

QUESTION 6: STATEMENT OF RESEARCH PROJECT

This document provides a statement of purpose for requesting to transmit over-the-air for academic research at the University of Texas at Austin.

(a) Description of the nature of the research project being conducted:

The research project focuses on passive UAV positioning using wireless communication signals transmitted from a user equipment (UE) to multiple static radio units (RUs). The UAV is passive and moves within the experimental area without participating in the communication link, and instead affects the wireless channel through scattering and reflection, causing measurable variations in the received signals at the RUs.

The study involves designing and evaluating machine learning-based methods to estimate UAV position from these over-the-air wireless measurements. To support this work, an experimental wireless testbed based on NVIDIA Aerial integrated with Benetel Open RAN radio units (O-RUs) operating in the 3300–3800 MHz band will be used to conduct controlled experiments and collect datasets under realistic propagation and UAV-induced channel variation conditions.

(b) Showing that the communications facilities requested are necessary for the research project involved:

The requested communications facilities are essential to perform over-the-air collection of wireless channel measurements on a university campus. The NVIDIA Aerial platform and Benetel O-RUs enable controlled transmission from a UE to multiple O-RUs in the 3300–3800 MHz band, which is necessary to generate labeled datasets and evaluate passive UAV positioning algorithms under realistic propagation and UAV mobility conditions. Evaluating the proposed methods across different days and channel conditions is necessary to assess robustness under time-varying wireless environments.

(c) Showing that existing communications facilities are inadequate:

Existing publicly available datasets and research facilities do not support over-the-air data collection using a programmable Open RAN-based testbed in the 3300–3800 MHz band under controlled UAV scenarios. As a result, they are not sufficient for generating the specific type of measurement data required for this study on passive UAV positioning. In particular, the study requires wireless measurements across diverse channel conditions, including variations in UAV location, mobility, and propagation environments, to enable rigorous evaluation of algorithm performance and generalization. Such controlled and varied data collection is necessary for meaningful validation and reproducibility in the research community. Therefore, a dedicated experimental setup is required to collect the necessary wireless measurements for algorithm development and evaluation.