• **EDITORIAL** •

Special Focus on Machine-Type Communications*

Machine-type communication (MTC) refers to the communication between devices with or without the involvement of the network infrastructure. In recent years, we have witnessed a rapid penetration of embedded devices; and we believed that MTC traffic is likely to predominate in future and has the potential to transform human lives like never before. The fifth generation (5G) mobile networks now provide an opportunity to enable not only faster data access, but also incorporate MTC to support a wealth of new and diverse connected devices and services. Therefore, with the anticipated massive deployment of devices, many new challenges that need to be addressed arise in term of scalable deployment, security, energy efficient operation, integration with the legacy 3G, 4G and future 5G mobile communications, and optimization for a wide range of diverse applications.

This special focus of *SCIENCE CHINA Information Sciences* is devoted to covering the recent advances in all aggregation transmission, cyber security, energy efficient operation and resource allocation for MTC. We have accepted seven contributed papers with novel results and techniques that are developed by the research groups in the field as follows:

"Certificate revocation in vehicular ad hoc networks techniques and protocols: a survey" classifies revocation schemes in a novel way into centralized and decentralized manners. It covers a survey of different certificate revocation schemes, and provides an overview of the research in the area of certificate revocation in Vehicular Ad hoc Networks (VANETs).

"Coexistence of delay-sensitive MTC/HTC traffic in large scale networks" proposes a service-level resource allocation scheme called load division, and derives the delay and capacity performance of critical machine-type-communication (cMTC) and human-type-communication (HTC) under different resource allocation schemes and priority scheduling policies.

In "Pilot reuse and power control of D2D underlaying massive MIMO systems for energy-efficiency optimization", a novel heuristic pilot reuse (PR) optimization scheme is proposed for the selection of device-to-device transmitters (D2DTs) with the objective to reuse the pilot of the cellular users (CUEs). To guarantee the quality-of-service (QoS) of both CUEs and D2D users (DUEs), the energy efficiency (EE) maximization problem is modeled as a non-cooperative game and a distributed iterative power control algorithm is proposed.

"Group-based joint signaling and data resource allocation in MTC-underlaid cellular networks" develops an adaptive group head selection algorithm and a joint signaling, and the data resource allocation algorithm that satisfy both the data rate requirement and resource constraints of CUEs, respectively.

In "Aggregation transmission scheme for machine type communications", a new aggregation transmission scheme (ATS) dealing with future massive connectivity in MTC field is proposed, which can help to save the radio resources by exploiting the similarity and relevance of all users' data under the delay constraints. Three algorithms are proposed for adjusting the data packets transmission order in ATS: conditional random search (CRS), standard row algorithm (SRA) and genetic algorithm (GA).

"A trust framework based smart aggregation for machine type communication" proposes a secured multiple mobile relay selection algorithm, which intelligently aggregates data from adjacent MTC devices through multiple user equipment and transmits it to their base station (BS). It also presents a frame-

work for the selection of trusted relays to cooperatively aggregate MTC data and rendering two-hop connectivity to the BS.

In "Secret key generation based on private pilot under man-in-the-middle attack", in order to fight against the Man-in-the-Middle (MITM) attack, the authors design a dynamic private pilot-based secret key generation (SKG) scheme, in which both private pilot and secret key are derived from the characteristics of the wireless channels and private to the eavesdropper.

Finally, we would like to express our sincere appreciation to all the authors for submitting their manuscripts. Moreover, we express our deep gratitude to all the anonymous reviewers for delivering high-quality and timely review comments. We also thank SCIENCE CHINA Information Sciences Editorial Office for their professional services and supports during the whole process of this special focus.

Guest Editors:
Xiaofeng TAO
Beijing University of Posts and Telecommunications, China
Ping ZHANG
Beijing University of Posts and Telecommunications, China
Victor C. M. LEUNG
The University of British Columbia, Canada
Songwu LU
The University of California, Los Angeles, USA
Yu CHEN
Beijing University of Posts and Telecommunications, China