

5G! DRONES

The 5G!Drones project conducted the first Feasibility Tests in Finland

On 24-28 August, 2020 the partners of the 5G!Drones project conducted the first physical tests in Finland, in which 5G infrastructure owners Aalto University and the University of Oulu and technology companies CAFA Tech, HEPTA, NOKIA and Robots.Expert participated.

Feasibility tests took place in two locations in Finland:

- On Monday, August 24, we performed tests at Aalto University in Espoo, Finland.
- On August 27 and 28, we performed tests at the University of Oulu in Oulu, Finland.

In Aalto University, CAFA Tech tested how UAV through 5G network capabilities can provide logistics solution. The scenario was the delivery of a medicine (paracetamol) to a sick person with a drone. A sick person who cannot go to a pharmacy can receive his/her medicine through a personal delivery by subscribing to a Drone Logistics Network (DLN). A DJI Mavic drone took one medicine (up to 50g) from a virtual pharmacy and flies towards the customer personal delivery box.

The figure below shows 5G communication chain and technologies used for Aalto feasibility test.

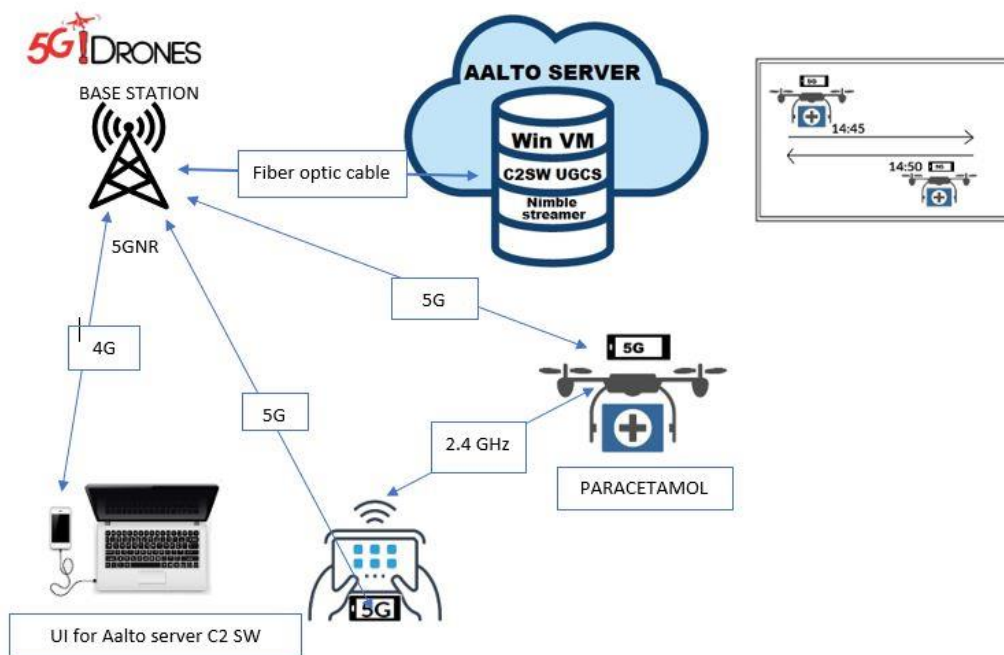


Figure 1 - Description of technologies on the feasibility tests in Aalto University August 24, 2020

Robots.Expert helped to plan and monitor compliance with safety requirements and acted as Airboss (safety coordinator) in Aalto and Oulu tests.

In Oulu University we tested 5G Quality-of-Service (QoS) mapping and infrastructure inspection flights. The tests were carried out at four locations in order to find the best location where the coverage of the 5G test network would be ensured and where it would be safe to carry out the tests.

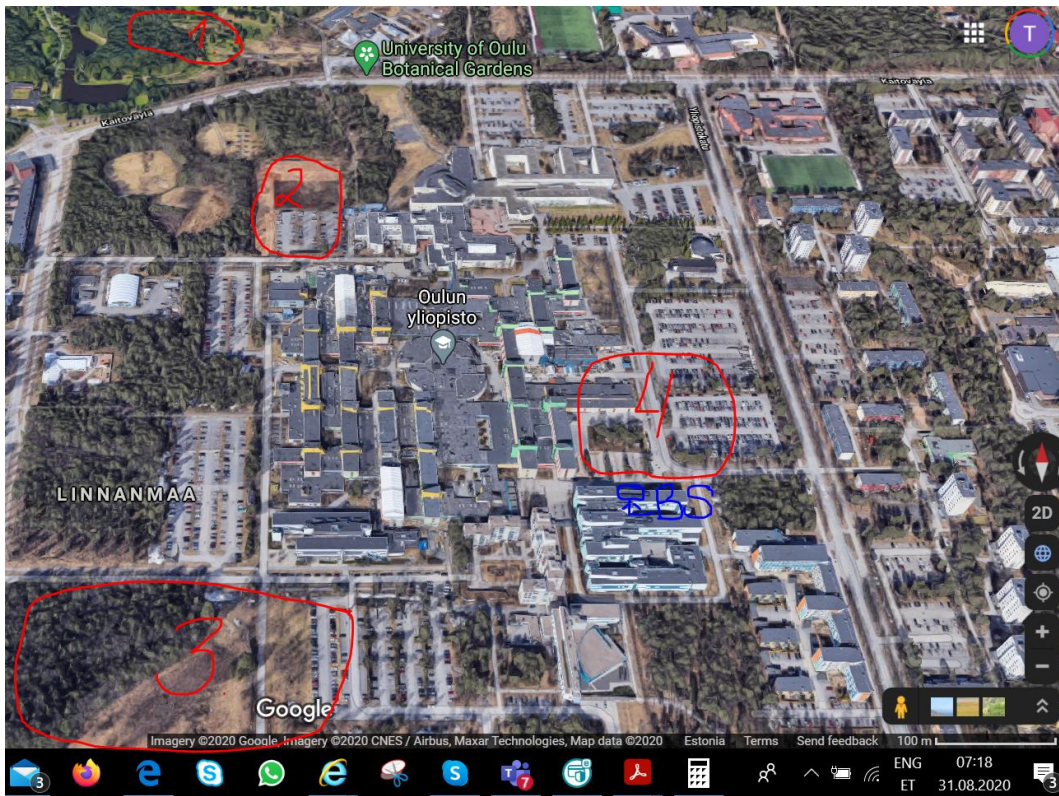


Figure 2 - Locations with 5G base-station marked with blue BS (27-28 August, University of Oulu)

The CAFA Tech’s drone (DJI Mavic) carried 5G smartphone and measured the quality of 5G coverage from various positions with 3D coordinates (X, Y, Z). Measurements of the 5G signal strengths were made on two planes: 20m and 40m. Speed tests (Downlink and Uplink) were made on level of 30m. Recorded measurements show that the results are in clear accordance with the antenna parameters of the University of Oulu 5G base station (direction NW and arrival down).

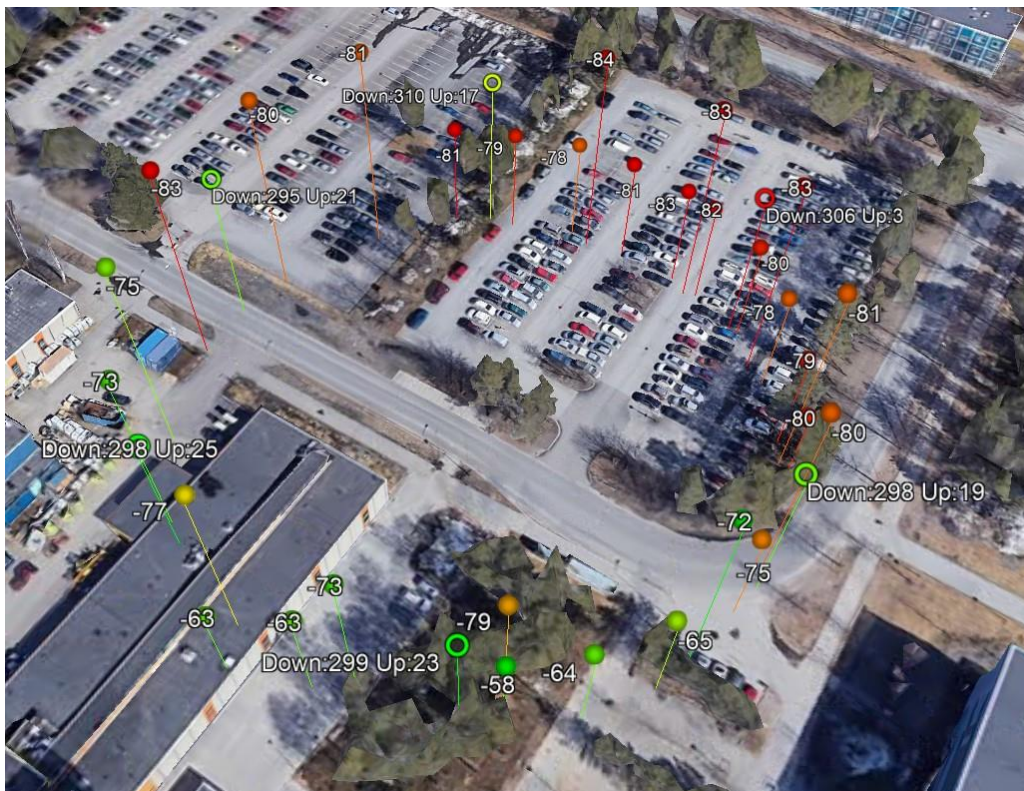


Figure 3 - 5G QoS measurement results in University of Oulu combined 20m-30m-40m signal strengths and speed tests 2020-Aug-28 at 14:15-14:55PM

In parallel, the Nokia team conducted feasibility tests using the Nokia 5G test network and gained good experience on how to plan next tests as per 5G!Drones use case scenarios.

Similarly, Hepta conducted feasibility tests for infrastructure flight supported by 5G. Hepta used DJI Matrice 600 drone equipped with one LIDAR for infrastructure inspection. The figure below explains the planned use case of Hepta.

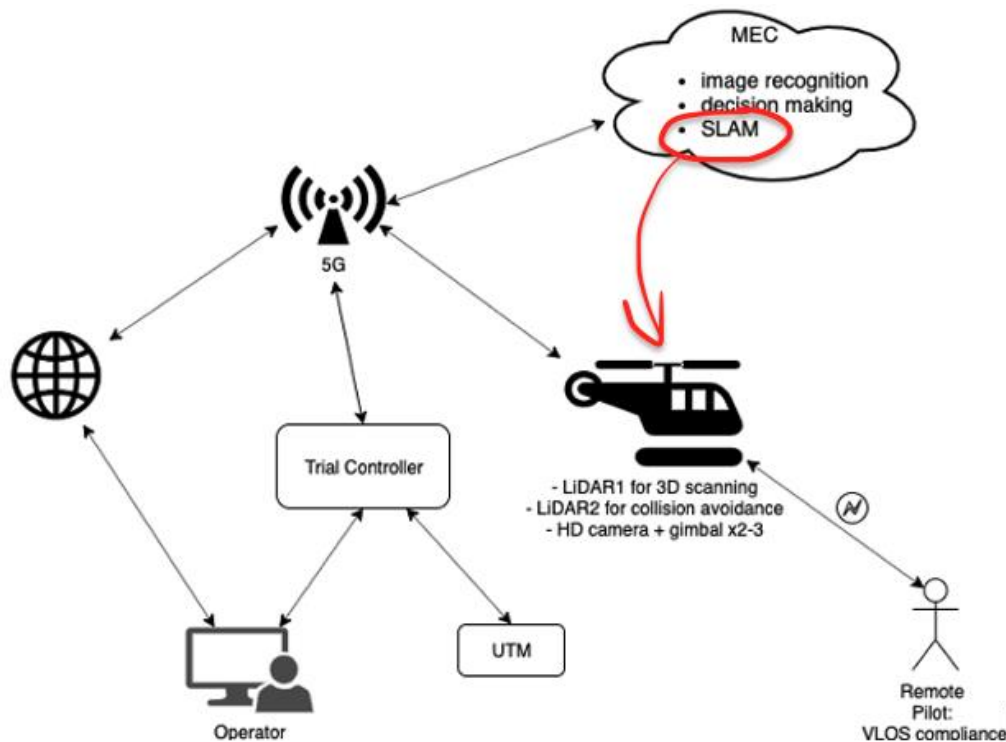


Figure 4 – Hepta planned use case

Initial conclusions

1. Preliminary work by Aalto and Oulu Feasibility tests started in the beginning of June and it is really important the appropriate planning to take place early enough before the execution of the actual trials.
2. Both Aalto and Oulu flights were carried out in an automated way - this means that, as planned in the 5G! Drones project, the drone flight control (C2) software runs on a 5G Edge server and sent C2 data to the Remote Controller (RC) and directly to the 5G smartphone on board the drone.
3. We received very important preliminary inputs for 5G!Drones next developments: WP2 (Trial controller) and WP3 (Enablers) activities. Given that 5G drones require both a 5G network and drones to work, we had a good initial experience of how the parameters of the 5G base station should be set in the future for the upcoming activities and trials.

