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CS425: Assignment 1

Step 1: Finding the Path Loss Exponent

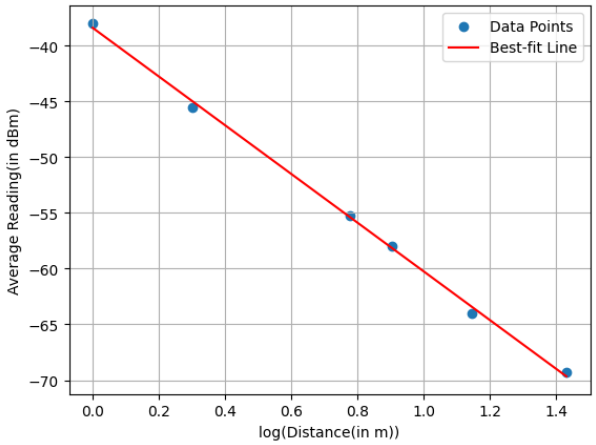
This report outlines the findings of an experiment conducted to determine the path loss exponent in a wireless network environment, It involved the use of a WiFi Analyzer app to collect the RSSI samples and analyze them to determine the path loss exponent.

RSSI Measurements

Distance(m)	Reading 1	Reading 2	Reading 3	Reading 4	Average (dBm)
1	-38	-39	-38	-37	-38
2	-46	-44	-47	-45	-45.5
6	-55	-54	-55	-57	-55.25
8	-58	-57	-59	-58	-58
14	-63	-65	-63	-65	-64
27	-69	-70	-68	-70	-69.25

These values were calculated in my hostel corridor using the WiFi service provided by IITK(iitk-sec) at the given distances in various orientations.

Path Loss Exponent Calculation



The graph has been plot using a python library i.e. **Matplotlib**.

The equation of the line obtained is

$$y = -21.8302 * log(Distance) + -38.4099$$

Slope of the graph comes out to be -21.83
Path loss exponent = $|\frac{slope}{10}| = 2.18$
Variance comes out to be = 0.193

Step 2: Range Estimation

The value of $P_r(d_o) = -38.41$ dBm, calculated by using $d_o = 1$m and $d = d_o$.

Actual Dist(m)	**Average Reading(dBm)**	**Calculated Dist(m)**	**Error(m)**
3	-50	3.396	0.396
7	-57	7.105	0.105
9	-59	8.774	0.226
12	-62	12.04	0.04
19	-66	18.36	0.64

The average reading is calculated by the average of the 4 RSSI readings given by the WiFi- Analyser App at the above-shown distances. Calculated distance has been calculated by putting these RSSI readings in the below formula.

$$P_r(d)[\text{dBm}] = P_r(d_0)[\text{dBm}] - 10n \log_{10}\left(\frac{d}{d_0}\right)$$

The average error in calculated distance = 0.2814 m, which is due to the noise between the transmitter and the receiver.