

1 Wireless Connectivity Map

In the following project the student is required to implement an application that is able to map the wireless connectivity in a geographic area. The goal of the application is to obtain a heatmap of a geographic area in which the strength on the wireless signal (the RSSI) is mapped to a color scale (e.g. red to green). The values represented on the map are to be obtained through actual readings from the wireless network interfaces of the smartphone. This has to be performed for the following technologies: UMTS (3G), LTE (4G) and WiFi. More in particular the requirements of the application are as follows:

1.1 Use of the Google Maps APIs

The application has to map the position of the user as well as any data collected in the geographic map. As the user moves in the map (when the application is active) a value has to be produced by the application and it has to be reported on the map in the form of a color associated with the area the user is in. Google Maps uses the GPS coordinates to encode locations, however, the student has to shift to a location (point) based encoding to an area encoding. The student can choose the way he/she wants to encode areas, with the only constraint that the whole map can be covered (e.g. if we use non overlapping circular areas there will be unavoidably “holes” in the map). hint: one way to do it could be using GPS-dependent square areas, or MGRS coordinates, or overlapping circular areas.

1.2 Convert the RSSI in a color encoding

The received signal strength in every area should be reported on the map in the form of a clear color scale. Whenever the user occurs within a new area, such area has to be mapped and reported on the map. Whenever a user occurs within an already mapped area in a reasonably distant point in time (e.g. after 1 day, or it can be asked as a configuration parameter in the app) a new value has to be generated and the mean of the value readings in the same area should output a new color. The number of the reading for each area should be taken into account too (e.g. using more transparency for areas with less readings).

1.3 Three technologies

The application should be able to switch among three different maps depending on the technology being used, in other words, each technology (UMTS, LTE, WiFi) outputs a different map.