Edge Computing and Vehicles:

Opportunities and Challenges for the Future

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With the rapid increase of various applications that require the high computation resources, the edge computing has been recently considered as means to efficiently execute these applications. In order to maximize the performance of edge computing, the ground vehicles or Unmanned Aerial Vehicles (UAVs) have been employed. In this presentation, two representative types of vehicle-based edge computing system are investigated such as Vehicular Edge Computing (VEC) [1] and Mobile Edge Computing (MEC) [2]. In VEC systems, the VEC nodes, i.e., road side unit (RSUs), help to improve the high-complexity vehicular services and reduce the energy consumption of battery-limited vehicles via offloading. In MEC systems, a UAV-mounted cloudlet is adopted to offer the computation offloading opportunities to mobile devices with the limited local processing capabilities. For both systems, since the energy-limited vehicles for VEC and mobile devices for MEC are required the high computation capabilities, leading the high energy consumption, we aim at minimizing their total energy consumption by offloading to RSU or UAV-mounted cloudlet, respectively. To this end, both orthogonal and non-orthogonal multiple access are explored, whose optimal solutions are addressed by jointly optimizing the bit allocation and offloading for VEC, and the bit allocation, offloading and UAV trajectory for MEC.

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[1] S. Jeong, O. Simeone, and J. Kang, "Mobile Edge Computing via a UAV-Mounted Cloudlet: Optimization of Bit Allocation and Path Planning," IEEE Trans. Vehicular Technology, Vol. 67, No. 3, pp.2049-2063, Mar. 2018

[2] Y. Jang, J. Na, S. Jeong, and J. Kang, "Energy-Efficient Task Offloading for Vehicular Edge Computing: Joint Optimization of Offloading and Bit Allocation," in proc. the 2020 IEEE 91st Vehicular Technology Conference (VTC2020-Spring), May 2020, Antwerp, Belguim