

Special Issue on
Unmanned Air Vehicles-to-Everything (U2X) Communications

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Unmanned aerial vehicles (UAVs) have attracted a lot of attention as they have endless commercial applications in fields such as agriculture, photography, surveillance, and numerous rescue operations due to their irrelatively small size and ability to fly without an on-board pilot. The world-wide deployment of UAVs will increase as the technology and regulations become mature enough, and, due to their global usability, UAVs will play a significant role in the Internet-of-Everything (IoE) vision and act as a key enabler of this vision. Since UAVs are usually equipped with sensors, cameras, etc., they can offer new IoE services. The unique advantages of the UAVs for IoE include their ability to be deployed at remote locations, reprogrammability during missions, and their impressive sensory ability.

IoE infrastructure includes a number of smart objects having sensing capabilities, and these smart devices communicate with each other using various protocols, allowing them to be accessed at anytime from anywhere. They have the potential to provide innovative services which would not be possible without the progress made in the IoE technology. Owing to their advanced technical capabilities, UAVs are making their way into IoE implementations, as a new generation of smart objects that can sense the environment, locate user positions, and communicate with objects enabling UAV-to-everything (U2X) communications. In U2X communications, each UAV moves along a predetermined trajectory to collect data and then uploads this data to the base station (BS). However, there is a possibility that some UAVs may be located at the cell edge and have weak communication links to the BS. To provide a satisfactory data rate, these UAVs can transmit the sensory data to the UAVs in its surroundings which have a better link quality, which then forward it to the BS as a relay.

In the U2X paradigm, objects connected with UAVs could be everything on the road, in the house, and within industry. This communication will also be helpful in collecting information from remote places where epidemic diseases spread, from areas where an emergency occurred, from machines that want to share their critical data, from cars that want to communicate at long range, etc. Hence, in future, UAVs with such capabilities will be an integral part of the IoE to wirelessly connect various IoE architectures.

In addition to that, 5G will also play a significant role in U2X by providing fast speed and low latency. To successfully accomplish the U2X goal, comprehensive solutions are needed to reshape existing networks. In this special issue, we welcome research and review articles that explore the research outcomes on U2X.

Potential topics include but are not limited to the following:

- ▶ Fog and edge computing architecture and technologies for U2X communications
- ▶ Low-latency protocol design for U2X communications
- ▶ Localization, navigation, and dynamic path planning of U2X communications
- ▶ Signal processing technologies for U2X communications
- ▶ Resource allocation and optimization for U2X communications
- ▶ Machine and deep learning algorithms for U2X communications
- ▶ Extending mobile coverage with UAVs as moving small cells, relays, and multihop D2D enablers for U2X communications
- ▶ UAV placement optimization for low latency and low energy applications
- ▶ Use cases enabled by UAVs and related business models for U2X communications
- ▶ Test bed development for U2X communications

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Papers are published upon acceptance, regardless of the Special Issue publication date.

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