**COMMUNICATIONS SYSTEMS
INTEGRATION AND MODELING
TECHNICAL COMMITTEE (CSIM-TC)**

NEWSLETTER

Christos Verikoukis (Chair)
Dzmitry Kliazovich (Vice-chair)
Burak Kantarci (Secretary)

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ABOUT CSIM

The Communications Systems Integration and Modeling technical committee focus its activities on simulation, analytical tools and measurement of communications links and networks. CSIM has been sponsoring activities on traffic modeling, performance and integration of next generation wireless and wireline networks.

CSIM sponsors its traditional bi-annual workshop CAMAD, as well as special issues in the IEEE Communications Magazine and in the IEEE Journal on Selected Areas in Communications. CSIM is very active in ICC and in GLOBECOM and was one of the co-founders of MILCOM. CSIM has its roots on the Communications Systems Engineering Technical committee and its past chairs are:

2015-now – Christos Verikoukis

2013-2015 – Stefano Giordano

2011-2013 – Harry Skianis

2009-2011 – Fabrizio Granelli

2007-2009 – Pascal Lorenz

2005-2007 – Nelson L.S. da Fonseca

2002-2005 – Mike Devetsikiotis

2000-2002 – Mohammad Ilyas

1999-2000 – Hussein Mouftah

1996-1999 – Guy Omydar

1994-1996 – Bill Tranter

For more information : http://sites.ieee.org/tc-csim/

1. Short Courses / Invited Talks/ Tutorials by CSIM Members

Distinguished Lecture Tour on 5G Networks
Guatemala, Salvadir, Mexico, March-April, 2017
By Dr. Albert Banchs Universidad Carlos III de Madrid

During the visit Guatemala, Salvador and Mexico, Dr. Banchsdelivered a total of seven talks to different audiences (undergrad, postgrad and industry) in a variety of venues (univeristies, conferences, hotels) on the following topics: (i) 5G networks, (ii) traffic offloading techniques, and (iii) mechanisms to prevent malicious behaviors in networks. There was a great interest from the audience in all these three topics, and they were specially interested in the current resarch and innovation that is ongoing in Europe in the area of 5G networks, where Dr. Banchs was participating in two major projects defining the future 5G architecture. The interaction was very fruitful with highly motivated students, very active Professors as well as some of the members of the local ICT industry.

A poster of Dr .Banchs talk during the Distinguished lecture tour is seen above.

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4G+ and Pre-5G Event in Qatar
(by Prof. Nizar Zorba, Qatar University)

The CSIM team within Qatar University (+20 members and led by Dr. Nizar Zorba) has organized a visit to local network provider Ooredoo to see their new equipment on 4G+ and pre-5G as well as their expected benefits from them. The team first visited Ooredoo headquarter in West Bay-Doha to listen and discuss with the innovations team at Ooredoo

about recent advances in their network, where the students had the opportunity to visit the OASIS lab. Then they moved to a major cellular site to get in touch with equipment and how old ones are being replaced by new ones. Many students within the IEEE students' branch attended the visit and showed high interest in the presented topics.

A picture from the visit of the CSIM team in Qatar is seen above.

Tutorial Connected Electric Vehicles, Vehicle-to-Grid and Grid-to-Vehicle Applications

Hussein Mouftah and Melike Erol-Kantarci @ IEEE Canadian Conference on Electrical and Computer Engineering, Windsor, ON, 30 April 2017

The speakers provided a comprehensive background on electric vehicles, batteries, electric vehicle supply equipment types, charging properties, in addition to fundamentals of operation of the generation, transmission and distribution in the smart grid. Then, they led the audience to the challenges of electric vehicle charging with in-depth presentation on its impacts on supply, ramping, renewable energy integration, regulation and distribution equipment (transformers, feeders, protection switches, etc.). They also introduced the opportunities when charging occurs overnight and reduces start-up and ramping costs in the next morning and discuss the options of using electric vehicle batteries as a resource in the smart grid. In the second part of the tutorial, the speakers presented the communication technologies and networks that are used for connecting electric vehicles to the smart grid communication networks. Both vehicle to charging station communications as well as charging station to smart grid communications were presented alog with wireless, powerline, Ethernet and optical-wireless solutions. Furthermore, the state-of-the-art research in

architectures and analytical models for G2V and V2G applications were introduced in detail in the last part of the tutorial. Aggregator architectures, queuing models, network calculus, optimization-based studies, algorithms and many other solutions from academia and industry were introduced. As a natural extension of VANETs, Connected Electric Vehicles (CEVs) and adoption of VANET technologies in CEVs were discussed thoroughly. The speakers also presented open issues and future directions which will give valuable hints for those who are willing to pursue cutting-edge research in the electric vehicle and smart grid domains.

2. Upcoming Events

CSIM's Flagship Event: **22nd IEEE International Workshop on Computer-Aided Modeling Analysis and Design of Communication Links and Networks (CAMAD)**

IEEE CAMAD 2017 will be held as a stand-alone event at Lund University, in Scania, Sweden. This year IEEE CAMAD will focus on communication aspects of 5G Networking and beyond. IEEE CAMAD will be hosting several Workshops and Special Sessions, bringing together a diverse group of scientists, engineers, manufacturers and providers to exchange and share their experiences and new ideas focusing on research and innovation results under wireless communications in the 5G domain. In addition to contributed papers, the conference will also include keynote speeches, panel and demo sessions. Paper selection process has been completed.

For more information, visist: http://www.ieee-camad.org/

General Chairs
Björn Landfeldt, Lund University, Sweden
Christos Verikoukis, CTTC, Spain
Björn Ekelund, Ericsson, Sweden
Peter C. Karlsson, Sony, Sweden
Technical Program Chairs
Di Yuan, Linköping University, Sweden

Petar Popovski, Aalborg University, Denmark
George Koudouridis , Huawei, Sweden
Charalabos Skianis, University of the Aegean, Greece

The 27th International Telecommunication Networks and Applications Conference (ITNAC 2017)

The 27th International Telecommunication Networks and Applications Conference (ITNAC 2017) is to be held in Melbourne, Australia between 22-24 November 2017 and is technically co-sponsored by the IEEE. CSIM-TC has been a supporter of the International Telecommunication Networks and Applications Conference for some years ITNAC has a long history of promoting the dissemination of papers covering simulation technologies particularly focused on telecommunications and networking. In 2017, as part of the ITNAC program, RMIT University will be hosting workshops on software defined networking and modelling and simulation. RMIT University is located in the Melbourne CBD near the conference venue. Melbourne is the world's most livable city, so if you're looking for an opportunity to see what this means and to submit a paper or get involved with the workshops then visit the website http://www.itnac.org.au/

3. **Ongoing Research projects**

SPOTLIGHT: A European Training Network for Beyond 2020 Mobile Data Networks

Coordinator: ETHNIKO KAI KAPODISTRIAKO PANEPISTIMIO ATHINON, Greece
Participants: IQUADRAT INFORMATICA, Spain; ERICSSON Sweden; NESSOS OLOKLIROMENON LISEON KAI SISTIMATON PLIROFORIKIS Greece; NEC EUROPE United Kingdom; EURECOM France; UNIVERSITY OF YORK United Kingdom; MTN CYPRUS LIMITED Cyprus; FUNDACIO PER A LA UNIVERSITAT OBERTA DE CATALUNYA Spain; POLITECNICO DI MILANO Italy

SPOTLIGHT is a H2020 Innovative Training Network (ITN) project, recently launched on January 2017. SPOTLIGHT is currently recruiting 15 Early Stage Researchers (ESRs), to create a fully integrated and multi-disciplinary network that will analyze, design, and optimize the performance of a disruptive new mobile network architecture: the SPOTLIGHT architecture. The SPOTLIGHT consortium is formed by 4 universities, 1 research center and 5 private companies, spanning across 8 European countries, which will join their expertise and complementary background to offer high-quality training opportunities to the recruited ESRs. The ESR enrollments are under very attractive employment conditions and competitive salaries offered by the MSCA ITN programme. The selected candidates will join top-class research groups and have a unique opportunity to pursue a career in mobile communications. Working in this ambitious research project could lead to the successful completion of a doctoral degree, together with a very strong joint multidisciplinary research training program in the field of emerging mobile networks.

The SPOTLIGHT project aims to overcome some fundamental limitations stemming from the design of current mobile networks. In particular, mobile networks are driven to their limits due to the unprecedented growth in the number of connected devices and the volume of data traffic, as well as the stringent demands of emerging applications and services. In an effort to overcome these challenges, operators and researchers have aimed to develop radio access technologies (RATs) that boost physical-layer link capacity, utilize millimeter wave radio, or further densify network topology. Notable steps have also been made towards shifting baseband processing from the (currently) ultra dense network edge to a central location where coordinated resource management will be performed. However, despite these continuous advances in transmission and networking technologies, the mobile network ecosystem remains vastly heterogeneous, and under-organized, failing to fully exploit and efficiently coordinate the vast amount of available network resources.

Aiming to meet and surpass the requirements set for the 5G and beyond mobile data networks, the SPOTLIGHT project will design an innovative disruptive architecture based on the creation of a flat coalition of massively distributed transceivers utilizing a common pool of energy, radio, computing and storage resources that are optimally handled by a cloud-empowered network core. The primary aim will be to support for the first time self-

including yet ultra-reliable radio communications at the edge network. To further reduce response time and enhance network resilience, all functions necessary for mobile communications will be subject to i) massive parallelization in cloud platforms at the network core, and ii) big data analysis running on-top of a virtual pool of shared energy, radio, computing and storage resources at the network (fog-inspired network optimization).

The SPOTLIGHT architecture is expected to meet the following key measurable objectives:

- a 50% reduction of the aggregate processing, signaling and communication overhead, by employing massively distributed antenna systems and shifting control operations to the core network (instead of the currently loosely-interconnected and isolated in operation attachment points).

- 10 Gb/s peak data rate and 100 Mb/s cell-edge data rate support for 95% of the users, achieved by pooling and effectively orchestrating all available resources at the network edge, while optimizing processing with massive parallelization, empowered by cloud computing and big data analysis platforms.

- support for below 1 ms latency and high-speed mobility with near-zero overhead over large service areas, by transforming the dense and vastly overlapping collection of the today's different-purpose networking clusters to autonomous services areas with high spatial diversity.

NSF-SaTC: Energy efficient participatory data collection and Context-Aware Incentives for Trustworthy Crowdsensing via Mobile Social Networks
Burak Kantarci

This research builds on Dr. Kantarci`s research on cloud-centric IoT and sensing as a service, and the NSF CRII grant with the research project entitled "CRII:SaTC: Energy efficient participatory data collection and Context-Aware Incentives for Trustworthy Crowdsensing via Mobile Social Networks". The project is primarily pursued at Clarkson University. Since Burak Kantarci joined the University of Ottawa, he has still been actively directing the project on a courtesy appointment at Clarkson. The project is expected to be completed in March 2018.

In a crowdsensing system, energy efficient data collection is a primary concern for mobile sensing service providers (i.e., mobile users offering sensing as a service via built-in sensors on their mobile devices) in order to maximize battery life whereas trustworthiness is a primary concern for the end users. The proposed research will simultaneously address energy-efficient data collection and context-aware incentives to both minimize power consumption and maximize data trustworthiness. Furthermore, this research will propose new user-driven crowdsensing

business models where smart phone users compete with each other for compensation based on the usefulness and trustworthiness of their sensing data. The ultimate societal impacts of the research are new crowdsensing applications in the areas of public safety, disaster management and community engagement that will be enabled by improved energy-efficient data collection, increased crowdsending trustworthiness through context aware sensing, and new crowdsensing business models that will incentivize more users to offer their mobile device built-in sensors as a service.
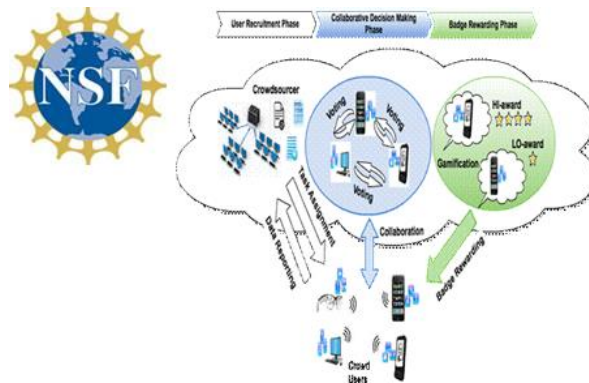
This research is extending the ongoing efforts on trustworthy crowdsensing to address energy efficient data collection and new context-aware user incentive strategies to improve data trustworthiness. In order to address energy efficient data collection, coalitional game theory-based algorithms will be proposed while trustworthiness of the aggregated system will be addressed by defining new trustworthiness functions and context analysis of mobile social networks of the sensing data providers. These methodologies will be validated through comparison to benchmark optimization models. Statistical and collaborative trust scores will be used to introduce new trustworthiness and reputation functions for sensing service providers. The new trustworthiness and reputation functions will mitigate the impact of adversaries including the Sybils who aim at misinformation and manipulation. An emphasis will be placed on compatibility with emerging mobile social network (MSN) models and their associated spatio-temporal context analyses. The research will be completed by building a framework which combines the merits of energy efficient data collection and context-aware user incentives.

4. **Special Issues Edited by CSIM members**
Special issue on Virtualization in 5G Networks
Journal of Wireless Communications and Mobile Computing

Lead Guest Editor

Fabrizio Granelli, University of Trento, Trento, Italy

Guest Editors

Akihiro Nakao, University of Tokyo, Tokyo, Japan

Christos Verikoukis, CTTC, Barcelona, Spain

Tarik Taleb, Aalto University, Espoo, Finland

(Fabrizio Granelli and Christos Verikoukis are the guest editors that are CSIM members.)

Manuscript Due Friday, 14 July 2017

First Round of Reviews Friday, 6 October 2017

Publication DateFriday, 1 December 2017

Research in wireless communications and networking is nowadays focused on the study and development of the next generation of cellular networks, the 5th Generation (5G). 5G is expected to provide an unprecedented step forward in terms of performance and service delivery, by merging the needs for massive wireless access with the requirements of Internet of Things and Tactile Internet scenarios. To achieve such goal, consensus is growing towards the need for an enhanced infrastructure with a high degree of flexibility and adaptability to service requirements. In this scenario, virtualization techniques represent a concrete solution for providing Quality of Service guarantees, service isolation, and real-time adaptation to service requirements.

Indeed, even though 5G is currently under development, it is widely acknowledged that 5G systems will be based on a heterogeneous networking infrastructure, thus requiring network function virtualization (NFV) and software defined networking (SDN) paradigms to enable proper abstracting and management of a diverse pool of resources. The introduction of NFV and SDN technologies within next-generation heterogeneous mobile networks will define new virtual network elements, each impacting the logic of the network management and operation, enabling the creation of new generation services with significantly higher data rates and lower delays. Such advances will introduce novel challenges in terms of design, operation, management, and security.

The purpose of this special issue is to present the most recent results on the specific research challenges related to virtualization in 5G networks. This includes all aspects related to the modeling, design, analysis, deployment, and management of virtualized 5G networks. The special issue will accept papers discussing recent outcomes in virtualization and programmability of wireless networks in general, efficient and flexible resource sharing, resource slicing in the wireless domain, and end-to-end, up to 5G standardization-specific aspects such as Cloud RAN architecture or network management and control.

High quality research papers or comprehensive reviews of recent advances in virtualization in 5G are welcome. We invite original contributions from both academia and industry that are not yet published or that are not currently under review by other journals or peer-reviewed conferences.

Potential topics include but are not limited to the following:

Virtualization and programmability in wireless access networks

Software-defined wireless networks

Network function virtualization in the wireless domain

Models and tools for design and optimization of virtualized cellular networks

Models and technologies for wireless infrastructure sharing

End-to-end 5G network slicing

Mobile virtual wireless networks modeling and design

Virtualized Radio Access Networks

Cloud RAN

Hybrid architectures of 5G with other wireless technologies (e.g., SDN/NFV satellite networks)

Virtualization in 5G networks for Fog Computing applications

Standards and resource description languages for virtual wireless networks

Service composition from heterogeneous physical resources

Network management and security in the virtualized domain

Standardization on virtualized 5G infrastructure and modules

Authors can submit their manuscripts through the Manuscript Tracking System at http://mts.hindawi.com/submit/journals/wcmc/v5gn/.

5. Job postings from CSIM members

15 ESR Positions - ITN SPOTLIGHT- posted by Elli Kartsakli

SPOTLIGHT, a newly launched European H2020 MSCA project offers fifteen (15) PhD positions in seven European countries. The project will work towards a 5G mobile networks architecture that aims to break performance limitations of the currently loosely inter-connected, resource-fragmented and isolated in operation mobile network ecosystem, by transforming the existing multi-layered set of attachment points to a flat coalition of massively distributed transceivers utilizing a common pool of energy, radio, computing and storage resources that are optimally handled by a cloud-empowered network core. More information on the project can be found here: http://cordis.europa.eu/project/rcn/205539_en.html

These enrollments of early stage researchers (ESRs) are under very attractive employment conditions and competitive salaries offered in MSCA Innovative Training Networks. The selected candidates will join top-class research groups and have a unique opportunity to pursue a career in mobile communications. Working in this ambitious research project, could lead to the successful completion of a doctoral degree, together with a very strong joint multidisciplinary research training program in the field of emerging mobile networks. The planned mobility among seven EU countries and ten institutions is a plus of these job positions.

Candidates must meet the following criteria: 1) be in the first four years (full-time equivalent research experience) of their research careers; 2) be of any nationality, but not having resided or carried out their main activity in the country of the host institution of the position they are applying to for more than 1 year in the past 3 years; 3) have not yet been awarded a PhD degree. More information on the positions and the application details can be found here: https://euraxess.ec.europa.eu/jobs/178608. The deadline is on May 31st 2017.

The available positions are:
ESR1 - Host institution: Eurecom - Project Title: Novel PHY techniques for fully-uncoordinated uplink transmissions in massively distributed MIMO systems with centralized processing
ESR2 - Host institution: Eurecom - Project Title: Low-complexity antenna design for massively distributed MIMO systems
ESR3 - Host institution: University of York - Project Title: Network coding and waveform design for concurrent downlink data delivery in massively distributed MIMO systems with centralized processing
ESR4 - Host institution: MTN - Project Title: Cognitive terminal-tracking and transmission profile selection schemes with partial information of the network topology
ESR5 - Host institution: Open Univ. of Catalonia - Project Title: Ultra-reliable data compression in massively distributed MIMO systems
ESR6 - Host institution: University of York - Project Title: Massive MIMO with 3D beamforming in the mmWave band
ESR7 - Host institution: Politecnico di Milano - Project Title: Cloud-empowered DSP exploiting big data
ESR8 - Host institution: Politecnico di Milano - Project Title: Cloud-empowered RRM using big data analysis feedback
ESR9 - Host institution: Iquadrat - Project Title: Mobility management and flow control in massively distributed MIMO

ESR10 - Host institution: NEC - Project Title: Flow-optimal routing of traffic in a plain IP mobile core network data-plane

ESR11 - Host institution: Nessos - Project Title: Coupling and pooling resources in loosely-coupled multi-layered networks

ESR12 - Host institution: Ericsson - Project Title: Resource elasticity in massively distributed and loosely-coupled MIMO systems

ESR13 - Host institution: Open Univ. of Catalonia - Project Title: Optimal strategies for popular content placement in massively distributed MIMO

ESR14 - Host institution: University of Athens - Project Title: Fountain-encoding techniques for improved QoE in massively distributed systems

ESR15 - Host institution: University of Athens - Project Title: Popular content delivery using massive machine type communications