Lab 6: Frequency Planning and RSS Measurement in Cellular Networks

Objectives

- To draw cellular _____ terns
- To measure and _____ strength

Prerequisites

- Knowledge of c_____ use techniques
- Access to a mob_____

Task-1 Frequency re-use [2 marks]

In this set of experiments, you will draw cellular frequency re-use patterns on tessellated hexagon maps.

a. **[0.5 mark]** For a frequency re-use factor of 1/9 (cluster size = 9), show the nearest co-channel cells for cell-A shown in the map of Figure 1 (A blank hexagonal tessellation map is available from the following URL: https://bblu.org/2014/11/27/jo/). [Hint: you will have to work out the values of i and j first.]

b. **[0.75 mark]** For a frequency re-use factor of 1/12 (cluster size = 12), show the nearest co-channel cells for cell-A shown in the map of Figure 1.

c. **[0.75 mark]** Using the map of Figure 1, show clusters of size 9 repeated all over the map. Use the letters A to I to represent the 9 members of each cluster. For ease of visualisation, outline the cluster borders with a different colour.

Submit the maps in your PDF report.

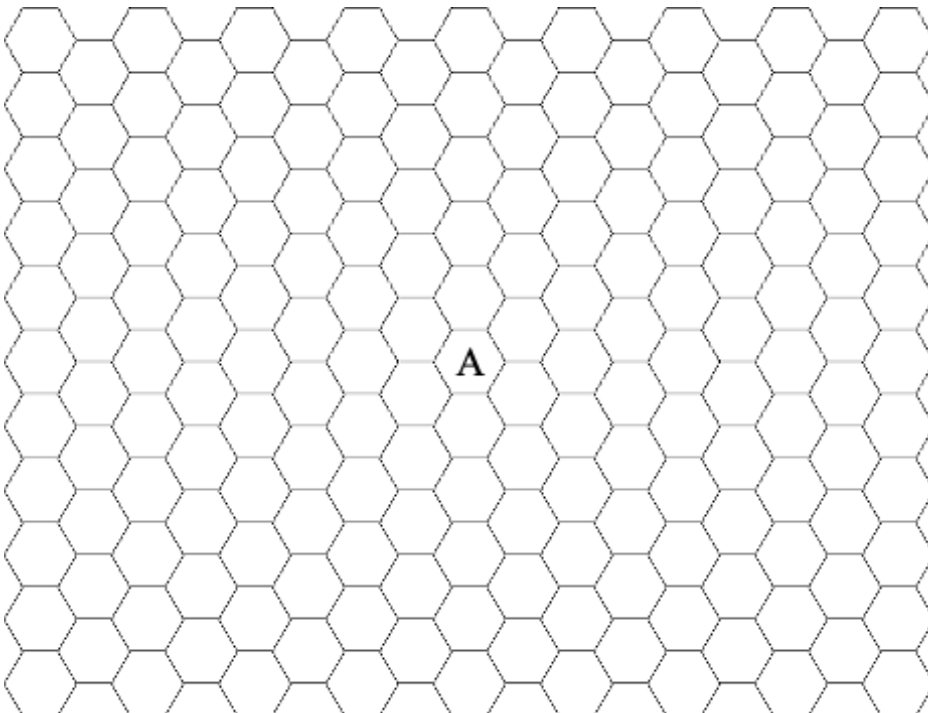_Figure 1: Tessellated hexagon map_

Task-2 Measuring cellular signal strength [2 marks]

In this task, you will measure and analyse cellular network signal strength in your home. You will measure signal strength at different locations of your home and indicate them on a basic map of your home (optionally, you ⬚⬚⬚⬚⬚⬚⬚AB *temperature plot* to present your data, which is more visually appealing). The ⬚⬚⬚⬚⬚⬚d be repeated for two different heights, on the floor and at an elevated position, ⬚⬚⬚⬚le phone is placed on a chair. Your measurement spots should not be further th⬚⬚⬚⬚⬚⬚lly) from the nearest spot.

The parameter you will ⬚⬚⬚⬚⬚⬚eference Signals Received Power (RSRP), which is type of RSSI measurement. ⬚⬚⬚⬚⬚ower of the LTE Reference Signals over a narrowband channel.

The measurement tool:
- **iPhone:** Open the "Phone" app on your Phone and enter the following number exactly: *3001#12345#*
  Press the Call button to dial the number, this will immediately launch the hidden "Field Test Mode" app on the iPhone. Older iPhones may get a different menu than recent models. You can find RSRP or RSSI in dBm by searching in the app.
- **Android:** There are plenty of apps for android to observe RSRP. We recommend:
  https://play.google.com/store/apps/details?id=com.wilysis.cellinfolite&hl=en_AU
- **Other phones:** You can find an appropriate method similar to the above phones. If you have difficulty contact your tutor.
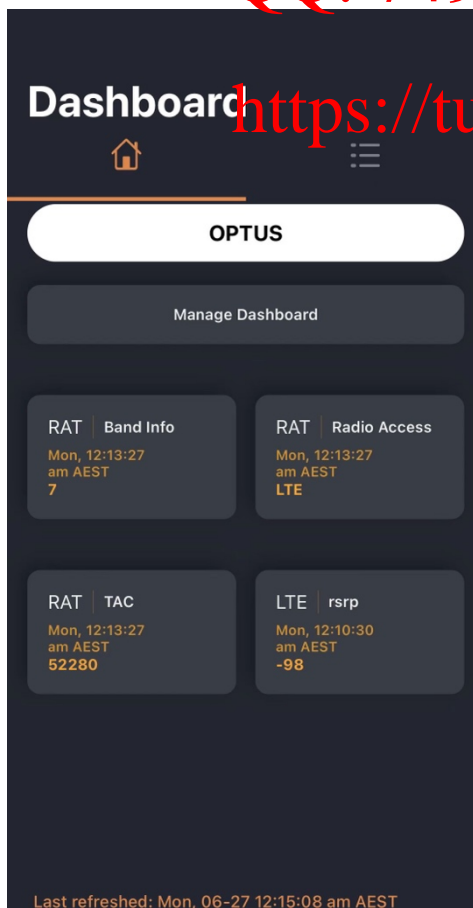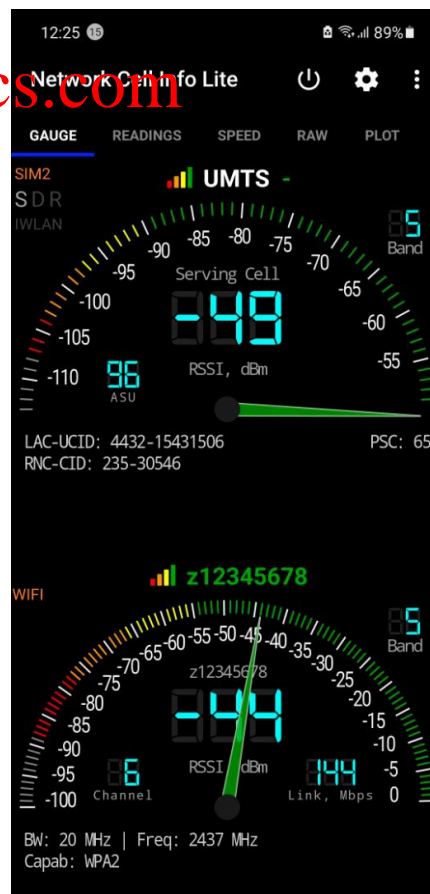
Figure2: iOS 15 RSRP   *Figure3: Network Cell Info APP in Android*

For both android and iPhone users, you may also find the second strong base station signal as a neighbour. If applicable, please measure and compare the RSRP or RSSI of the current cell and the neighbour in three location and show them on another map.

Submit your report that includes the above tasks outcomes.

Penalty at the rate of 5% per day will be strictly enforced for all lab submissions. All submissions will be subject to the usual plagiarism rules.

End of Lab 6 – Hope you enjoyed this lab.

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