2017 IEEE 18th International Symposium on a World of Wireless, Mobile and Multimedia Networks (WoWMoM 2017)

Macau, China
12-15 June 2017

Additional Copies of This Publication Are Available From:

CURRAN ASSOCIATES INC.
proceedings
.com

Technical Sessions
June 13th, 2017 (Tuesday)

09:00-09:15 Registration

09:15-09:30 WoWMoM Opening Remarks

09:30-10:30 Keynote 1 – Feeling the Pulse of 5G (Auditorium)
Chih-Lin I, Chief Scientist of Wireless Technologies, China Mobile Research Institute

10:30-11:00 Coffee Break (Exhibition Gallery, ground floor, Chi Un Building)

11:00-12:30 Session 1A: Energy-Efficient Multimedia Networks

Chair: You-Chiun Wang [Lecture Theatre 1, 1st floor, Wui Chi Building]

[1] A Detailed Look into Power Consumption of Commodity 60 GHz Devices   1
Swetank Kumar Saha, Tariq Siddiqui and Dimitrios Koutsonikolas (University at Buffalo, SUNY, USA); Adrian Loch and Joerg Widmer (IMDEA Networks Institute, Spain); Ramalingam Sridhar (University at Buffalo, SUNY)

[2] Energy Efficiency Impact of Transient Node Failures when using RPL   11
Ulf Kulau, Silas Müller, Sebastian Schildt, Arthur Martens, Felix Büsching, and Lars Wolf (Technical University – Braunschweig, Germany)

[3] Wireless Power Transfer under the Spotlight: Charging Terminals amid Dense Cellular Networks   17
Leonardo Bonati, Ángel Fernández Gambín and Michele Rossi (University of Padova, Italy)

[4] Dynamic Base Station Repositioning to Improve Spectral Efficiency of Drone Small Cells   26
Azade Fotouhi (University of New South Wales, Australia); Ming Ding (Data 61-CSIRO, Australia); Mahbub Hassan (University of New South Wales, Australia)

11:00-12:30 Session 1B: Wireless Network Analysis and Optimization

Chair: Laurie Cuthbert [Lecture Theatre 2, 1st floor, Wui Chi Building]

[1] Fine-grained LTE Radio Link Estimation for Mobile Phones   35
Nicola Bui, Foivos Michelinakis and Joerg Widmer (IMDEA Networks Institute, Spain)

[2] Measurement Study of IEEE 802.11ac Wi-Fi Performance in High Density Indoor Deployments: Are Wider Channels Always Better?   44
Ljiljana Simić, Janne Riihijärvi and Petri Mähönen (RWTH Aachen University, Germany)

[3] Multi-Path D2D Leads to Satisfaction   53
Edgar Arribas (IMDEA Networks Institute & University Carlos III of Madrid, Spain); Vincenzo Mancuso (IMDEA Networks Institute, Spain)

[4] Implementation of Wrap Around Mechanism for System Level Simulation of LTE Cellular Networks in NS3   60
Rajendra Singh Panwar and Krishna M. Sivalingam (Indian Institute of Technology Madras, India)

WoWMoM 2017 Technical Sessions – June 13th

12:30-14:00 Lunch Break (Exhibition Gallery, ground floor, Chi Un Building)

14:00-15:30 **Session 2A: Next Generation Networks**

Chair: Ana Aguiar [Lecture Theatre 1, 1st floor, Wui Chi Building]

[1] Design and Experimental Evaluation of a 2.4 GHz-AoA-Enhanced Beamsteering Algorithm for IEEE 802.11ad mm-Wave WLANs   69
Avishek Patra, Ljiljana Simić and Marina Petrova (RWTH Aachen University, Germany)

[2] 60 GHz Range Boost: Exploiting Frequency Selectivity in Millimeter-Wave Networks   79
Guillermo Bielsa (IMDEA Networks Institute & Universidad Carlos III de Madrid, Spain); Adrian Loch and Joerg Widmer (IMDEA Networks Institute, Spain)

[3] Queue-aware Opportunistic Scheduling in Multi-channel Dynamic Spectrum Access Networks   88
Enas F. Khairullah and Mainak Chatterjee (University of Central Florida, USA); Swades De (Indian Institute of Technology Delhi, India)

[4] Solar-Enabled Green Base Stations: Cost versus Utility   96
Suraj Suman and Swades De (Indian Institute of Technology Delhi, India)

14:00-15:30 **Session 2B: Mobile Data Offloading**

Chair: James Colley [Lecture Theatre 2, 1st floor, Wui Chi Building]

[1] Understanding the Present and Future of Cellular Networks through Crowdsourced Traces   104
Francesco Malandrino and Carla-Fabiana Chiasserini (Politecnico di Torino, Italy); Scott Kirkpatrick (Hebrew University Jerusalem, Israel)

[2] On the Feasibility of a User-Operated Mobile Content Distribution Network   113
Ioannis Psaras, Vasilis Sourlas and Denis Shtefan (University College London, United Kingdom); Sergi Rene (University College of London, United Kingdom); Mayutan Arumaithurai (University of Goettingen, Germany); Dirk Kutscher (Huawei German Research Center, Germany); George Pavlou (University College London, United Kingdom)

[3] Why Your Smartphone Doesn't Work in Very Crowded Environments   122
Paolo Castagno (University of Turin, Italy); Vincenzo Mancuso (IMDEA Networks Institute, Spain); Matteo Sereno (University of Torino, Italy); Marco Ajmone Marsan (Politecnico di Torino, Italy & IMDEA Networks Institute, Spain)

[4] Efficient Feedback Mechanism and Rate Adaptation for LTE-based D2D Communication   131
Hoyoung Yoon, Seungil Park and Sunghyun Choi (Seoul National University, Korea)

15:30-16:00 Coffee Break (Wui Chi Canteen, 1st floor, Wui Chi Building)

16:00-17:30 **Session 3A: PhD Forum**

Chair: Andreas Reinhardt [Lecture Theatre 1, 1st floor, Wui Chi Building]

[1] An Experimental Study of Secret Key Generation for Passive Wi-Fi Wearable Devices   140
Mohammad Hossein Chinaei and Vijay Sivaraman (University of New South Wales, Australia); Diethelm Ostry (CSIRO, Australia)

[2] Friendly-Jamming: An Anti-Eavesdropping Scheme in Wireless Networks   143
Xuran Li and Hong-Ning Dai (Macau University of Science and Technology, Macao, P.R. China)

[3] Mathematical Model of LoRaWAN Channel Access   146
Dmitry Bankov (Institute for Information Transmission Problems (IITP RAS), Russia); Evgeny Khorov (Skolkovo Institute of Science and Technology & IITP RAS, Russia); Andrey Lyakhov (IITP RAS, Russia)

[4] On Modeling of Eavesdropping Behavior in Underwater Acoustic Sensor Networks   149
Qiu Wang and Hong-Ning Dai (Macau University of Science and Technology, Macao, P.R. China)

[5] Towards Intelligent Flying Base Stations in Future Wireless Network   152
Azade Fotouhi (University of New South Wales, Australia)

16:00-17:30 **Session 3B: Demo and Poster**

Chair: Cheong Sio Tai [Exhibition Gallery, ground floor, Chi Un Building]

18:00-21:30 **Welcome Reception** (Exhibition Gallery, ground floor, Chi Un Building)

Technical Sessions
June 14th, 2017 (Wednesday)

09:00-09:30 Registration

09:30-11:00 Panel 1 – Big Data & IoT (Lecture Theatre 1, 1st floor, Wui Chi Building)

11:00-11:30 Coffee Break (Wui Chi Canteen, 1st floor, Wui Chi Building)

11:30-13:00 Session 4A: IoT, Wearables, and Social Networks

Chair: Rui Zhou [Lecture Theatre 1, 1st floor, Wui Chi Building]

[1] Multi-Periodic Contact Patterns in Predicting Future Contacts Over Mobile Networks   155
Sima Das and Sajal K. Das (Missouri University of Science and Technology, USA)

[2] Wi-Friend: Identifying Potential Real Life Friends Nearby   165
Jia Wang, Xuefeng Liu and Jiannong Cao (Hong Kong Polytechnic University, Hong Kong)

[3] WearIA: Wearable Device Implicit Authentication based on Activity Information   174
Yunze Zeng, Amit Pande, Jindan Zhu and Prasant Mohapatra (University of California, Davis, USA)

[4] Analyzing Students' Attention in Class Using Wearable Devices   183
Xin Zhang and Cheng-Wei Wu (National Chiao Tung University, Taiwan); Philippe Fournier-Viger (Harbin Institute of Technology, P.R. China); Lan-Da Van (National Chiao Tung University, Taiwan); Yu-Chee Tseng (National Chiao Tung University, Taiwan)

11:30-13:00 Session 4B: Analytics and Machine Learning

Chair: Swades De [Lecture Theatre 2, 1st floor, Wui Chi Building]

[1] A Load Balancing Scheme for Sensing and Analytics on a Mobile Edge Computing Network   192
Chen-Khong Tham and Rajarshi Chattopadhyay (National University of Singapore, Singapore)

[2] Estimate Air Quality Based on Mobile Crowd Sensing and Big Data   201
Cheng Feng, Wendong Wang and Ye Tian (Beijing University of Posts and Telecommunications, P.R. China); Xirong Que (Institute of Networking Technology, P.R. China); Xiangyang Gong (Beijing University of Posts and Telecommunications, P.R. China)

[3] Millimetric Diagnosis: Machine Learning Based Network Analysis for mm-Wave Communication   210
Maria Scalabrin and Michele Rossi (University of Padova, Italy); Guillermo Bielsa (IMDEA Networks Institute & Universidad Carlos III de Madrid, Spain); Adrian Loch and Joerg Widmer (IMDEA Networks Institute, Spain

[4] Optimal trade-off between accuracy and network cost of distributed learning in Mobile Edge Computing: An analytical approach   219
Lorenzo Valerio, Andrea Passarella and Marco Conti (IIT-CNR, Italy)

WoWMoM 2017 Technical Sessions – June 14th

13:00-14:30 Lunch Break (Exhibition Gallery, ground floor, Chi Un Building)

14:30-15:30 **Keynote 2 – Post-5G: Is This the End of Telecommunications?** (Auditorium)
Petri Mähönen, RWTH Aachen University, Germany

15:30-16:00 Coffee Break (Exhibition Gallery, ground floor, Chi Un Building)

16:00-17:30 **Session 5A: Localisation & Tracking**

Chair: Andreas Reinhardt [Lecture Theatre 1, 1st floor, Wui Chi Building]

[1] Self-Improving Indoor Localization by Profiling Outdoor Movement on Smartphones   228
Chen Qiu and Matt W. Mutka (Michigan State University, USA)

[2] Silent Whistle: Effective Indoor Positioning with Assistance from Acoustic Sensing on Smartphones   237
Chen Qiu and Matt W. Mutka (Michigan State University, USA)

[3] CSI Fingerprinting with SVM Regression to Achieve Device-free Passive Localization   243
Rui Zhou, Jiesong Chen, Xiang Lu and Jia Wu (University of Electronic Science and Technology of China, P.R. China)

[4] A Novel Accurate Synthetic Aperture RFID Localization Method with High Radial Accuracy   252
Run Zhao, Qian Zhang, Dong Li, Haonan Chen and Dong Wang (Shanghai Jiao Tong University, P.R. China)

16:00-17:30 **Session 5B: Context-Awareness**

Chair: Raffaele Bruno [Lecture Theatre 2, 1st floor, Wui Chi Building]

[1] Wi-Chase: A WiFi based Human Activity Recognition System for Sensorless Environments   261
Sheheryar Arshad, Chunhai Feng and Yonghe Liu (The University of Texas at Arlington, USA); Yupeng Hu (Hunan University, P.R. China); Ruiyun Yu (Northeastern University, P.R. China); Siwang Zhou and Heng Li (Hunan University, P.R. China)

[2] On the usage of smart devices to augment the user interaction with multimedia applications   267
Alan Ferrari, Vanni Galli, Daniele Puccinelli and Silvia Giordano (University of Applied Sciences and Arts of Southern Switzerland (SUPSI), Switzerland)

[3] Beacon-based Proximity Detection using Compressive Sensing for Sparse Deployment   276
Pai Chet Ng (Hong Kong University of Science and Technology, Hong Kong); Li Zhu (Ajou University, Korea); James She (Hong Kong University of Science and Technology, Hong Kong); Rong Ran (Ajou University, Korea); Soochang Park (Hong Kong University of Science and Technology & NIE Social Media Lab, Hong Kong);

[4] VehicleSense: A Reliable Sound-based Transportation Mode Recognition System for Smartphones   282
Sungyong Lee (Ulsan National Institute of Science and Technology, Korea); Jinsung Lee (Samsung Electronics, Korea); Kyunghan Lee (Ulsan National Institute of Science and Technology, Korea)

18:00-21:30 **Conference Banquet** (Macao Tower 360 Cafe)

Technical Sessions

June 15th, 2017 (Thursday)

09:00-09:30 Registration

09:30-11:00 Panel 2 – 5G Wireless (Lecture Theatre 1, 1st floor, Wui Chi Building)

11:00-11:30 Coffee Break (Wui Chi Canteen, 1st floor, Wui Chi Building)

11:30-13:00 Session 6A: Multimedia Systems Optimization
Chair: Dimitrios Koutsonikolas [Lecture Theatre 2, 1st floor, Wui Chi Building]

[1] VoDCast: Efficient SDN-based Multicast for Video on Demand   291
   Christian Koch, Stefan Hacker and David Hausheer (Technical University – Darmstadt, Germany)

[2] e-DASH: Modelling An Energy-Aware DASH Player   297
   Benoy Varghese (Data61-CSIRO & University of New South Wales, Australia); Guillaume Jourjon (Data61-CSIRO, Australia); Kanchana Thilakarathna (Data61-CSIRO, Sydney, Australia); Aruna Seneviratne (University of New South Wales, Australia)

11:30-13:00 Session 6B: Resource Management and QoS/QoE Provisioning
Chair: Wei Zhang [Lecture Theatre 3, 1st floor, Wui Chi Building]

[1] Adaptive Configuration of Time-domain eICIC to Support Multimedia Communications in LTE-A Heterogeneous Networks   306
   You-Chiun Wang and Shih-Ting Chen (National Sun Yat-Sen University, Taiwan)

[2] Cross-Layer Approach for HTTP-Based Low-Delay Adaptive Streaming in Mobile Networks   312
   Hieu Le (Technical University – Berlin, Germany); Konstantin Miller (Technical University – Berlin, Germany); Arash Behboodi (RWTH Aachen University, Germany); Adam Wolisz (Technical University – Berlin, Germany)

[3] Subjective QoE Assessment on Video Service: Laboratory Controllable Approach   321
   Petros Spachos (University of Guelph, Canada); Thomas Lin, Weiwei Li, Mark Chignell and Alberto Leon-Garcia (University of Toronto, Canada); Jie Jiang (TELUS, Canada); Leon Zucherman (University of Toronto, Canada)

13:00-14:30 Lunch Break (Exhibition Gallery, ground floor, Chi Un Building)

14:30-17:30 Macao Sightseeing Tour

Fifth IEEE Workshop on Emerging COgnitive Radio Applications and aLgorithms

IEEE CORAL 2017

Workshop Program

A113 (Chi Un Building, ground floor)

14:00-14:15 **Opening Remarks**

14:15-15:30 **Session 1: Spectrum Sharing**

[1] Cognitive Radio using Spectrum-Sharing and Power Minimisation   330

    Yue Liu and Xu Yang (Macao Polytechnic Institute, Macao), Ka Seng Chou (Information Systems Research Centre MPI, Macao), Laurie Cuthbert (Information Systems Research Centre MPI, Macao)

[2] Optimal Power Allocations for Multichannel Energy Harvesting Cognitive Radio   336

    Hui Liang and Xiaohui Zhao (Jilin University & College of Communication Engineering, P.R. China); Wei Zhang (The University of New South Wales, Australia)

[3] Joint Link-Channel Selection and Power Allocation in Multi-Radio Wireless Mesh Networks   342

    Maheen Islam (University of Dhaka & East West University, Bangladesh); Md. Abdur Razzaque (University of Dhaka & Bangladesh, Bangladesh); Md. Mamun-Or-Rashid (University of Dhaka, Bangladesh)

15:30-16:00 Coffee Break (Wui Chi Canteen, 1st floor, Wui Chi Building)

16:00-17:00 **Session 2: Spectrum Sensing**

[1] Fast Spectrum Sensing Using a Large Number of Receive Antennas   349

    Benjamin K. Ng and Chan Tong Lam (Macao Polytechnic Institute, Macao)

[2] Efficient Mode Decision with Enhanced Sampling Algorithm for HEVC   354

    Sio-Kei Im and Ka-Hou Chan (Macao Polytechnic Institute, Macao)

17:00-17:15 **Closing Remarks**

Work-In-Progress Papers & Demos

Work-In-Progress Papers

Demos

The Sixth IEEE Workshop on the Internet of Things: Smart Objects and Services

IEEE IoT-SoS 2017

Workshop Program

Lecture Theatre 2 (Wui Chi Building, 1st floor)

09:00-09:30 **Registration**

09:30-09:40 **Opening Remarks**

09:35-10:30 **Keynote Presentation**
Towards Smart Internet-of-Things
Dr. Jiannong Cao (Hong Kong Polytechnic University, HK)

10:30-11:00 Coffee Break (Wui Chi Canteen, 1st floor, Wui Chi Building)

11:00-12:30 **Session 1: Enabling Technologies for IoT**

[1] Accountable Internet of Things? Outline of the IoT Databox Model   379
Andy Crabtree, Tom Lodge, James Colley and Chris Greenhalgh (University of Nottingham, United Kingdom); Richard Mortier (University of Cambridge, United Kingdom)

[2] Understanding Autonomous Drone Maneuverability for Internet of Things Applications   385
Azade Fotouhi (University of New South Wales, Australia); Ming Ding (Data 61, Australia); Mahbub Hassan (University of New South Wales, Australia)

[3] A Lightweight Privacy-Preserving Scheme for Metering Data Collection in Smart Grid   391
XiaoLi Zeng (Harbin Institute of Technology Shenzhen Graduate School, P.R. China); Qin Liu (School of Computer, Wuhan University, P.R. China); Hejiao Huang (Harbin Institute of Technology, P.R. China); Xiaohua Jia (City University of Hong Kong, Hong Kong)

[4] Distributed Sensor Data Computing in Smart City Applications   397
Wei Wang (Xi'an Jiaotong Liverpool University, P.R. China); Suparna De and Yuchao Zhou (University of Surrey, United Kingdom); Xin Huang (Xi'an Jiaotong-Liverpool University, P.R. China); Klaus Moessner (University of Surrey, United Kingdom)

12:30-14:00 Lunch Break (Exhibition Gallery, ground floor, Chi Un Building)

14:00-15:20 **Session 2: Middleware and Platforms for IoT**

[1] Benchmarking IoT Middleware Platforms   402
João Cardoso and Carlos Pereira (Instituto de Telecomunicações & University of Porto, Portugal); Ana Aguiar (University of Porto & Instituto de Telecomunicações, Portugal); Ricardo Morla (INESC Porto and Faculty of Engineering, University of Porto, Portugal)

Andrei Palade (Distributed Systems Group, School of Computer Science and Statistics, Trinity College Dublin, Ireland); Christian Cabrera (Trinity College Dublin, Ireland); Gary White (Distributed Systems Group, SCSS, Trinity College Dublin, Ireland); M.A. Razzaque (Trinity College, Ireland); Siobhán Clarke (Trinity College Dublin, Ireland)

Christian Cabrera, Fan Li and Vivek Nallur (Trinity College Dublin, Ireland); Andrei Palade (Distributed Systems Group, School of Computer Science and Statistics, Trinity College Dublin, Ireland); M.A. Razzaque (Trinity College, Ireland); Gary White (Distributed Systems Group, SCSS, Trinity College Dublin, Ireland); Siobhán Clarke (Trinity College Dublin, Ireland)

15:20-15:30 Closing Remarks

The First International Workshop on Small Cell Networking for 5G

IEEE SCN 2017

Workshop Program

Lecture Theatre 3 (Wui Chi Building, 1st floor)

14:00-14:15 Opening Remarks

14:15-15:00 Keynote Presentation

Paving the Way to the Realization of 5G Cellular Networks based on mmWave Small Cell Networking

Dr. Gia Khanh Tran (Tokyo Institute of Technology, Japan)

15:00-15:30 Session 1: SCN for 5G

[1] User Association in 5G Heterogeneous Networks with Mesh Millimeter Wave Backhaul Links   421

Agapi Mesodiakaki (Karlstad University, Sweden), Enrica Zola (UPC, Spain), Andreas Kassler (Karlstad University, Sweden)

15:30-16:00 Coffee Break (Wui Chi Canteen, 1st floor, Wui Chi Building)

16:00-17:30 Session 2: Enabling SCN

[1] Interference Coordination for Small Cell Networks with Full-Duplex Base Stations   427

Zihan Zhang (Zhejiang University, China), Guanding Yu (Zhejiang University, China)

[2] Exploiting Distance Information for Transparent Access Point Driven Wi-Fi Handovers   433

Ensar Zeljković (University of Antwerp – imec & IDLab, Belgium), Roberto Riggio (FBK CREATE-NET, Italy), Steven Latré (University of Antwerp – iMinds, Belgium)

[3] Millimeter-Wave Wireless Backhauling for 5G Small Cells: Scalability of Mesh over Star Topologies   439

Ahmed I. Nasr (Cairo University & Fingerprint Consultancy, Egypt), Yasmine Fahmy (Cairo University, Egypt)

[4] Performance Analysis of Distance-based Inter-cell Interference Coordination in Small Cell Networks   445

Jonghun Yoon (KAIST, Korea), Ganguk Hwang (KAIST, Korea)

17:30-17:40 Closing Remarks

The Fourth IEEE Workshop on Smart Vehicles: Connectivity Technologies and ITS Applications

IEEE SmartVehicles 2017
Workshop Program
Lecture Theatre 1 (Wui Chi Building, 1st floor)

09:00-09:30 Registration

09:30-09:35 Opening Remarks

09:35-10:30 Keynote Presentation

Joy and safety on the road: Sharing live pictures on the road and securing autonomous platooning vehicles

Susumu Ishihara (Department of Mathematical and Systems Engineering, Shizuoka University, Japan)

10:30-11:00 Coffee Break (Wui Chi Canteen, 1st floor, Wui Chi Building)

11:00-12:40 Session 1: Intelligent and Cooperative Transportation Systems

[1] Platooning as a Service of Autonomous Vehicles   471

Duo Lu (Arizona State University, USA); Zhichao Li (University of California, San Diego, USA); Dijiang Huang (Arizona State University, USA)

[2] Toward a Social Sensor Based Framework for Intelligent Transportation   477

Raymon Y.K. Lau (City University of Hong Kong, Hong Kong)

[3] 5G Enabled Cooperative Collision Avoidance: System Design and Field Test   483

Mohamed Gharba, Hanwen Cao and Sandip Gangakhedkar (Huawei German Research Center, Germany); Joseph Eichinger (Huawei Technologies & ERC, Germany); Ali Ramadan Ali (Huawei German Research Center, Germany); Karthikeyan Ganesan (Huawei Technologies, Germany); Varun Jain and Stephan Lapoehn (German Aerospace Center, Germany); Tobias Frankiewicz (German Aerospace Center, Germany); Tobias Hesse (German Aerospace Center, Germany); Yao Zou (Huawei Technologies, P.R. China); Chen Tang (Huawei Technologies, P.R. China); Liang Gu (Huawei Technologies, P.R. China)

[4] A Consistent Heuristic for Efficient Path Planning on Mobility Maps   489

Wanmai Yuan (Harbin Institute of Technology, P.R. China); Nuwan Ganganath (Hong Kong Applied Science and Technology Research Institute, Hong Kong); Chi-Tsun Cheng (The Hong Kong Polytechnic University, Hong Kong); Guo Qing (Harbin Institute of Technology, P.R. China); Francis C.M. Lau (The Hong Kong Polytechnic University, Hong Kong)

12:40-14:00 Lunch Break (Exhibition Gallery, ground floor, Chi Un Building)

14:00-15:15 Session 2: Communication Networks and Services

[1] A fog-based distributed look-up service for intelligent transportation systems   494

G. Tanganelli (University of Pisa, Italy); C. Vallati (University of Pisa, Italy); E. Mingozzi (University of Pisa, Italy)

[2] Can IEEE 802.11p and Wi-Fi Coexist in the 5.9GHz ITS band?   500
Irfan Khan (EURECOM, France); Jérôme Härri (EURECOM, France)

[3] Sidelink-Assisted Handover for Cellular Networks   506
Konstantinos Manolakis (Huawei Technologies, Germany); Wen Xu (Huawei Technologies & ERC, Germany)

15:15-15:30 **Closing Remarks**