Editorial

Ultra-Dense Networking Architectures and Technologies for 5G

► **Guest Editors**

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With the continuous enrichment of mobile communication application scenarios in the future, the traditional macro-cellular-based mobile communication network architecture will be difficult to meet the explosive growth in demand for communications services. A promising solution is the deployment of ultra dense networks (UDNs) comprising flexibly deployed low-power small base stations (BSs), such as microcell BSs, picocell BSs and femtocell BSs. In 5G, ultra dense networks that are deployed with low-cost and low-power small cells are expected to enhance the overall performance of the network in terms of energy efficiency and load balancing. The essence of ultra dense cell deployment is to shorten the physical distance between the transmitter and the receiver, so as to improve the performance of the system.

For this feature topic, academic and industrial researchers have been invited to discuss technical challenges and recent results related to future mobile networks employing UDNs. After a rigorous review process, five papers have been selected for inclusion of this feature topic.

In the first article, LI Tongxin et al. discuss the intrinsic features and potential benefits of unmanned aerial vehicles (UAVs) and introduce the architecture of a multi-layer heterogeneous wireless network (MHetNet), in which traditional wireless network is assisted by UAVs. Then, an explicit discussion on the factors that limit the performance of MHetNet is presented. Simulations show that the altitude of UAV is a limiting factor that should be optimized to improve the spatial throughput (ST) of MHetNet.

The second article by JIN Yaqi et al. proposes a multi-QoS guaranteed resource allocation algorithm for multi-services based on opportunity cost. This algorithm can achieve a well-done balance between user satisfaction and system fairness. The authors first formulate a unified utility function with effective capacity to describe the multi-QoS metrics of different services. Then they introduce the theory of opportunity cost in economy to form the concept of opportunity cost applying. Finally, the simulation results show that the algorithm can achieve superior overall user satisfaction.

In the third article, FENG Hong et al. propose a wireless backhaul algorithm to find an effective backhaul method for the densely-deployed small base stations (SBSs) and to maximize the energy efficiency of the system. They put forward adaptive backhaul methods of indirect and direct modes. At the same time, the algorithm allocates network resources, including the power of SBSs and system bandwidth, to solve the serious interference problem in UDNs. Simulation results show that the proposed wireless backhaul algorithm has desired performance to achieve higher energy efficiency with a required data rate.

There are transport networks with different performance that varies from high transport latency to low transport latency in the real deployment; in order to cater for these various types of transport networks and realize multi-vendor centralized unit and distributed unit (CU-DU) operation, the radio access network (RAN) architecture in New Radio (NR) is split into two kinds of entities, i.e., CU and DU. In the

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fourth article, GAO Yin et al. introduce the general aspects of CU-DU split architecture, including the split method, interface function, mobility scenarios and other CU-DU related issues.

In the fifth article, GAO Tengshuang et al. propose a linear interpolation method for time-division duplex coordinated multiple point transmission (TDD-CoMP) systems to estimate the uplink channel at the receiver, which can reduce the channel difference caused by time delay and decrease the probability of codeword mismatch between both sides. Moreover, to mitigate severe inter-cell interference and increase the coverage and throughput of cell-edge users in UDN, a two-codebook scheme is used to strengthen cooperation between base stations (BSs). Simulations show that the proposed scheme can significantly improve the link performance compared to the global precoding scheme.

This special issue covers the network architectures, key technologies, challenges, and methodologies of UDN, and it gathers the researchers of the related areas to analysis the future development of UDN in detail.

Call for Papers

ZTE Communications Special Issue on

Data Intelligence

The new ear of AI is brought about by three converging forces: the advance of AI algorithms, the availability of big data, and the increasing popularity of high performance computing platforms. Data-driven intelligence, or data intelligence, is a new form of AI technologies that leverages the power of big data. It is becoming an extremely active research area with broad area of applications such as computer vision, medial and healthy, intelligent transportation system, multimedia system, and social network. With the huge volume of data available in various domains, big data brings opportunities to boost the performance of artificial intelligent system with advanced machine learning especially deep learning techniques. On the other hand, it also presents unprecedented challenges to manage and exploit big data for a variety of applications. This special issue seeks original articles describing development, relevant trends, challenges, and current practices in the field of big data and artificial intelligence. Position papers, and case studies are also welcome.

Appropriate topics include, but are not limited to,
- Computer vision with big data
- Big medial data
- Big transportation data
- Deep learning for big data
- Applications of big data intelligence
- Semantic of heterogeneous data

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Important Dates
- Submission Due: August 1, 2018
- Review and Final Decision Due: September 15, 2018
- Final Manuscript Due: October 1, 2018
- Publication Date: December 25, 2018

Manuscript Preparation
Manuscripts must be typed in English and submitted electronically in MS Word (or compatible) format. The word length is approximately 3000 to 8000, and no more than 8 figures or tables should be included. Authors are requested to submit mathematical material and graphics in an editable format.

Online Submission
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