

Opinion on the Paper for MCS Project

by FINICHIU Eduard - Adelin

FILS 1241 EB

The paper brings a fascinating and forward-looking perspective by integrating *deep reinforcement learning* with *UAV-based mmWave communication systems*. I particularly appreciate how the authors address one of the most critical challenges in next-generation networks: maintaining high-throughput links under mobility and blockage constraints. The use of UAVs as intelligent relays is both innovative and practical, especially in scenarios where ground infrastructure is limited or damaged. I found the concept of adapting beam alignment through DRL especially insightful, as it replaces rigid thresholds with a learning-based policy that can optimize performance over time.

One aspect I like is the clear formulation of the problem using an MDP framework, with states, actions, and rewards defined in a way that makes the approach theoretically strong and implementation-ready. The extension to Hierarchical Reinforcement Learning (HRL) adds another layer of realism, allowing the system to handle multiple frequency bands and reduce training complexity.

However, I believe the paper could have provided more discussion on real-world deployment challenges, such as computational constraints on UAV hardware and the energy cost of running neural networks in flight. While the simulations are convincing, more practical experiments or hardware demonstrations would increase the paper's credibility and applicability.

From this paper, I learned how DRL can be applied beyond traditional robotics or games, directly into wireless communication systems. I also realized that future 6G networks will not rely solely on fixed infrastructure but will include autonomous, AI-driven nodes such as drones. Overall, I found the paper highly inspiring, showing that artificial intelligence is not just an optimization tool, but a key enabler of the next generation of wireless technologies.