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Program

Monday, September 7

Monday, September 7, 09:00 - 10:00

K1: Keynote 1

Perspectives on Software Defined Networking (SDN): origins and likely future

Professor Steve Uhlig

Room: G

SDN has been around now for a few years, bringing massive hopes of a revolution within the network. The revolution has not happened, despite some clear signs of evolution especially from the "northbound" area. In this talk, I will cover the origins of SDN, the current developments, and provide some perspective on its possible futures, with focus on the areas where its potential is most promising.

Monday, September 7, 10:30 - 12:30

S1: Special Session 1

Duplexing Techniques for 5G Networks

Room: B

Full-duplex transmission in small area radio communication systems

Kari Rikkinen, Visa Tapio and Hirley Alves (University of Oulu, Finland); Mohammed Al-Imari (Samsung R&D Institute UK, United Kingdom); Ali Cagatay Cirik (University of British Columbia, Canada); Jawad Seddar (Thales Communications & Security, France); Alok Sethi (University of Oulu, Finland); Björn Debaillie (IMEC, Belgium); Cristina Lavín (TTI, Spain)
pp. 1-5

Challenges and possibilities for flexible duplexing in 5G networks

Pekka Pirinen (University of Oulu, Finland)

pp. 6-10

On the Performance of Future Full-Duplex Relay Selection Networks

Mohammad Galal Khafagy and Mohamed-Slim Alouini (King Abdullah University of Science and Technology (KAUST), Saudi Arabia); Sonia Aïssa (INRS, University of Quebec, Canada)

pp. 11-16

Brief Survey on Full-Duplex Relaying and its Applications on 5G

Hirley Alves (University of Oulu, Finland); Richard Demo Souza (Federal University of Technology - Paraná (UTFPR), Brazil); Marcelo Eduardo Pellenz (Pontifical Catholic University of Paraná, Brazil)

pp. 17-21

An Energy-Scalable In-Band Full Duplex Architecture

Tom Vermeulen and Fernando Rosas (KU Leuven, Belgium); Barend van Liempd (IMEC, Belgium); Marian K. h. Verhelst (University of Leuven (KU Leuven), Belgium); Sofie Pollin (KU Leuven, Belgium)

pp. 22-26

T1: Technical Session 1

Room: J

DS-CDMA Assisted Visible Light Communications Systems

Chang He (University of Surrey, United Kingdom); Lie-Liang Yang (University of Southampton, United Kingdom); Pei Xiao and Muhammad Ali Imran (University of Surrey, United Kingdom)

pp. 27-32

Stochastic Modelling of Downlink Transmit Power in Wireless Cellular Networks

Boris Galkin and Jacek Kibiłda (Trinity College Dublin, Ireland); Luiz DaSilva (Trinity College & Trinity College Dublin, Ireland)

pp. 33-37

On The Optimal Number of Antennas for Power Efficient Generalized Spatial Modulation

Kaige Yang and Christos Masouros (University College London, United Kingdom)

pp. 38-42

Minimizing Queueing Delay through CDMA Uplink Power Control

Spyros Papafragkos and Antonis Dimakis (Athens University of Economics and Business, Greece)

pp. 43-48

Performance Evaluation and Comparison of Different Multicarrier Modulation Schemes

Adnan Zafar, Muhammad Ali Imran and Pei Xiao (University of Surrey, United Kingdom); Aijun Cao and Yonghong Gao (ZTE Wistron Telecom AB, Sweden)

pp. 49-53

Decentralized Q-Learning for Uplink Power Control

Sumayyah Dzulkifly (King's College London, United Kingdom); Lorenza Giupponi (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain); Fatin Said and Mischa Dohler (King's College London, United Kingdom)

pp. 54-58

Monday, September 7, 14:00 - 18:00

S2: Special Session 2a/b

Performance Analysis and Modelling for Large Scale 5G Wireless Networks

Room: B

Energy Efficiency in Energy Harvesting Cooperative Networks with Self-Energy Recycling

Shiyang Hu, Zhiguo Ding, Qiang Ni and Wenjuan Yu (Lancaster University, United Kingdom); Zhengyu Song (Beijing Institute of Technology, P.R. China)

pp. 59-63

Improved coded massive MIMO OFDM detection using LLRs derived from complex ratio distributions

Ali Jaber Al-Askery, Charalampos C. Tsimenidis, Said Boussakta and Jonathon Chambers (Newcastle University, United Kingdom)
pp. 64-68

Throughput and Backhaul Energy Efficiency Analysis in two-tier HetNets: A MultiObjective Approach

Haris Pervaiz (Lancaster University, United Kingdom); Zhengyu Song (Beijing Institute of Technology, P.R. China); Leila Musavian and Qiang Ni (Lancaster University, United Kingdom); Ge Xiaohu (Huazhong University of Science & Technology, P.R. China)
pp. 69-74

Software-Defined Architecture for Mobile Cloud in Device-to-Device Communication

Muhammad Usman, Anteneh A. Gebremariam and Fabrizio Granelli (University of Trento, Italy); Dzmitry Kliazovich (University of Luxembourg, Luxembourg)
pp. 75-79

A Hierarchical Rate Splitting Strategy for FDD Massive MIMO under Imperfect CSIT

Mingbo Dai (Imperial College London, United Kingdom); Bruno Clerckx (Imperial College London & Korea University, United Kingdom); David Gesbert (Eurecom Institute, France); Giuseppe Caire (Technische Universität Berlin, Germany)
pp. 80-84

Monday, September 7, 14:00 - 16:00

T2: Technical Session 2

Room: J

Bayesian Game analysis of a queueing system with multiple candidate servers

Anna Guglielmi (University of Padova, Italy); Leonardo Badia (Università degli Studi di Padova, Italy)
pp. 85-90

Epidemic Models using Resource Prediction Mechanism for Optimal Provision of Multimedia Services

Yiannos Kryftis and Constandinos X. Mavromoustakis (University of Nicosia, Cyprus); George Mastorakis (Technological Educational Institute of Crete, Greece); Jordi Mongay Batalla (Warsaw University of Technology & National Institute of Telecommunications, Poland); Periklis Chatzimisios (Alexander TEI of Thessaloniki, Greece)
pp. 91-96

Performance Analysis of C/U Split Hybrid Satellite Terrestrial Network for 5G Systems

Jiaxin Zhang (Beijing University of Posts and Telecommunications, P.R. China); Barry Evans and Muhammad Ali Imran (University of Surrey, United Kingdom); Xing Zhang and Wenbo Wang (Beijing University of Posts and Telecommunications, P.R. China)

pp. 97-102

Radio Resource Allocation and System-Level Evaluation for Full-Duplex Systems

Mohammed Al-Imari (Samsung R&D Institute UK, United Kingdom); Mir Ghoraiishi and Pei Xiao (University of Surrey, United Kingdom)

pp. 103-107

Towards Achieving Practical GPON FTTH Designs

Anis Ouali and Kin Fai Poon (Khalifa University, UAE); Beum-Seuk Lee (British Telecom, UAE); Kaltham Al Romaithi (Khalifa University of Science, Technology and Research, UAE)

pp. 108-113

Monday, September 7, 16:30 - 18:00

S3: Special Session 3

Dense and Elastic Big Data Empowered Self Organizing Networks

Room: J

Impact of Inaccurate User and Base Station Positioning on Autonomous Coverage Estimation

Iman Akbari and Oluwakayode Onireti (University of Surrey, United Kingdom); Ali Imran (University of Oklahoma, USA); Muhammad Ali Imran and Rahim Tafazolli (University of Surrey, United Kingdom)

pp. 114-118

Energy Efficient Resource Allocation for 5G Heterogeneous Networks

Arsalan Saeed (University of Surrey, United Kingdom); Efstathios Katranaras (University of Surrey & Institute for Communication Systems, United Kingdom); Ahmed Zoha (QMIC, Qatar); Ali Imran (University of Oklahoma, USA); Muhammad Ali Imran and Mehrdad Dianati (University of Surrey, United Kingdom)

pp. 119-123

Predicting QoS in LTE HetNets based on location-independent UE measurements

Jessica Moysen (CTTC, Spain); Lorenza Giupponi and Josep Mangles-Bafalluy (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain); Nicola Baldo (CTTC, Spain)

pp. 124-128

Network Densification: Challenges and Opportunities in enabling 5G

Bashar Romanous (University of California, Riverside, USA); Naim Bitar (The University of Oklahoma, USA); Ali Imran (University of Oklahoma, USA); Hazem Refai (Oklahoma University, USA)

pp. 129-134

Tuesday, September 8

Tuesday, September 8, 09:00 - 10:00

K2: Keynote 2

Running 5G as a Software

Dr Artur Hecker

Room: G

To cope with highly diversified, partly contradicting requirements under the pressure of lowering costs, the major feature of 5G will certainly be flexibility. The European 5G research, carried out within the H2020 framework, suggests that the 5G integration and core network therefore will be driven by software. Here, network softwarization through the usage of virtualization (e.g. NFV) and programmable fine-grained traffic steering (e.g. SDN) is believed to unchain operators from the burden of highly dedicated, specialized, expensive devices to be maintained over decades. Yet, striving to support new business scenarios, the 5G will have to provide mission critical services along with cheap best effort services, massive M2M connectivity (MMC) along with highly mobile devices. Therefore, technologically we will have to go beyond the relatively straightforward replacement of current hardware through the equivalent virtual components (e.g. EPC). Our longer term vision advocates a dynamic composition of 5G and legacy services by leveraging scale out approaches on top of infrastructures composed of both COTS server and switching hardware and leased virtual resources. The problem is that such softwarization does not come for free: while it assumes the pervasiveness of control, it introduces new degrees of dynamics in both the realization and the daily usage, which must be first coped with. Hence, one of the important questions becomes how to evaluate the practical relevance of new concepts, promising enabling technologies and concrete implementations on and of this carrier-grade infrastructure with mobility support. In this presentation, we show how we run 5G as a software in our lab. To this end, we introduce our network emulator, capable of correctly maintaining large-scale network topologies, while using real software and real protocols. In a live demonstration concluding this talk we show different features of our emulator such as transparent support for virtual network deployments across multiple workers, full runtime control of the emulated infrastructure, programmable control of allocations, scriptable mobility support for devices and uncritical and runtime visualization of both topology and network flows with possibility for runtime measurements.

Tuesday, September 8, 10:30 - 12:30

S4: Special Session 4

Body centric wireless communication and networking from meter to the nanoscale

Room: B

Reliable communication between rescuers during interventions using textile antenna systems

Thijs Castel, Sam Lemey, Sam Agneessens and Patrick Van Torre (Ghent University, Belgium);
Claude Oestges (Université Catholique de Louvain, Belgium); Hendrik Rogier (Ghent University,
Belgium)

pp. 135-139

Compact Linear Embroidered Antenna Research (CLEAR)

David Speight (Loughborough University, United Kingdom); Diane Titz (University of Nice, France); Cyril Luxey (University Nice Sophia-Antipolis, France); William Whittow (Loughborough University, United Kingdom)

pp. 140-143

Physical Layer Security for Wireless Implantable Medical Devices

Zekeriyya E Ankarali and Ali Demir (University of South Florida, USA); Marwa Qaraqe (Texas A & M University, USA); Qammer Hussain Abbasi (Texas A & M University, Qatar); Erchin Serpedin (Texas A&M University, USA); Huseyin Arslan and Richard D. Gitlin (University of South Florida, USA)

pp. 144-147

Integrated Vectorcardiogram (iVCG) Rotation Modeling and Compensation

Calvin Perumalla, Thomas Ketterl, Richard D. Gitlin and Peter Fabri (University of South Florida, USA)

pp. 148-151

An In-body Communication Link Based on 400 MHz MICS Band Wireless Body Area Networks

Yangzhe Liao, Mark S Leeson and Matthew D Higgins (University of Warwick, United Kingdom)

pp. 152-155

T3: Technical Session 3

Room: J

Analysis of a Homomorphic MAC-based Scheme against Tag Pollution in RLNC-Enabled Wireless Networks

Alireza Esfahani (Instituto de Telecomunicações, Portugal); Georgios Mantas (Instituto de Telecomunicações - Pólo de Aveiro, Portugal); Valdemar C. Monteiro (Instituto de Telecomunicações, Portugal); Kostas Ramantas (Iquadrat Informatica, Greece); Eftychia Datsika (IQUADRAT Informatica S. L., Spain); Jonathan Rodriguez (Instituto de Telecomunicações, Portugal)

pp. 156-160

WLAN Throughput Management: A Game Theoretic TXOP Scheduling Approach

Ziming Zhu (Toshiba Research Europe Ltd, United Kingdom); Fengming Cao (Toshiba Europe Research Telecommunication Lab, United Kingdom); Zhong Fan (Toshiba Research Europe, United Kingdom)

pp. 161-164

Throughput Bound of XOR Coded Wireless Multicasting to Three Clients

Jalaluddin Qureshi (Namal College, Pakistan); Adeel Malik (Namal College, Mianwali, Pakistan)

pp. 165-169

An Evaluation of Opportunistic Native Multicast

Dhaifallah Alwadani and Mario Kolberg (University of Stirling, United Kingdom); John Buford (Avaya Labs Research, USA)

pp. 170-174

A burst-approach for transmission of TCP traffic over DVB-RCS2 links

Ahmed Said Abdel Salam (University of Rome Tor Vergata, Italy); Michele Luglio (University of Rome Tor Vergata - Dip. Ing. Elettronica, Italy); Cesare Roseti and Francesco Zampognaro (University of Rome Tor Vergata, Italy)

pp. 175-179

Physical Layer Security in Two-Path Successive Relaying

Qian Yu Liao (Universiti Teknologi Malaysia & Faculty of Electrical Engineering, Malaysia); Chee Yen (Bruce) Leow (Universiti Teknologi Malaysia, Malaysia)

pp. 180-183

Tuesday, September 8, 14:00 - 16:00

S5: Special Session 5

ICT-Based Solutions for the Smart Energy Grid

Room: B

Power Scheduling for Programmable Appliances in Microgrids

Juliette Ugirumurera and Zygmunt Haas (University of Texas at Dallas, USA)

pp. 184-189

VIMSEN: A Modular Gateway supporting Decentralised, Virtual Micro-Grid Architectures

George Lyberopoulos, Elina Theodoropoulou and Ioanna Mesogiti (COSMOTE Mobile Telecommunications S.A., Greece); Konstandinos G. Filis (Cosmote Mobile Communications SA, Greece)

pp. 190-195

Effective Capacity Analysis of Smart Grid Communication Networks

Minglei You and Xiaolin Mou (Durham University, United Kingdom); Hongjian Sun (Durham University, USA)

pp. 196-200

Power Saving Strategy in Advanced Metering Infrastructure for High-density Residential Community

Qi Wang and Anteneh A. Gebremariam (University of Trento, Italy); Raul Palacios-Trujillo (University of Campinas, Brazil); Fabrizio Granelli (University of Trento, Italy)

pp. 201-206

Markov models for electric vehicles: the role of battery parameters and charging point frequency

Beatrice Da Lio and Anna Guglielmi (University of Padova, Italy); Leonardo Badia (Università degli Studi di Padova, Italy)

pp. 207-210

T4: Technical Session 4

Room: J

Fuzzy Multiple Criteria Switch Off Method for Dense Heterogeneous Networks

Anna Dudnikova (University of Catania, Italy); Paolo Dini and Lorenza Giupponi (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain); Daniela Panno (University of Catania, Italy)

pp. 211-215

Low-complexity Green Scheduling for the Coordinated Downlink of HetNet System

Fabien Hélot, Ting Yang and Chuan Heng Foh (University of Surrey, United Kingdom)

pp. 216-220

Performance Analysis of Cellular-WLAN Heterogeneous Network Based on Continuous Time Markov Chain

Shobanraj Navaratnarajah, Mehrdad Dianati and Muhammad Ali Imran (University of Surrey, United Kingdom)

pp. 221-225

Reduction of Core Network Signalling Overhead in Cluster based LTE Small Cell Networks

Joseph Stalin Thainesh, Ning Wang and Rahim Tafazolli (University of Surrey, United Kingdom)

pp. 226-230

Tuesday, September 8, 16:30 - 17:15

P1: Panel Discussion

Role of 5G in Internet of Things

Dr Periklis Chatzimisios, Dr Ali imran

Room: G

Wednesday, September 9

Wednesday, September 9, 09:30 - 10:30

K3: Keynote 3

Addressing Spectrum Scarcity through Optical Wireless Communications

Professor Mohamed-Slim Alouini

Room: G

Rapid increase in the use of wireless services over the last two decades has lead the problem of the radio-frequency (RF) spectrum exhaustion. More specifically, due to this RF spectrum scarcity, additional RF bandwidth allocation, as utilized in the recent past, is not anymore a viable solution to fulfill the demand for more wireless applications and higher data rates. The talk goes first over the potential offered by optical wireless communications to relieve spectrum scarcity. It then summarizes some of the challenges that need to be surpassed before such kind of systems can be massively deployed. Finally the talk offers an overview of some of the recent results in the area of the performance analysis of optical wireless communication systems.

Wednesday, September 9, 11:00 - 13:00

T5: Technical Session 5

Room: J

Energy Loss through Standby and Leakage in Energy Harvesting Wireless Sensors

Erol Gelenbe and Yasin M Kadioglu (Imperial College London, United Kingdom)

pp. 231-236

A Distributed Sleep Mechanism for Energy-Efficiency in Non-Beacon-Enabled IEEE 802.15.4 Networks

Raja Al Kiyumi (University of Surrey, United Kingdom); Serdar Vural (University of Surrey & Institute for Communication Systems, United Kingdom); Chuan Heng Foh and Rahim Tafazolli (University of Surrey, United Kingdom)

pp. 237-241

Improvement and Application of LEACH Protocol based on Genetic Algorithm for WSN

Hongxia Miao, Xuanxuan Xiao, Bensheng Qi and Kang Wang (Hohai University, P.R. China)

pp. 242-245

Analysis of PC and SGA Models for an Ultra Wide-Band Ad-hoc Network with Multiple Pulses

Yangzhe Liao, Mark S Leeson and Matthew D Higgins (University of Warwick, United Kingdom)

pp. 246-250

TU: Tutorial

Advanced Green Networks: New paradigms for energy and spectral efficient network design

Dr Marco Maso and Dr Muhammad Ali Imran

Room: G

In this tutorial, we study the spectral and energy aware deployment of advanced heterogeneous small-cell networks (HetNets), where a plethora of low-power/low-cost user/operator deployed base stations (BSs) complements the existing macrocell network. This multiple radio access technologies (RATs) based approach is considered a viable solution to cope with the evergrowing high spectral and energy efficiency demands of modern mobile communications networks. In this context, we specifically focus on the latter metric. In particular, we quantify the effect of the adoption of energy saving strategies on the energy efficiency of the network in two ways: in terms of a) impact of the end-to-end energy consumption of the network on the system performance and emerging network topologies, and b) ecological and economic impact of the reduction in Carbon footprint emissions of future mobile communication networks. Additionally, this tutorial also presents a short introduction to the so-called wireless powered communication networks, a new and promising paradigm for deploying energy efficient and self-sustaining networks. This tutorial is part of the authors most recent research on Green Heterogeneous networks, self-sustainable communications and uplink fast power control.

Wednesday, September 9, 14:00 - 17:30

S6: Special Session 6a/b

Advanced PHY and MAC Design for Ultra Dense Wireless Networks

Room: B

Dense Wireless Cloud Network via Physical Layer Network Coding

Yi Wang, Alister G. Burr and Qinhuai Huang (University of York, United Kingdom)
pp. 251-255

Comparison of Multicarrier Relay Selection Schemes in Super Dense Networks

Shuping Dang, David Simmons and Justin P Coon (University of Oxford, United Kingdom)
pp. 256-260

Towards a Scalable Routing Approach for Mobile Ad-hoc Networks

Arvind Ramrekha and Olayinka Adigun (Ubitech Ltd, United Kingdom); Alexandros Ladas (Kingston University, United Kingdom); Nuwan S Weerasinghe (Kingston University & iScienta Limited, United Kingdom); Christos Politis (Kingston University, United Kingdom)
pp. 261-266

Outage Based Power Allocation for a Lossy Forwarding Two-Relaying System

Albrecht Wolf (Technical University of Dresden, Germany); Maximilian Matthé (Technical University Dresden, Germany); Andreas Festag (TU Dresden, Germany); Gerhard P. Fettweis (Technische Universitaet Dresden, Germany)
pp. 267-272

Error Propagation Mitigation By Exploiting Source-Relay Correlation With Limited Feed-Forward Bits

Jiancao Hou, Chuyi Qian, Na Yi and Yi Ma (University of Surrey, United Kingdom)
pp. 273-277

A Comparative Study on Outage Probabilities of Decode-and-Forward and Lossy-Forward Relay Techniques

Shen Qian (Japan Advanced Institute of Science and Technology & University of Oulu, Finland); Markku Juntti (University of Oulu, Finland); Tad Matsumoto (Japan Advanced Institute of Science and Technology, Japan)
pp. 278-282

Symbol-Level Selective Decode-Forward Relaying for Uncoordinated Dense Wireless Networks

Na Yi, Yi Ma, Jiancao Hou and Rahim Tafazolli (University of Surrey, United Kingdom)
pp. 283-287

Wednesday, September 9, 14:00 - 15:00

T6: Technical Session 6

Room: J

Power Distribution and Frequency Response Performance of Underwater Optical Wireless Communications

Faezah Jasman and Roger J Green (University of Warwick, United Kingdom)
pp. 288-292

A Multi-Channel MAC Protocol for Underwater Acoustic Networks

Mingsheng Gao, Jian Li and Zhixiang Deng (Hohai University, P.R. China)
pp. 293-298

A Reliable and Evenly Energy Consumed Routing Protocol for Underwater Acoustic Sensor Networks

Ning Sun and Tongtong Wu (Hohai University, P.R. China)
pp. 299-302

Wednesday, September 9, 15:30 - 17:30

S7: Special Session 7

Design, Modelling and Analysis of Cognitive Radio Networks

Room: J

Experiments on Spectrum Sensing Algorithms of Pilot-Added OFDM Signals with a Cognitive LTE-A System

Trung Thanh Nguyen (Faculty of Engineering, The University of Duisburg-Essen, Germany);
Ammar Kabbani (University of Duisburg-Essen, Germany); Sundar Peethala and Theo Kreul
(University of Duisburg-Essen, Germany); Thomas Kaiser (Universität Duisburg-Essen, Germany)
pp. 303-307

Cooperative IDED in a Medium-traffic Primary Network over Rayleigh-faded Sensing Channels

Ramtin Rabiee (Nanyang Technological University (NTU), Singapore); Kwok Hung Li (Nanyang Technological University, Singapore)
pp. 308-312

Load Estimation and Balancing in Heterogeneous Wireless Networks with Cognitive Small Cells

Man Su, Chuan Heng Foh and Rahim Tafazolli (University of Surrey, United Kingdom)
pp. 313-317

A Mobility Prediction Scheme of LTE/LTE-A Femtocells under Different Velocity Scenarios

Chris G Guy (The University of Reading, United Kingdom); Myasar Tabany (The University of Reading & Wireless Communications Research Lab, United Kingdom)
pp. 318-323