T9: Communication Network Based on Flying Devices

Resilient and low-latency, meshed wireless communication networks with mobile communication nodes

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Motivation

— Expanding the capabilities of Advanced Air Mobility (AAM) aircraft through communication and computing technologies

— Use of mobile communication nodes for flexible network extension

— Flying in a swarm as an effective cooperation option

— Use of AAM aircraft in densely populated areas for various applications

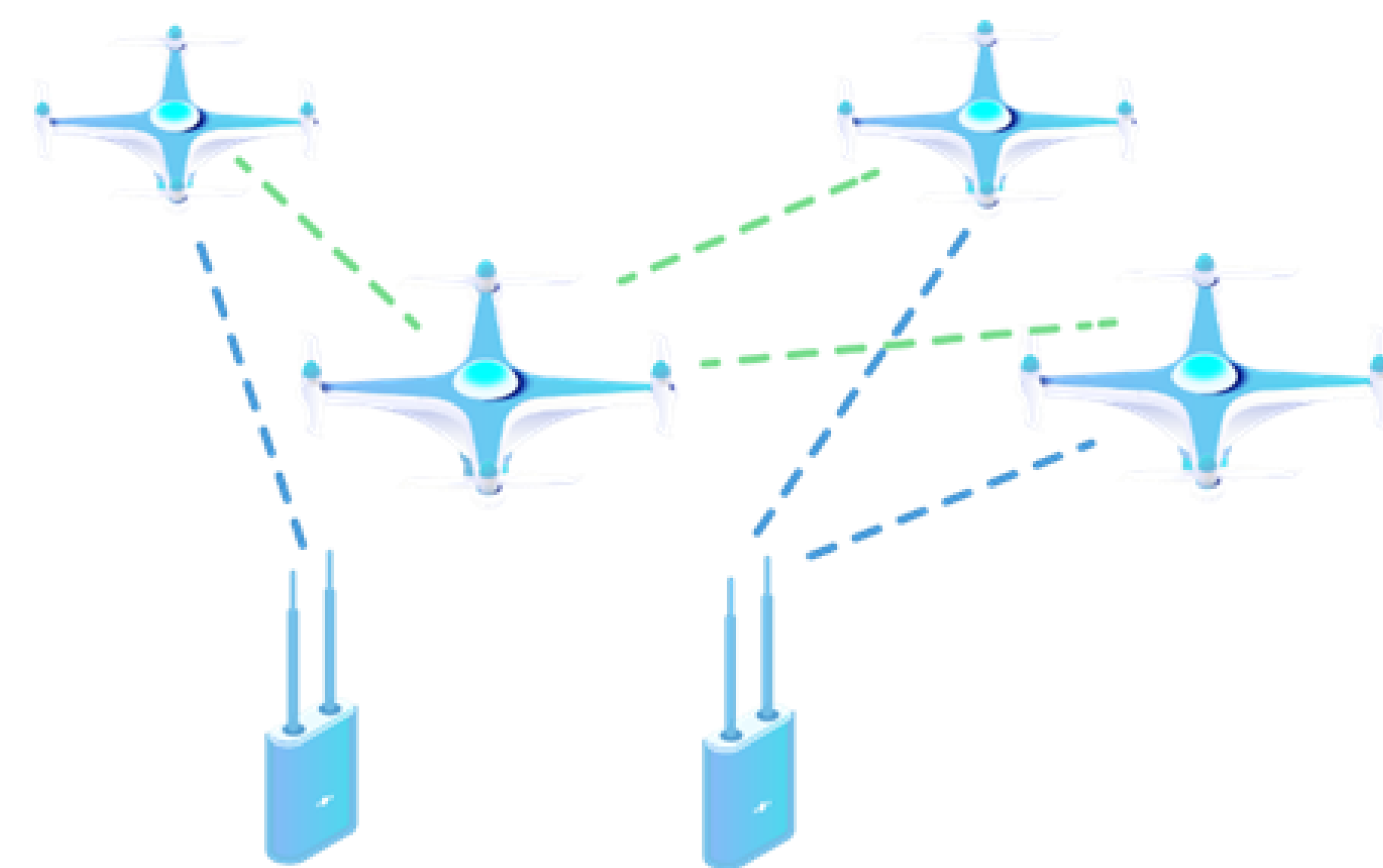— Improving the effectiveness and safety of AAM aircraft operations

Figure 1: Multi-path with relaying capabilities to improve reliability

Methods

— Planning and evaluation of an intelligent, fail-safe, low-latency and secure communication network in the 5G software stack

— Cooperation with the 5G-Opera project at European level

— Building of the communication network by AAM flying devices

— Investigation of quantum security in the network, dialectical approaches with own protocols, post-Shannon approaches against jamming attacks

— Development of AI-supported procedures that can react efficiently to dynamic changes in the communication topology

Results

— Publications and patents on the ideas mentioned

— Establishment of a testbed for mobile aircraft and their communication technologies

— Contribution of the testbed to the publications and cooperation within the project

Networking in the RTG

— Input on the scope and structure of AAM for the analysis of communication requirements and communication network architecture (T1, T7)

— Output from communication network simulations/testing for accident risk modeling (T3, T6)

— Input on location and density of AAM landing sites (T4)

— Exchange on sensor fusion, influence on communication network (T5)

Literature:

[1] J. C. Borromeo, K. Kondepu, N. Andriolli, L. Valcarenghi, R. Bassoli and F. H. P. Fitzek, "5G NR Support for UAV-Assisted Cellular Communication on Non-Terrestrial Network," European Wireless 2022; 27th European Wireless Conference, Dresden, Germany, 2022, pp. 1-7.

[2] Z. Xiang, F. Gabriel, E. Urbano, G. T. Nguyen, M. Reisslein, and F. H. P. Fitzek, "Reducing latency in virtual machines enabling tactile internet for human machine co-working," IEEE Journal on Selected Areas in Communications, vol. 37, no. 5, pp. 1098–1116, 2019

[3] J. A. Cabrera Guerrero, R.-S. Schmoll, G. T. Nguyen, S. Pandi, and F. H. P. Fitzek, "Softwarization and network coding in the mobile edge cloud for the tactile internet," Proceedings of the IEEE, 2018

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