



Boston University
Electrical & Computer Engineering
EC464 Capstone Senior Design Project

Final Testing Test Plan

5G Network Performance Testing - Sky Seer



Team #16
5G Drone Team Red

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Overview and Setup

Data Collection Software:

The overall system for the project has a hardware and software component. The software component includes a Kotlin-based Android application, using the Ookla SDK and connected with a Firebase Firestore database, a Flask web application, and a machine learning model.

The main point of this test is to present the process of data collection. Our Android application can automatically run to gather data and push the collected data to our database. The web application shows and controls the status of data collection, pre-processing data for training, and predicting network performance with the machine learning model.

The constraints for this test, since it will be conducted in the lab, are that our application will only collect ground network speed data as a demonstration. Secondly, the machine learning model will be demonstrated through previously collected data since there is not enough time to gather a larger dataset during the test block and there will be no data at higher altitudes. Finally, the altitude that our app measures via GPS in the lab could be unreliable since the lab is on the bottom floor of a building.

The main setup is to ensure the phone is connected to the desired network, which would be the AT&T 5G network. Next is to open the mobile app on the phone and open the web app, database, and machine learning model on laptops.

Drone/Hardware:

The hardware component consists of an assembled drone and a 5G Android phone with a 5G SIM card. The 5G Android phone is mounted on the drone and runs the data collection software during flight to collect data as the drone is flown at different altitudes.

In the second prototype test we only showed that the drone can turn on and the propellers can be controlled with the RC transmitter. We did not actually fly the drone since we were in the lab. Now we will show a video of the drone flying during one of our data collection trials to prove it works. The main purpose of this test is to simply show that the drone can fly with the phone mounted on it.

The only setup required is to load up our video on a laptop to show it to the professors/TAs.

Testing Materials

Hardware:

- 5G Android phone with SIM card
- Laptop(s)

Software:

- Android data collection mobile application
 - Ookla speedtest via Speedtest SDK (provided by Ookla)

- GPS via Android native hardware
- Flask web application
- Machine learning model code
- Firebase Firestore database

Drone Testing Procedure

1. Show a video of the drone flying to demonstrate that it works

Drone Testing Criteria

- ☐ Drone flies

Data Collection Software Testing Procedure

1. Run mobile application manually
2. Run mobile application remotely via our web application
3. Observe collected speedtest data (via SDK) and longitude/latitude/altitude data (via GPS)
4. The collected data is pushed into the database (multiple observable iterations)
5. The machine learning algorithm is run to produce predictions from data in database
 - a. Read data from the database
 - b. Data pre-processing for training
 - c. Calculate predictions
 - d. Plotting for visualization

Data Collection Software Testing Criteria

- ☐ Network speed tests can be performed by the phone through our app
- ☐ Data collected by the phone is pushed to the database
- ☐ Web application can control data collection via the phone
 - ☐ Remotely control the network test operation on the Android app
 - ☐ Fetch the result whenever the test is finished
- ☐ Data can be accessed from database for use in the machine learning algorithm
 - ☐ Import data from Firestore database
 - ☐ Data pre-processing
- ☐ Machine learning algorithm can calculate predictions from gathered data
 - ☐ Use the collected data to make predictions
 - ☐ Make note of the predictions that the ML model made
- ☐ Location data
 - ☐ Longitude, latitude, and altitude is recorded by our Android app