Title: Coverage Analysis for Users in Big Events Using Drone-based Signal Propagation in Stadiums

1. Introduction:

This report presents a code designed to analyze the signal strength and coverage for users in big events, specifically focusing on FIFA events in stadiums. The code utilizes drone-based signal propagation modelling to evaluate the effectiveness of signal transmission and provide insights into coverage within the stadium environment. By simulating the use of drones as signal transmitters, the code enables the assessment of signal strength for users attending large-scale events.

2. Code Functionality:

The code utilizes advanced ray tracing techniques to model signal propagation in a stadium setting. It takes into account various factors that affect signal strength, including material interferences, weather conditions, and foliage losses. By employing drones as signal transmitters, the code allows for the analysis of signal coverage and strength for users present within the stadium.

3. Usage:

To utilize the code, follow these steps:

- Ensure the code is properly configured with the necessary functions and libraries for ray tracing and signal propagation modelling.

- Define the stadium layout within the code, including seating areas, walls, roof, and other relevant structures.

- Specify the positions and properties of the drones acting as signal transmitters. Consider factors such as transmission power, antenna characteristics, and placement within the stadium.

- Set the simulation parameters, such as the number of users, their positions within the stadium, and the desired duration of the simulation.

- Run the code to initiate the simulation and calculate the signal strength for each user at different locations within the stadium.

- Analyze the output data, which provides information on signal strength and coverage across the stadium. This analysis can assist in evaluating the effectiveness of signal transmission and identifying areas with potential coverage limitations.

4. Customization and Extensions:

The code can be customized and extended to suit specific requirements. Consider the following possibilities:

- Incorporate realistic weather models to simulate weather effects on signal propagation, such as rain, wind, or temperature variations.

- Expand the code to include advanced material interference models, accounting for reflective surfaces, absorptive materials, and obstacles present within the stadium.

- Integrate different propagation models to evaluate signal behaviour in various scenarios, such as line-of-sight, non-line-of-sight, or multi-path propagation.

- Enhance the code to support real-time analysis and visualization of signal strength during live events, providing insights into coverage fluctuations and potential areas of concern.

- Consider the impact of user mobility within the stadium by introducing dynamic user movement patterns to assess signal strength and coverage during user transitions.

5. Conclusion:

The presented code offers a valuable tool for analyzing signal strength and coverage during big events, particularly in stadiums hosting FIFA events. By leveraging drone-based signal propagation modelling, the code enables the evaluation of signal transmission effectiveness and coverage within the stadium environment. This analysis can assist in optimizing signal transmission strategies, ensuring seamless coverage, and enhancing the overall user experience during big events.

Disclaimer: It is essential to comply with local regulations and permissions related to drone usage and adhere to appropriate safety guidelines when implementing drone-based signal propagation analysis during real-world events. Additionally, considerations of interference management, power limitations, and spectrum allocation are crucial for effective signal transmission in event scenarios.

Note: This report provides an overview of the code's functionality and potential applications. It is recommended to review and adapt the code according to specific project requirements and consult with experts in signal propagation analysis and event management to ensure accurate assessments and implementation considerations.

Ali shujaa

National University of Malaysia.