TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABSTRACT

In the evolving landscape of 6G wireless communication, Unmanned Aerial Vehicle (UAV)-assisted covert communication has emerged as a promising technique due to the UAVs' high mobility, flexible deployment, and ability to dynamically adapt to environmental changes. These attributes make UAVs particularly effective in supporting covert transmission, where the goal is not only to ensure secure data delivery but also to prevent detection by unauthorized receivers.

However, one of the major challenges in such systems arises from the presence of ground obstacles such as buildings, trees, and terrain irregularities which significantly affect the characteristics of air-to-ground (A2G) communication channels. These obstacles can cause signal attenuation, multipath fading, and non-line-of-sight (NLoS) conditions, all of which degrade the quality and reliability of the communication link.

To address these issues, this study introduces a novel *Obstacle-Assisted UAV Covert Communication* (OA-UCC) scheme. The proposed method integrates real-time obstacle information into the transmission strategy by jointly optimizing UAV positioning and transmit power. By doing so, it becomes possible to exploit natural and artificial obstacles as allies to enhance covert performance effectively using them to block potential eavesdroppers or to create more favourable propagation paths for the legitimate receiver.

The UAV's potential flight locations are categorized into distinct placement scenarios based on the spatial distribution of obstacles and the relative positions of the transmitter, legitimate receiver, and eavesdropper. For each scenario, the optimal UAV positioning region is analytically and numerically determined to maximize the covertness of the transmission while maintaining acceptable communication quality.

Simulation results substantiate the effectiveness of the proposed OA-UCC scheme. Compared to conventional UAV deployment strategies, this method demonstrates superior performance in terms of both covert transmission success rate and energy efficiency. The results also highlight that by carefully leveraging obstacle information, UAVs can achieve near-optimal placement without exhaustive search, thus enabling practical implementation in dynamic 6G environments.