

Workshop/Tutorial T5 (Half Day)

IEEE P1920.1: Standards for Aerial Communications and Networks

Organizers and Presenters

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Tutorial Summary

As unmanned aircraft systems (UAS) are being integrated into the National Airspace (NAS) around the world, there is a need for enhanced situational awareness and traffic management of UASs, and safety and security of people and infrastructure. Standardization efforts are being pursued to support UAS Traffic Management (UTM), over-the-air communications between UASs, Beyond Radio Line-of-Sight (BRLOS) communications, and UAS navigation and command and control using satellite, cellular, and ad hoc networks. At present, National Aeronautics and Space Administration (NASA) is leading the standardization efforts for UTM and the Institute of Electrical and Electronics Engineers (IEEE) is leading the standardization efforts for Self-organized Aerial Communications and Networking of UASs through the IEEE P1920.1 Working Group.

This workshop is intended to provide an update on the progress made and future plans towards the standardization of aerial communications and networking. Researchers and practitioners

actively engaged in the standardization efforts will discuss topics such as vehicle-to-vehicle communications and ad hoc networking, along with experiences gained from flight-tests, experimental test-beds and simulations. While the focus is primarily on standardization, novel ideas towards future research such as swarm autonomy, and mesh networking for UASs will also be discussed.

Topics Covered

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| ✓ Air-to-air/air-to-ground channel modeling | ✓ Geo-fencing, trajectory, and path planning |
| ✓ Ad hoc and mesh-networking of UASs | ✓ UAS Traffic Management |
| ✓ Command & control, and navigation | ✓ Beyond radio line of sight communications |
| ✓ UAS-to-UAS communications | ✓ Redundant communication links |
| ✓ UAS regulations for security, safety, and privacy | ✓ Flight-tests, test-beds, and simulations |
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Tutorial Outline

1:00 – 2:15 PM: Overview of Aerial Communications and Networks Networking (Kamesh Namuduri)
Introduction to UAV Networks, Air-to-Ground and/ Air-to-Air Data Link Communications , Wi-Fi Networks and Aerial Base Stations, Disruption Tolerant Airborne Networks and Protocols, Integrating UAVs in the National Airspace System , Information Security and Privacy aspects in UAS Networks, Real-world Applications

2:15 to 2:30: Break

2:30 – 3:30 PM: UAV communications enablers and global standardization status (Ravi Pragada)
IEEE 1920.1: IEEE Standards for Aerial Communications and Networks
UTM: Unmanned Aircraft Systems Traffic Management
The 3rd Generation Partnership Project (3GPP)
Dedicated Short Range Communications (DSRC)

3:30 to 3:45: Break

3:45 to 4:45 PM: Research Challenges, and Future Directions (Sven G. Bilén)
Software Defined Aerial Networks
Perspectives, Challenges, and Future Outlook

Tutorial Reference

UAV Networks and Communications, Edited by Kamesh Namuduri, University of North Texas , Serge Chaumette, Université de Bordeaux , Jae H. Kim, Boeing Research and Technology , James P. G. Sterbenz, University of Kansas , Publisher: Cambridge University Press, 2017.

<https://www.cambridge.org/core/books/uav-networks-and-communications/6E20641A2B1F493FBA5BAC977F2E06F7>