International Teletraffic Congress

ITC 30 – Teletraffic in a Smart World

4 – 7 September 2018

Vienna, Austria

International Teletraffic Congress ITC 30

Conference Program at at Glance

	Tue, Sept. 4	Wed, Sept. 5	Thu, Sept. 6	Fri, Sept. 7
08:30	Registration	Registration	Registration	Registration
09:00	Opening and Keynote *HS1*	Vision Day Session A *HS1*	Technical Session 6: Wireless & Cellular Networks *HS1*	NetCal 2018 Opening & Keynote *HS2*
10:00				Coffee Break
	Coffee Break	Coffee Break	Coffee Break	Session I: Applications *HS2*
11:00	Technical Session 1: Performance Evaluation *HS1*	Young Researchers Session *HS1*	Technical Session 7: Network Measurements *HS1*	
12:00				
13:00	Lunch Break *2nd floor*	Lunch Break *Stiegl-Ambulanz (University Campus)*	Lunch Break *2nd floor*	Lunch Break *2nd floor*
				Session II: Service and Arrival Characterizations *HS2*
14:00	Technical Session 2: Mobile Edge Computing *HS1*	Vision Day Session B *HS1*	Technical Session 8: Network Architectures & Paradigms *HS1*	
15:00				Coffee Break
	Coffee Break		Coffee Break	Session III: Analysis Techniques *HS2*
16:00	Technical Session 3: PhD Paper Session & Madness Session *HS1*	Coffee Break	Technical Session 9: Application Scenarios *HS1*	
		ITC Award Session *HS1*		Closing
17:00			Farewell	
18:00				
19:00	Welcome Reception and Concert *Palais Eschenbach*			
20:00		Conference Dinner *City Hall*		

Welcome Message from the General Co-Chairs

On behalf of the Organizing Committee, we are delighted to welcome you to the 30th International Teletraffic Congress (ITC 30) to be held on September 4-7, 2018, at the University of Vienna, Austria.

ITC was founded back in 1955 by enthusiastic scientists and engineers who were willing to deploy networks holistically. Since then, it has established a multi-decade tradition as the primary forum for presenting and discussing the latest technical advances in the broad areas of teletraffic models, network systems, and measurements. Its inherent roots in solid methodological foundations have allowed ITC to adapt constantly its technological focus without losing its original identity. Today, ITC continues to serve as a broad and lively community for researchers and practitioners dedicated to advancing the limits of knowledge in networking.

ITC 30 focuses on the future smart world and how to build it using recent advances in networking science & practice, including key challenges arising from the upcoming interconnection of massive numbers of devices, sensors, and human beings. Cutting-edge papers spanning both theory and experimentation will address all areas of networking, ranging from traffic engineering and control with application also to emerging softwarized/virtualized network paradigms, up to innovative wireless scenarios around the emergence of 5G and IoT systems. Moreover, it aims to bridge the gap between performance modeling and real-life operational aspects, e.g. by leveraging measurement data to provide a better understanding of the wired and wireless networks' operation under realistic conditions.

We are happy that **Debasis Mitra** discusses the future smart world in his keynote on "An Engineer's Perspective on Some Societal Problems". In his view, engineers rely on models, analysis and model-based experimentation to explore societal problems, like the role of knowledge, its nurture and impact in high-tech industries, the survival of Best Effort services in the Internet in an uncertain regulatory environment, or inter-organizational content delivery in an increasingly content-centric Internet.

As one of the highlights of ITC 30, the **ITC 30 Networking Science Vision Day** will bring together top experts from the networking community discussing views and visions on the future smart world and the role of networking research in it. The key question is "Networking Science - Where Are We Heading To?", and **Piet Van Mieghem** will start with a survey on "Network Science and Telecommunications", providing his personal view on the history of Network Science and its fascinations, and discussing the epidemic spread on networks as a way of diffusing information in a network. **Mikaël Touati** focuses on "Networks and Market Mechanisms", in particular, mechanisms used to match, allocate or trade resources in markets and surveys mechanisms with and without money, their use-cases, properties and solution concepts. **Philippe Jacquet** will talk on "Wireless and the City". Despite being the place where the majority of the human population lives and interacts, cities are in general among the worst environments for radio communication. Hence, this talk reviews the theories of wireless networks at the scale of a full city. **Alexandre Proutière** considers "Data-driven Decisions in Communication Systems", surveying recent advances in the use of online learning methods on the design of optimal radio access protocols in wireless networks as well as enhanced resource allocation schemes for better Quality of Experience. The Vision Day will be chaired by **Helmut Leopold**, Head of the Center for Digital Safety & Security at the Austrian Institute of Technology, who will bring in his broad experience in the field and thus will additionally stimulate the discussions, which are complemented by the perspectives of young researchers as well as a session on doctoral dissertations.

The Network Science Vision Day will be closed by the **ITC 30 Award Session** in which the ITC Rising Scholar Award and the Arne Jensen Lifetime Achievement Awards will be given to the recipients. The **ITC Rising Scholar Award** has been created in order to recognize young researchers with significant contributions to the ITC Community in the field of performance, traffic modeling, and control in communication networks and networking science, and will be delivered to **Arpan Mukhopadhyay**. The **Arne Jensen Lifetime Achievement Award** is given to an individual who has provided an exceptional contribution to traffic modeling, control and performance, and dedication to the teletraffic community. We are extremely happy to congratulate **Luigi Fratta** for receiving this prestigious award.

This year's ITC is arranged around four different areas: Performance Evaluation, Control and Optimization Chairs; Network Measurements and Big Data; Networking Architectures and Paradigms; and Wireless and Cellular Networks. The ITC technical program contains 18 full papers and 5 demo and poster papers across these areas. ITC 30 has a dedicated session with 5 accepted papers on doctoral dissertations which are related to the ITC topics in the field of performance, traffic modeling, and control in communication networks and networking science. This session gives PhD students a forum to present their ideas to a larger audience during the main conference. In addition, 2 PhD work-in-progress papers will be presented as part of the ITC conference. We would like to thank the chairs of the PhD session: Ramón Agüero, Thomas Bauschert, Ognjen Dobrijević, and Andreas Timm-Giel.

In addition to the ITC conference, we also sponsor a workshop dedicated to **"Network Calculus and Applications" (NetCal 2018)**. Network Calculus is a branch of queueing theory which aims at exploring the bounding behavior for queues. The workshop is composed of 10 original papers reporting mature or early-stage results in network calculus theory and its applications to different areas. **Jean-Yves Le Boudec** will give a keynote talk on "Network Calculus: From Integrated Services to Deterministic Networking". We would like to thank the workshop organizers for this successful event at ITC: Yuming Jiang, Jens Schmitt, and Markus Fidler.

We also thank ITC's International Advisory Committee (IAC) for their support of student travel grants and best paper awards, as well as IFIP TC6 WG6.6 for sponsoring additional student travel grants. ITC 30 has set up two prestigious awards: The **Best Paper Award** will be granted to the best contribution presented at ITC 30, while 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. These awards will be selected based on the scientific merit of the publication as well as the quality of the oral presentation at ITC 30.

A successful conference requires the tireless dedication of many people. We would like to especially recognize the never-ending efforts of the three TPC Co-Chairs Eitan Altman, Giuseppe Bianchi, and Thomas Zinner, who have done a magnificent job in compiling an excellent technical program and who have put a lot of efforts and personal enthusiasm to make ITC 30 a lively and attractive event. Thank you so much!

Our thanks go to the Workshop Chairs Chiara Buratti and Poul Heegaard, and to the Demo and Poster Chairs Michael Jarschel and Corinna Schmitt for all their efforts. We thank Christopher Metter and Florian Metzger, who have served as Web & EDAS Co-Chairs. Ravi Mazumdar as Award Chair will lead the best paper award selection process. Prosper Chemouil organized the student travel grant jury and reviewed the student travel grant applications. Our Publicity Co-Chairs Pedro Casas, Frank Restuccia and Sheng Zhou have done a great job in disseminating information about ITC 30 throughout the world. Our Publication Co-Chairs Matthias Hirth and Lea Skorin-Kapov very efficiently organized the publication process with the CPS publisher and the technical sponsorship with IEEE ComSoc and ACM SIGCOMM. And our special thanks go to Michela Meo as International Advisory Council Chair of ITC.

We greatly appreciate everyone who submitted papers to the conference, particularly those who will be presenting their work at ITC 30. The IEEE, IEEE Communications Society, IFIP, and the Information Technology Society within VDE (ITG VDE) kindly agreed to technically co-sponsor ITC 30, and ACM SIGCOMM helped us through their in-cooperation agreement. Last but not least we are very grateful for the financial support by the Faculty of Computer Science of University of Vienna, as well as the Austrian Electrotechnical Association (OVE) and the City of Vienna for their generous support with organizing the social events. And of course, we thank all members of the COSY Research Group of University of Vienna for the local arrangements.

Having finished all preparations, we are now looking forward to a wonderful scientific event in a magnificent city, and would like to cordially welcome all participants of ITC 30 here in Vienna!

Peter Reichl (University of Vienna, Austria)   *Tobias Hoßfeld (University of Würzburg, Germany)*

Tuesday, September 4, 2018

08:30 – 09:00   **Registration and Get together**

09:00 – 10:30   **Opening and Keynote**
(Chair: Peter Reichl)

Debasis Mitra (Columbia University New York, USA):
An Engineer's Perspective on Some Societal Problems

10:30 – 11:00   **Coffee Break**

11:00 – 12:30   **Technical Session 1: Performance Evaluation**
(Chair: Udo Krieger)

Esa Hyytiä, Rhonda Righter: Evaluating Rare Events in Mission Critical Dispatching Systems

Mark Akselrod, Markus Fidler: Statistical Delay Bounds for Automatic Repeat Request Protocols with Pipelining

Samuli Aalto, Pasi Lassila: Whittle Index Approach to Energy-aware Dispatching

Thirupathaiah Vasantam, Ravi Mazumdar: On Occupancy Based Randomized Routing Schemes in Large Systems of Shared Servers

12:30 – 14:00   **Lunch Break (2nd Floor)**

14:00 – 15:30   **Technical Session 2: Mobile Edge Computing**
(Chair: Giuseppe Bianchi)

Youngmi Jin, Michiaki Hayashi, Atsushi Tagami: Online Algorithms for Cost-effective Cloud Selection with Multiple Demands

Oliver Hohlfeld, Jens Helge Reelfs, Jan Rüth, Florian Schmidt, Torsten Zimmermann, Jens Hiller, Klaus Wehrle: Application-Agnostic Offloading of Datagram Processing

Marcel Enguehard, Giovanna Carofiglio, Dario Rossi: A Popularity-based Approach for Effective Cloud Offload in Fog Clusters

Peiyue Zhao, György Dán: Time Constrained Service-aware Migration of Virtualized Services for Mobile Edge Computing

15:30 – 16:00   **Coffee Break**

16:00 – 17:00   **Technical Session 3: PhD Paper Session**
(Chair: Corinna Schmitt)

Christian Moldovan, Tobias Hoßfeld, Poul E. Heegaard, Lea Skorin-Kapov:
Optimal Fairness and Quality in Video Streaming With Multiple Users

Vivian Noronha, Thomas Bauschert, Ekkehard Lang, Maximilian Riegel:
Performance Evaluation of Virtualization on Embedded Microprocessors

17:00 – 17:30   **Madness Session**

Anika Schwind, Michael Seufert: WhatsAnalyzer: a Tool for Collecting and
Analyzing WhatsApp Mobile Messaging Communication Data

*Joris Heyse, Maria Torres Vega, Tim Wauters, Femke De Backere,
Filip De Turck:* Effects of Adaptive Streaming Optimizations on the
Perception of 360° Virtual Reality Video

Florian Metzger, Roman Heger: Exploring the Transmission Behaviour of
Overwatch: The Source of Lag

Stefan Geissler, Stanislav Lange, Florian Wamser, Tobias Hoßfeld:
Deriving YouTube Playout Phases from Encrypted Packet Level Traffic

*Zhenmin Li, Renshi Fan, Du Gao-Ming, Yifan Cao, Zhonghai Lu,
Gao Ming-Lun:* RB-OLITS: A Worst-case Reorder Buffer Size Reduction
Method for 3D-NoC based on Ohm's Law-like Traffic Splitting

17:45   **Walk along Ringstrasse (approx. 45 mins)**
Meeting point in front of the faculty building

18:30 – 20:30   **Welcome Reception and Gala Concert at Palais Eschenbach
(Eschenbachgasse 9, 1010 Vienna) ***

"Belcanto – A Night at the Opera"

Marena Balinova sings famous arias from operas by Vincenzo Bellini,
Gaetano Donizetti and Giuseppe Verdi

Wednesday, September 5, 2018
ITC Vision Day 2018: "Networking Science - Where Are We Heading To?"

08:30 – 09:00   **Registration**

09:00 – 10:30   **Vision Day Session A**
(Introduction and moderation: Helmut Leopold, AIT)

Piet Van Mieghem (TU Delft):
Network Science and Telecommunications

Mikaël Touati (Orange Labs):
Networks and Market Mechanisms

10:30 – 11:00   **Coffee Break**

11:00 – 12:30   **Young Researchers' Session**
(Chair: Tobias Hoßfeld)

Ronald Romero Reyes, Thomas Bauschert: Online Resource Allocation in Dynamic Optical Networks

Stanislav Lange: Optimization of Controller Placement and Information Flow in Softwarized Networks

Decebal Constantin Mocanu: Network Computations in Artificial Intelligence

Maria Torres Vega, Antonio Liotta: Cognitive Real-time QoE Management of Video Streaming Services

Daniela Renga, Michela Meo: From Self-sustainable Green Mobile Networks to Enhanced Interaction with the Smart Grid

12:30 – 14:30   **Lunch at "Stiegl Ambulanz" (University Campus)**

14:30 – 16:00   **Vision Day Session B**
(Introduction and moderation: Helmut Leopold, AIT)

Philippe Jacquet (Nokia Bell Labs):
Wireless and the City

Alexandre Proutière (KTH Stockholm):
Data-driven Decisions in Communication Systems

16:00 – 16:30   **Coffee Break: Poster and Demo Session**

16:30 – 17:30   **ITC Award Session**
(Chair: Michela Meo)

ITC Rising Scholar Award 2018: *Arpan Mukhopadhyay (EPFL Lausanne)*
Algorithms for Large Networks: An Asymptotic Approach

Arne Jensen Lifetime Achievement Award:
Luigi Fratta (Politecnico di Milano)
All Around Internet: Past, Present and Future

19:30   **Mayor's Reception and Conference Dinner at Vienna City Hall**
(Stadtsenatssitzungssaal, Feststiege I) *

Thursday, September 6, 2018

08:30 – 09:00   **Registration**

09:00 – 10:30   **Technical Session 6: Wireless and Cellular Networks**
(Chair: Ravi R. Mazumdar)

Antonia Maria Masucci, Philippe Olivier, Alain Simonian: Performance Evaluation of Scheduling Schemes for D2D Communications

Zhiyuan Jiang, Bhaskar Krishnamachari, Sheng Zhou, Zhisheng Niu: Can Decentralized Status Update Achieve Universally Near-Optimal Age-of-Information in Wireless Multiaccess Channels?

Ish K. Jain, Rajeev Kumar, Shivendra Panwar: Limited by Capacity or Blockage? A Millimeter Wave Blockage Analysis

Ilenia Tinnirello; Domenico Garlisi; Fabrizio Giuliano: Enabling a Win-Win Coexistence Mechanism for WiFi and LTE in Unlicensed Bands

10:30 – 11:00   **Coffee Break**

11:00 – 12:30   **Technical Session 7: Network Measurements**
(Chair: Thomas Zinner)

Runa Barik, Michael Welzl, Ahmed Mustafa Elmokashfi, Thomas Dreibholz, Stein Gjessing: Can WebRTC QoS Work? A DSCP Measurement Study

Andrea Morichetta; Marco Mellia: LENTA: Longitudinal Exploration for Network Traffic Analysis

Ramakrishnan Durairajan, Sathiya Kumaran Mani, Paul Barford, Robert Nowak, Joel Sommers: TimeWeaver: Opportunistic One Way Delay Measurement via NTP

Antonio Cianfrani, Marco Polverini, Trupti Nalawade: A Heuristic Approach to Assess the Traffic Matrix of an ISP exploiting Segment Routing

12:30 – 14:00   **Lunch Break (2nd Floor)**

14:00 – 15:30   **Technical Session 8: Network Architectures and Paradigms**
(Chair: Poul Heegaard)

Mark Schmidt, Andreas Stockmayer, Florian Heimgaertner, Michael Menth: A Semi-Virtualized Testbed Cluster with a Centralized Server for Networking Education

Dominik Scholz, Daniel Raumer, Paul Emmerich, Alexander Kurtz, Krzysztof Lesiak, Georg Carle: Performance Implications of Packet Filtering with Linux eBPF

Habtegebreil Haile, Anna Brunstrom, Karl-Johan Grinnemo, Per Hurtig, Eneko Atxutegi, Fidel Liberal,Åke Arvidsson: Impact of TCP BBR on CUBIC Traffic: A Mixed Workload Evaluation

Lam Dinh-Xuan, Michael Seufert, Florian Wamser,Constantinos Vassilakis,Anastasios Zafeiropoulos, Phuoc Tran-Gia: Performance Evaluation of Service Functions Chain Placement Algorithms in Edge Cloud

15:30 – 16:00   **Coffee Break**

16:00 – 17:00   **Technical Session 9: Application Scenarios**
(Chair: Florian Metzger)

Jan Willem Kleinrouweler, Britta Meixner, Joost W Bosman, Hans van den Berg, Rob van der Mei, Pablo Cesar: Improving Mobile Video Quality Through Predictive Channel Quality Based Buffering

Nikolaos Pappas, Ioannis Dimitriou, Zheng Chen: Network-level Cooperation in Random Access IoT Networks with Aggregators

17:00 – 17:30   **Farewell**

Friday, September 7, 2018

International Workshop on Network Calculus and Applications (NetCal 2018)

08:30 – 09:00   Registration

09:00 – 09:15   Opening

09:15 – 10:15   Keynote

Jean-Yves Le Boudec (EPFL Lausanne):
Network Calculus: From Integrated Services to Deterministic Networking

10:15 – 10:30   Coffee Break

10:30 – 12:30   Session I: Applications

E. Mohammadpour, Eleni G. Stai, Maaz Mohiuddin, Jean-Yves Le Boudec: Latency and Backlog Bounds in Time-Sensitive Networking with Credit Based Shapers and Asynchronous Traffic Shaping

Sounak Kar, Amr Rizk, Markus Fidler: Multi-interface Communication: Interface Selection under Statistical Performance Constraints

Sami Akin: Energy Management in Wireless Communications with Energy Storage Imperfections

Mark Akselrod, Markus Fidler, Ralf Lübben: Stochastic Guarantees for Rate-Adaptive Streaming

12:30 – 13:30   Lunch Break

13:30 – 15:00   Session II: Service and Arrival Characterizations

Jorg Liebeherr: A Fluid-Flow Interpretation of SCED Scheduling

Almut Burchard, Jorg Liebeherr: A General Per-Flow Service Curve for GPS

Paul Nikolaus; Sebastian Henningsen; Michael A. Beck; Jens Schmitt: Integrating Fractional Brownian Motion Arrivals into the Statistical Network Calculus

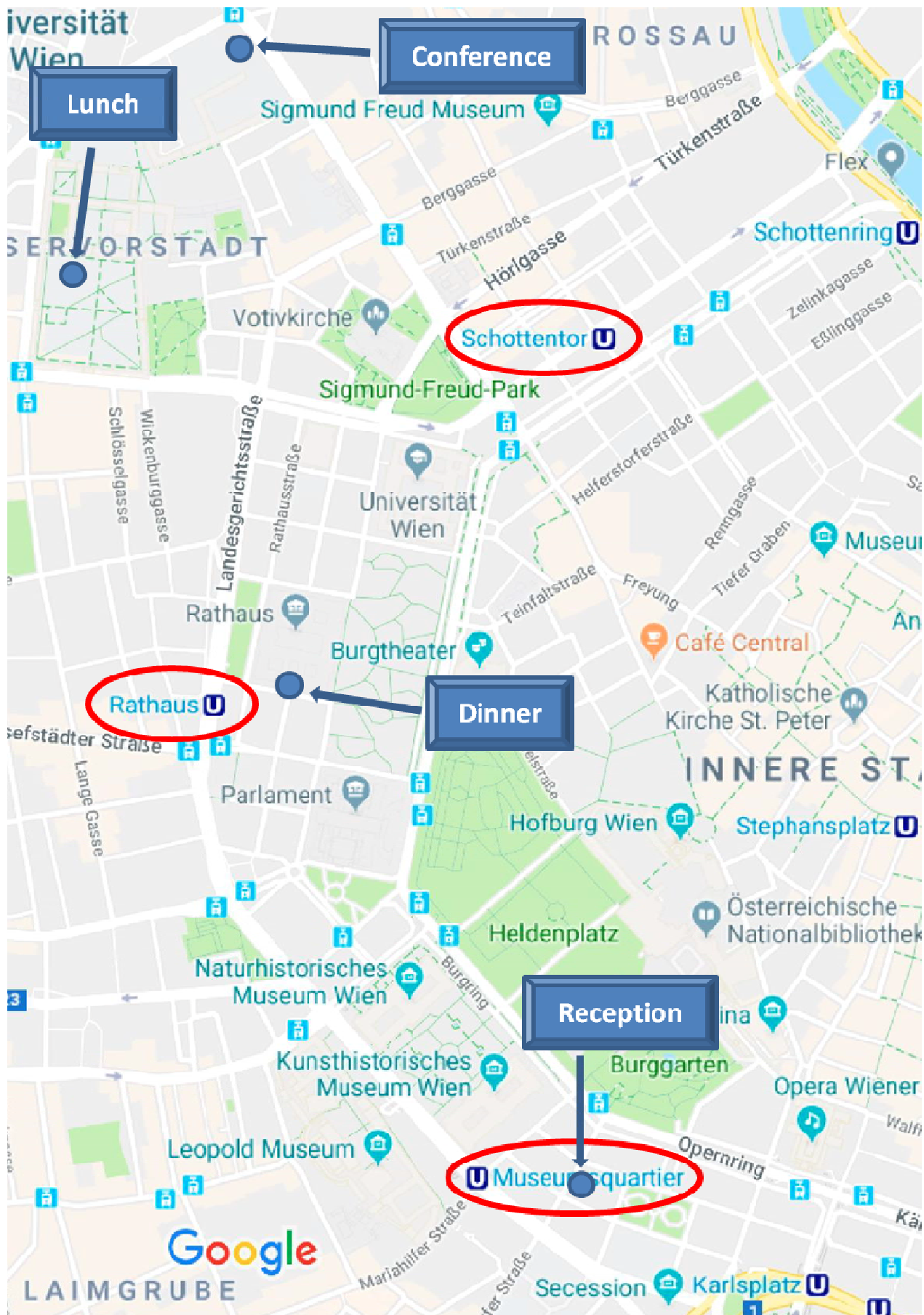**15:00 – 15:15   Coffee Break**

15:15 – 16:45   Session III: Analysis Techniques

Fabien Geyer, Georg Carle: The Case for a Network Calculus Heuristic: Using Insights from Data for Tighter Bounds

Anne Bouillard, Céline Comte, Élie de Panafieu, Fabien Mathieu: On Kernels and Queues: When Network Calculus Meets Analytic Combinatorics

Fabrice M. Guillemin, Ravi R. Mazumdar, Catherine Rosenberg, Yu Ying: Network Calculus for Mean Delay Analysis through a Network

16:45 – 17:00   Closing

http://itc30.org

https://cosy.cs.univie.ac.at