

## W6: Small Data Networks (SmallDataNets)

Sunday 22 September 2019 • 09:00 – 17:30 • Milo 3 (2<sup>nd</sup> floor)

09:00 Welcome

09:30 Keynote I: Coding and Compressed Sensing for Unsourced Multiple Access  
 Jean-Francois Chamberland, Texas A&M

Currently deployed wireless access systems based on sustained connectivity, channel estimates, and scheduling policies are ill-equipped to deal with the sporadic traffic generated by legions of unattended wireless devices. This impending technological challenge has fueled several recent research initiatives whose shared goal is to ready wireless infrastructures for the demands of tomorrow. Pertinent recent advances in this area include the introduction of unsourced, uncoordinated multiple-access models attuned to machine-driven communications and the assessment of their fundamental limits for messages with small payloads. This presentation will review recent contributions on this topic and focus on a novel communication scheme, termed coded compressed sensing, for unsourced multiple-access communication. The proposed divide-and-conquer approach leverages recent progress in compressed sensing and forward error correction to produce a novel uncoordinated access paradigm, along with a computationally efficient decoding algorithm. Within this framework, every active device partitions its data into several sub-blocks and, subsequently, adds redundancy using a systematic linear block code. Compressed sensing techniques are then employed to recover sub-blocks up to a permutation of their order, and the original messages are obtained by stitching fragments together using a tree-based algorithm. The presentation will also discuss how this conceptual architecture is influencing other efforts in the field, along with candidate future directions and open problems.

10:30 Refreshments break

11:00 Session I

A Polar Code Based Unsourced Random Access for the Gaussian MAC  
 Evgeny Marshakov, Gleb Balitskiy, Kirill Andreev, Alexey Frolov, Skolkovo Institute of Science and Technology

On the Design of Analog Fountain Codes for Short Packet Communications in 5G URLLC  
 Wen Jun Lim, Mahyar Shirvanimoghaddam, University of Sydney; Rana Abbas, The University of Sydney; Yonghui Li, University of Sydney; Branka Vucetic, The University of Sydney

A Novel Non-Orthogonal Multiple Access with Space-Time Line Codes for Massive IoT Networks  
 Ki-Hun Lee, Jeong Seon Yeom, Bang Chul Jung, Chungnam National University; Jingon Joung, Chung-Ang University

An Evolved Non-Orthogonal Multiple Access For User Multiplexing with Small-Data Transmission  
 Qi Xiong, Chen Qian, Bin Yu, Chengjun Sun, Samsung Electronics

Efficient Concatenated Same Codebook Construction for the Random Access Gaussian MAC  
 Daria Ustinova, Anton Glebov, Pavel Rybin, Alexey Frolov, Skolkovo Institute of Science and Technology

12:30 Lunch (on your own)

14:30 Keynote II: Wen Cheng Chong, Kepler Communications

15:30 Refreshments break

16:00 Session II

Low complexity energy efficient random access scheme for the asynchronous fading MAC  
 Kirill Andreev, Skolkovo Institute of Science and Technology; Suhas S Kowshik, Massachusetts Institute of Technology; Alexey Frolov, Skolkovo, Institute of Science and Technology; Yury Polyanskiy, MIT

Residual Energy Optimization for MIMO SWIPT Two-Way Relaying System  
 Guanyi Chen, Ericsson (China) Communications Co.LTD; Jinlong Wang, Harbin Institute of Technology; Gang Wang, Yikun Zou, Communication Research Center, Harbin Institute of Technology; Donglai Zhao, Harbin Institute of Technology

On the Flexible and Performance-Enhanced Radio Resource Control for 5G NR networks  
 Ahlem Khlass, Daniela Laselva, Rauli Jarvela, Nokia Bell Labs

New Results in Asynchronous Scrambled Coded Multiple Access: Multi-stream Transmission and Application to 5G Small Data Networks  
 Mustafa Ero, Neal Becker, Hughes Network Systems, LLC; Rohit Seshadri, Lin-nan Less, Hughes Network Systems

17:10 Wrap-up