papers in their domain.

In addition, we introduced demo sessions for ITC 28 that cuts thematically across the areas. The demo session is distinguished from the regular sessions only in the presentation format. "Demo papers" are papers whose content is best understood by an audience if the material is demonstrated rather than presented in a lecture style slide presentation. With the demo session, we aimed to provide a different kind of interactions among the participants, so as to make ITC more attractive for other communities.

Accordingly, ITC 28 is structured into the following eight different areas and demo session with the listed chairs:

Area 1: Smart cities and IoT (Alberto Leon-Garcia, Yanmin Zhu)
Area 2: Cloud services and networking (Arup Acharya, Patrick Lee)
Area 3: Mobile, wireless and 5G (Kin Leung, Thomas Hou)
Area 4: Next generation and future Internet architectures (Michael Zink, Thomas Zinner)
Area 5: Network and traffic management (Florin Ciucu, Peter Reichl)
Area 6: Network design and optimization (Thomas Bauschert, Eric Wong)
Area 7: Network measurements and analysis (Marco Mellia, Mark Squillante)
Area 8: Networked applications (Zhu Li, Lea Skorin-Kapov)
Demonstration Session (Mark Berman, Michael Jarschel, Rick McGeer)

ITC 28 attracted 116 international paper submissions across all areas, while 157 papers were registered. The 116 papers were submitted by authors from 33 different countries, out of which 20% were from the USA and Canada, 68% from Europe/Middle East/Africa, 11% from Asia/Pacific and the remainder from Latin America.

Each submitted paper was reviewed by at least three experts assigned by the area chairs and TPC chairs. All papers are single-blind reviewed. In special cases, when the discussion of reviewers did not converge, additional expert reviews were requested to come to a solicited decision. In total, there were 420 completed reviews for the 116 submitted papers, i.e. an average of 3.6 reviews per paper. The area chairs and TPC members fostered discussions to converge the reviewers' recommendations towards a decision. In total, 300 discussion posts were provided for papers with diverging review scores. The area chairs provided a ranked list of papers with suggestions for papers to be accepted and rejected.

A full-day TPC meeting was held at the University of Würzburg, Germany, from 9.00 – 19.30 on May 3, 2016. The meeting was structured according to the areas. The area chairs presented the papers submitted to their area and the list of ranked papers.

Based on the reviews and the recommendations from the area chairs, it was decided during the TPC meeting which papers were to be accepted or rejected per area. In addition, for each area a few reserve papers were identified. It should be noted that those papers were also good contributions. After the discussion of all areas, the reserve papers were discussed by the physically attending TPC members in Würzburg. The papers were evaluated and compared across different areas in order to identify the best papers from among the reserve papers. If an accepted paper was flagged as needing improvement, shepherding of such papers was initiated by the area chairs. Shepherding was led by the area chairs or a TPC member assigned to a particular area.

Finally, 37 full papers were accepted out of the 108 full paper submissions, yielding an acceptance rate of 34%. In addition, 6 short demo papers were accepted. The statistics per area are given below. From among the authors of accepted papers, 28% are from USA and Canada, 61% from Europe/Middle East/Africa, 8% from Asia/Pacific and the remaining are from Latin America.

Area	Registered	Submitted	Accepted
1. Smart cities and IoT	8	5	0
2. Cloud services and networking	14	9	3
3. Mobile, wireless and 5G	19	9	4
4. Next generation and future Internet architectures	26	20	9
5. Network and traffic management	23	19	5
6. Network design and optimization	18	14	4
7. Network measurements and analysis	21	15	5
8. Networked applications	12	11	4
Demos	16	14	3

Given the accepted papers, we then group the papers according to their topics. On behalf of the Technical Program Committee (TPC), we proudly present to you an excellent technical program covering a wide range of topics which are manifested in 12 technical oral sessions and a demo session.

Session 1.A Clouds and Data Center
Session 1.B Traffic and Network Management
Session 2 Wireless
Session 3.A Cellular
Session 3.B Video Streaming
Session 4.A Caching Strategies
Session 4.B Performance Analysis
Session 5 Demo Session
Session 6.A Softwarization
Session 6.B Information and Social Networks
Session 7.A Measurements
Session 7.B Caching
Session 8 Virtualization

The technical program is presented in the form of double-track sessions spanning three days, from September 13 to 15, 2016. The demo session, the three keynote speeches, and two selected sessions are presented as plenary sessions. On the first day of the congress, September 12, 2016, a half-day workshop on Programmability for Cloud Networks and Applications (PROCON) takes place. On the final day of the congress, September 16, there are two full-day workshops: (1) 2016 International Workshop on Quality of Experience Centric Management (QCMan) and (2) Workshop of COST Action ACROSS on "Quality Engineering for a Reliable Internet of Services".

We are delighted to have three excellent keynote speakers in the main program. We thank them for agreeing to be keynote speakers and presenting their visions in spite of their busy schedules.

- Nikhil Jain (Vice President of Technology, Qualcomm Technologies, Inc.): Internet of Everything: Engineering Challenges and Opportunities
- Wolfgang Kellerer (Technical University of Munich (TUM), Germany): Towards Flexible Networking in Dynamically Changing Environments
- Eitan Altman (INRIA Sophia Antipolis, France): Dynamic Games for Analyzing Competition in the Internet

The TPC co-chairs wish to thank in particular, the area chairs who did a fantastic job and dedicated much effort to make ITC 28 a success. We thank the TPC members and experts that provided paper reviews, contributed to the discussions and attended the TPC meeting for the conference. Without their diligence and hard work the program could not have been put together. And, of course, we thank everyone who submitted a paper and those who are presenting their work at the conference.

Further we wish to give special thanks to the University of Würzburg for hosting the TPC meeting and we are particularly indebted to Thomas Zinner for his willingness to help in all aspects of organizing ITC 28. Special thanks for their efforts in the TPC meeting are dedicated to Benny Van Houdt, Florin Ciucu, and Michael Zink. We thank the members of the ITC steering committee, particularly Michela Meo for providing guidance. Last but not least we wish to thank the previous ITC organizers for passing on their thoughts and experiences: Dragos Illie, Peter Van Daele, Markus Fiedler, Michela Meo, Sabine Wittevrongel. We thank Harry Rudin for supporting us in setting up the Elsevier Computer Networks Special Issue on "Softwarization and Caching in NGN" related to ITC 28.

Special thanks go to the ITC 28 publications chairs, Michael Menth and Jörg Liebeherr, who took care of the publication process and made the technical co-sponsorship happen with IEEE Communications Society (IEEE ComSoc) as well as the cooperation with ACM SIGCOMM. We acknowledge the publicity chairs, Florin Ciucu and Sheng Zhou, for their extensive efforts to make ITC 28 visible and to attract submissions and attendees. We thank Prosper Chemouil, the awards chair, for taking care of the student travel grants and the best paper awards. We extend our sincere thanks to Florian Metzger for facilitating the paper submission and review process electronically in EDAS, Christopher Metter for taking care of the ITC 28 mailing lists and web site, as well as the local organizers Matthias Hirth, Florian Wamser and Alison Wichmann for implementing the ITC 28 registration process, all local arrangements and the social events to make ITC 28 happen.

Finally, we would like to express our appreciation the general chairs, Phuoc Tran-Gia and Hisashi Kobayashi, for all of their hard work in putting together an excellent overall program and a wonderful ITC 28 event.

Tobias Hoßfeld (University of Duisburg-Essen, Germany)
Brian L. Mark (George Mason University, US)
Gary Chan (The Hong Kong University of Science and Technology, China)
Andreas Timm-Giel (Hamburg University of Technology, Germany)

September 2016

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Area 2: Cloud Services and Networking

Samuli Aalto	Aalto University, Finland
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Area 3: Mobile, Wireless and 5G

Ozgur Akan	Koc University, Turkey
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Area 4: Next Generation and Future Internet Architectures

Hans van den Berg	TNO, Delft, the Netherlands
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Steve Uhlig	Queen Mary, University of London, UK
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Area 5: Network and Traffic Management

Samuli Aalto	Aalto University, Finland
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Giuseppe Bianchi	University of Rome "Tor Vergata", Italy
Thomas Bonald	Telecom ParisTech, France
Sem Borst	Alcatel-Lucent, Bell Labs, US
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Miklos Telek	Technical University of Budapest, Hungary
Steve Uhlig	Queen Mary London, UK
Xinbing Wang	Shanghai Jiao Tong University, China

Area 6: Network Planning and Optimization

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Wolfgang Bziuk	University of Braunschweig, Germany
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Christian Raack	Atesio, Berlin, Germany
Jacek Rak	Gdansk University of Technology, Poland
Mathias Schweigel	Detecon, Dresden, Germany
Gangxiang Shen	Soochow University, China
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Anna Tzanakaki	University of Bristol, UK
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Area 7: Network Measurements and Analysis

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Peter van de Ven	Centrum voor Wiskunde en Informatica, Netherlands
Joris Walraevens	Ghent University, Belgium
Rolf Winter	Augsburg University, Germany
Bo Zhang	IBM Research, US

Area 8: Networked applications

Ake Arvidsson	Ericsson, Sweden
Imed Bouazizi	Samsung Research America, US
Sangtae Ha	University of Colorado, US
Poul Heegard	Norwegian University of Science and Technology, Norway
Cheolkon Jung	Xidian University, China
Luntian Mou	Beijing University of Technology, China
Symeon Papavassiliou	National Technical University of Athens, Greece
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Dan Wang	Hong Kong Polytechnic University, China
Xin Wang	Huawei Media Lab, US
Liang Zhou	Nanjing University of Post & Communications, China
Rong Zheng	McMaster University, Canada

Demo Session

Andy Bavier	Princeton University, US
Justin Cappos	NYU Polytechnic, US
Chip Elliott	GPO/BBN, US
Deniz Gurkan	University of Houston, US

Marc Körner	TU Berlin, Germany
Thanasis Korakis	NYU Polytechnic, US
Robert Krahn	Communications and Design Group, US
Joe Mambretti	Northwestern University, US
Sebastian Meier	University of Stuttgart, Germany
Hausi Muller	University of Victoria, US
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Simon Oechsner	NEC Laboratories Europe, Germany
Max Ott, NICTA	Australia
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Rastin Pries	Nokia Munich, Germany
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Niky Riga	Geni Project Office, US
Christian E. Rothenberg	University of Campinas, Brazil
Charalampos Rotsos	University of Lancaster, UK
Paul Ruth	RENCI, US
Dennis Schwerdel	University of Kaiserslautern, Germany
James Sterbenz	University of Kansas, US

Tuesday 13th September, 2016

09:00 – 09:30 Opening by Phuoc Tran-Gia

09:30 – 10:30 **Keynote** by Nikhil Jain (Qualcomm Technologies)
Internet of Everything: Engineering Challenges and Opportunities

10:30 – 11:00 Coffee break

11:00 – 12:20 **Session 1.A: Clouds and Data Centers**
Offering Resilient and Bandwidth Guaranteed Services in Multi-Tenant Cloud Networks: Harnessing the Sharing Opportunities by Hyame Assem Alameddine; Sara Ayoubi; Chadi Assi

Dynamic Virtual Network Traffic Engineering with Energy Efficiency in Multi-Location Data Center Networks by Mirza Mohd Shahriar Maswood; Chris Develder; Edmundo Madeira; Deep Medhi

An Energy-Aware Embedding Algorithm for Virtual Data Centers by Tran Manh Nam; Nguyen Van Huynh; Le Quang Dai; Nguyen Huu Thanh

Session 1.B: Traffic and Network Management
Disaster Avoidance Control against Tsunami by Phuong Nga Tran; Hiroshi Saito

Building a Low Latency Linux Software Router by Alexander Beifuß; Torsten M. Runge; Daniel Raumer; Paul Emmerich; Bernd E. Wolfinger; Georg Carle

Traffic-Driven Implicit Buffer Management – Delay Differentiation Without Traffic Contracts by Martin Karsten; Daniel S. Berger; Jens Schmitt

12:20 – 13:45 Lunch

13:45 – 15:15 **Session 2: Wireless**
Full Demo 1: *Self-Optimization of Software Defined Radios Through Evolutionary Algorithms* by Zubair Shaik; André Puschmann; Andreas Mitschele-Thiel

Opportunistic Channel Estimation for Implicit 802.11af MU-MIMO by Ryan E. Guerra; Narendra Anand; Clayton Shepard; Edward W. Knightly

DiVote: A Distributed Voting Protocol for Mobile Device-to-Device Communication by Peter Danielis; Sylvia T. Kouyoumdjieva; Gunnar Karlsson

15:15 – 15:45 Coffee break

Tuesday 13th September, 2016 (cont.)

15:45 – 17:05 **Session 3.A: Cellular**

Joint Optimization of User Association and User Satisfaction in Heterogeneous Cellular Networks by Farah Moety; Mustapha Bouhtou; Taoufik En-Najjary; Ridha Nasri

Joint Resource Allocation and User Association for Heterogeneous Cloud Radio Access Networks by Ying Loong Lee; Li-Chun Wang; Teong Chee Chuah; Jonathan Loo

Performance-Oriented Association in Large Cellular Networks with Technology Diversity by Abishek Sankararaman; Jeong-woo Cho; François Baccelli

Session 3.B: Video Streaming

Bridging the Gap Between QoE and User Engagement in HTTP Video Streaming by Christian Moldovan; Florian Metzger

A Markov Model for Evaluating Resource Sharing Policies for DASH Assisting Network Elements by Jan Willem Kleinrouweler; Sergio Cabrero; Rob van der Mei; Pablo Cesar

Mobile Live Video Upstreaming by Philip Lundrigan; Mojgan Khaledi; Makito Kano; Naveen Dasa Subramanyam; Sneha Kasera

18:30 – 20:00 Welcome Reception

Wednesday 14th September, 2016

09:00 – 10:00 **Keynote** by Wolfgang Kellerer (Technical University of Munich, Germany)
Towards Flexible Networking in Dynamically Changing Environments

10:00 – 10:30 Full Demo 2: *PlanetIgnite: A Self-Assembling, Lightweight, Infrastructure-as-a-Service Edge Cloud* by Andy Bavier; Rick McGeer; Glenn Ricart

10:30 – 11:00 Coffee break

11:00 – 12:20 **Session 4.A: Caching Strategies**
Stochastic Dynamic Cache Partitioning for Encrypted Content Delivery by Andrea Araldo; György Dán; Dario Rossi

Access-time Aware Cache Algorithms by Giovanni Neglia; Damiano Carra; Mingdong Feng; Vaishnav Janardhan; Pietro Michiardi; Dimitra Tsigkari

Asymptotically Exact TTL-Approximations of the Cache Replacement Algorithms LRU(m) and h-LRU by Nicolas Gast; Benny Van Houdt

Session 4.B: Performance Analysis
Meeting Soft Deadlines in Single- and Multi-Server Systems by Esa Hyytiä; Rhonda Righter; Jorma Virtamo

Performance Analysis of CoDel and PIE for Saturated TCP Sources by Fabian Schwarzkopf; Sebastian Veith; Michael Menth

Stochastic Upper and Lower Bounds for General Markov Fluids by Florin Ciucu; Felix Poloczek; Jens Schmitt

12:20 – 13:45 Lunch

Wednesday 14th September, 2016 (cont.)

13:45 – 15:15 **Session 5: Demo Session**

Demo: Resilient Integration of Distributed High-Performance Zones into the BelWue Network Using OpenFlow by Mark Schmidt; Robert Finze; Daniel Reutter; Michael Menth

Demonstrating a Personalized Secure-By-Default Bring Your Own Device Solution Based on Software Defined Networking by Steffen Gebert; Thomas Zinner; Nicholas Gray; Raphael Durner; Claas Lorenz; Stanislav Lange

Demonstrating Context-Aware Services in the MobilityFirst Future Internet Architecture by Francesco Bronzino; Dipankar Raychaudhuri; Ivan Seskar

jLISP: An Open, Modular and Extensible Java-Based LISP Implementation by Andreas Stockmayer; Mark Schmidt; Michael Menth

Network as a Service – A Demo on 5G Network Slicing by Rastin Pries; Hans-Jochen Morper; Nandor Galambosi; Michael Jarschel

Security of Distributed Container Based Service Clustering with Hypriot Cluster Lab by Marcel Großmann; Andreas Eiermann

15:15 – 15:45 Coffee break

15:45 – 17:05 **Session 6.A: Softwarization**

Sector: TCAM Space Aware Routing on SDN by Sai Qian Zhang; Qi Zhang; Ali Tizghadam; Byungchul Park; Hadi Bannazadeh; Alberto Leon-Garcia; Raouf Boutaba

Port Based Capacity Extensions (PBCEs): Improving SDNs Flow Table Scalability by Robert Bauer; Martina Zitterbart

Performance Modeling of Softwarized Network Functions Using Discrete-Time Analysis by Steffen Gebert; Thomas Zinner; Stanislav Lange; Christian Schwartz; Phuoc Tran-Gia

Session 6.B: Information and Social Networks

Cache the Queues: Caching and Forwarding in ICN From a Congestion Control Perspective by Dinh Nguyen; Kohei Sugiyama; Atsushi Tagami

Optimizing Time to Exhaustion in Service Providers Using Information-Centric Networking by Ali Shariat; Ali Tizghadam; Alberto Leon-Garcia

Binary Opinion Dynamics with Biased Agents and Agents with Different Degrees of Stubbornness by Arpan Mukhopadhyay; Ravi R. Mazumdar; Rahul Roy

19:00 – 23:00 Social Event

Thursday 15th September, 2016

09:00 – 10:00 **Keynote** by Eitan Altman (INRIA Sophia Antipolis, France)
Dynamic Games for Analyzing Competition in the Internet

10:00 – 10:30 Full Demo 3: *LiveTalk: A Framework for Collaborative Browser-Based Replicated-Computation Applications* by Matthew Hemmings; Daniel Ingalls; Robert Krahn; Rick McGeer; Glenn Ricart; Marko Röder; Ulrike Stege

10:30 – 11:00 Coffee break

11:00 – 12:20 **Session 7.A: Measurements**
IntegraTag: a Framework for High-Fidelity Web Client Measurement by Charles Thomas; Jeff Kline; Paul Barford

CLUE: Clustering for Mining Web URLs by Andrea Morichetta; Enrico Bocchi; Hassan Metwalley; Marco Mellia

Testing for Traffic Differentiation with ChkDiff: The Downstream Case by Riccardo Ravaioli; Guillaume Urvoy-Keller; Chadi Barakat

Session 7.B: Caching
ModelGraft: Accurate, Scalable, and Flexible Performance Evaluation of General Cache Networks by Michele Tortelli; Dario Rossi; Emilio Leonardi

Distributed Algorithms for Content Caching in Mobile Backhaul Networks by Valentino Pacifici; Slađana Jošilo; György Dán

Performance Evaluation for New Web Caching Strategies Combining LRU with Score Based Object Selection by Gerhard Hasslinger; Kostas Ntougias; Frank Hasslinger; Oliver Hohlfeld

12:20 – 13:45 Lunch

13:45 – 15:15 **Session 8: Virtualization**
A Power Efficient and Robust Virtual Network Functions Placement Problem by Antonio Marotta; Andreas J. Kassler

Elastic Network Service Provisioning with VNF Auctioning by Mathis Obadia; Mathieu Bouet; Vania Conan; Luigi Iannone; Jean-Louis Rougier

15:15 – 15:45 Closing Session

Workshop on Programmability for Cloud Networks and Applications (PROCON)

Monday 12th September, 2016

11:00 – 12:00	**Keynote** by Robert Birke (IBM Research – Zurich, Switzerland) *Ensuring Performance in the Virtual Environment*
12:00 – 12:30	*ZOOM: Lightweight SDN-based Elephant Detection* by Steffen Gebert; Stefan Geißler; Thomas Zinner; Anh Nguyen-Ngoc; Stanislav Lange; Phuoc Tran-Gia
12:30 – 13:00	Short Lunch & Coffee Break
13:00 – 14:30	*A Novel Reconfigurable-by-Design Highly Distributed Applications Development Paradigm Over Programmable Infrastructure* by Panagiotis Gouvas; Constantinos Vassilakis; Eleni Fotopoulou; Anastasios Zafeiropoulo *On the Necessity of Accounting for Resiliency in SFC* by Ghada Moualla; Thierry Turletti; Mathieu Bouet; Damien Saucez *Automated Decision Making Methods for the Multi-objective Optimization Task of Cloud Service Placement* by Michael Seufert; Stanislav Lange; Markus Meixner
14:30 – 15:00	Coffee Break
15:00 – 15:30	Invited Demonstration & Live Talk: *An SDN/NFV Telco Operator Platform for Multipoint Video Live Streaming: Design and Prototyping* by Giovanni Schembra; Marcello Natale Melita
15:30 – 16:30	*OpenVolcano: An Open-Source Software Platform for Fog Computing* by Roberto Bruschi; Paolo Lago; Guerino Lamanna; Chiara Lombardo; Sergio Mangialardi *An Analytical Model to Design Processor Sharing for SDN/NFV Nodes* by Giuseppe Faraci; Alfio Lombardo; Giovanni Schembra
16:30 – 16:45	Closing

2016 International Workshop on Quality of Experience Centric Management (QCMan)

Friday 16th September, 2016

09:00 – 10:00	**Keynote** by Alexander Raake (TU Ilmenau, Germany) *What's the Number? Monitoring IP-based Video with Standardized QoE Models*
10:00 – 10:30	*Multi-Agent Systems for Personalized QoE-Management* by Amro Najjar; Xavier Serpaggi; Christophe Gravier; Olivier Boissier
10:30 – 11:00	Coffee Break
11:00 – 12:30	*YouTube Can Do Better: Getting the Most Out of Video Adaptation* by Christian Moldovan; Christian Sieber; Poul Heegaard; Wolfgang Kellerer; Tobias Hoßfeld *Towards a Framework for Comparing Application-Network Interaction Mechanisms* by Susanna Schwarzmann; Thomas Zinner; Ognjen Dobrijević *Impact of Variances on the QoE in Video Streaming* by Christian Moldovan; Tobias Hoßfeld
12:30 – 13:30	Lunch
13:30 – 14:00	*Application-Aware Infrastructure Clustering for Cloud Service Placement to Enhance User QoE* by Dmitrii Chemodanov; Prasad Calyam
14:00 – 14:40	Short Paper: *Insensitivity to Network Delay: Minecraft Gaming Experience of Casual Gamers* by Oliver Hohlfeld; Hannes Fiedler; Enric Pujol; Dennis Guse Short Paper: *Correlating QoE and Technical Parameters of an SAP System in an Enterprise Environment* by Kathrin Borchert; Matthias Hirth; Thomas Zinner; Decebal Constantin Mocanu
14:40 – 15:00	Coffee Break
15:00 – 16:00	Panel: *What Are Challenges in Managing the QoE of the Upcoming Wave of Immersive Media-rich Applications?*
16:00 – 16:15	Closing

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