

# Performance Evaluation of UAV-based NOMA for 5G and Beyond

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**Abstract**—The use of Unmanned Aerial Vehicles (UAVs) as flying Base Stations (BSs) is an efficient way to enhance wireless communication throughput and coverage, especially in Line-of-Sight (LoS) networks. Both military and civilian applications have shown interest in studying communication aided by UAVs. Utilizing UAVs as BSs to expand the range of current cellular networks is widely discussed, and Non-Orthogonal Multiple Access (NOMA) is a potential approach for UAV communications. This paper investigates the use of NOMA for upcoming 5G radio access and beyond, focusing on a multiuser communication system in which a UAV-BS with a single antenna communicates with ground users via NOMA. Simulation results show that NOMA outperforms Orthogonal Multiple Access (OMA) in terms of rates, Energy Efficiency (EE), Spectral Efficiency (SE), and Signal to Noise Ratio (SNR). The main objective is to develop a MATLAB platform for NOMA-related systems at the system-level analysis. NOMA's SE performance is significantly higher than other potential 6G options. The paper provides a NOMA system for two or more users, and the system-level analyses include scenarios with three cells, seven cells, and 19 cells.

**Keyword**—6G, EE, NOMA, OMA, SE, SNR, UAV.



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