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THE DESIGN AND IMPLEMENTATION OF AN LTE NETWORK FOR HIGH-ALTITUDE ROCKET
LAUNCHES**Abstract**

This paper presents the design, implementation and some challenges of developing an LTE network for high-altitude rocket launches. The paper covers the development process of an LTE network, including the necessary hardware, software, and network components. The CU InSpace LTE network was designed to support a wide range of potential applications such as providing a reliable and secure communication platform for team members, a way to collect telemetry data and the infrastructure for real-time video streaming from the rocket. Traditionally team members would use handheld radios for communication but during competitions where hundreds of teams are participating, issues of radio frequency interception are abundant. Additionally, handheld radios have the disadvantage of not being able to communicate over long distances. In the field, the team would deploy a base station and several antennas and a network controller to manage the network. The base is designed to have a range greater than 10km and is would be able to maintain a stable connection with the rocket. The implementation of this network would be a challenging process, as the team has to ensure that the network is capable of withstanding some of the difficult conditions of a launch procedure. Firstly, the CU InSpace has to overcome the issue of interference and signal attenuation. To address this issue, directional antennas with high gain and a specialised frequency band are being used to minimise the effects of interference. Furthermore, CU InSpace has to develop custom software to manage the network and ensure the reliable transfer of data from the rocket to the ground as well as from person to person through a mobile application. Some features of the software include being able to analyse the rocket telemetry data and provide real-time feedback and manage the communication between team members. In conclusion, the development of an LTE network for a high-altitude rocket launch is an incredibly complex process that requires a lot of time and effort. Successful implementation of the CU InSpace LTE network would provide a reliable and secure communication platform for the team during the launches as well as give the team a reliable way to capture, analyse and transfer data from the rocket.