Homework 1 submission

ECET 512 — Wireless Systems

Siddhesh Deodhar
ID: 14528073

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1 Submitted files

For this assignment, besides this report, the following archives were created:

1.1 SRC Folder

+ *"demo.m"*: This function was given for the homework as a part of code framework
+ *"drawCell.m"*: This function was given for the homework.
+ *"drawCluster.m"*: This function allows the user to plot a cluster of N cells with N being 3,4 and 7 only as asked.
+ *"ServingCell.m"*: This function computes the serving cell. The serving cell is highlighted and a line is drawn from mobile to center of the serving cell.

1.2 DOC Folder

+ *"video.avi"*: This video shows how a mobile user moves through a set of 7 seven clusters of 7 cells each. A colored line connects user with active base station. It can be opened in VLC media player.
+ *"cluster1.jpg, cluster2.jpg and cluster3.jpg"*: These images represent the different cluster sizes 7,4 and 3.
+ *"friss.jpg"*: This is the Friis plot for the Received Power(decibels) by the Mobile user. The dots in the graph indicate the sampled real locations of the moving user from the base station.

2 Code explanation

The code for this homework has been developed with MATLAB 2022a. The mobile moves across different cells along a fixed path. Real time locations of mobile are sampled. Number of samples are increased with increase in frame rate. An array stores the real time sampled distances from active base stations. Then it is sorted in ascending order. The sorted array is then used to plot the friss equation where received power is in decibels.

3 Homework 1 Solution

3.1 implications of the circular cell-to-mobile distance assumption

By assuming circular cell-to-mobile distance we assume that the antenna is isotropic. That means equally radiating in all directions. We also assume the environment to be isotropic. That means having uniform electromagnetic medium properties.

4 Running the Matlab code

Open the demo.m file in MATLAB along with all other .m files. The 6th line in demo.m file is setting the cluster size. It can be set as 7,4 or 3 as asked. The frame rate can be changed in line 11. Power of transmitting antenna can be changed in line 75.