Experiment- 2
Review of Coverage in Indian Homes/Hostels

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***Abstract*—In this experiment, we review the coverage of Wi-Fi APs near our hostel zones. We look at coverage in 2.4GHz as well as 5GHz. We look at the dependence of the RSSI (Received Signal Strength Indicator) on the distance from the AP and the number of walls between AP and laptop.**

THEORY

The following path loss relation is noted:

$$RSSI(dB) = RSSI_{\text{ref}}(dB) + 10 \times \text{PathLossExponent} \times \log(\text{Distance})$$
$$+ \#\text{walls} \times \text{WallAttenuationFactor}$$

5GHz is typically faster than 2.4GHz, but dies out faster. Theoretically, for 5GHz, the PathLossExponent as well as the WallAttenuation Factor is expected to be larger in magnitude than 2.4GHz.

OBSERVATIONS

The desired pcap files were captured from the hostel zone. It is noted here that the Wi-Fi AP I used is the same one used by EP21B001 (Abhinav) also, since we're in the same hostel.

CDF of RSSI

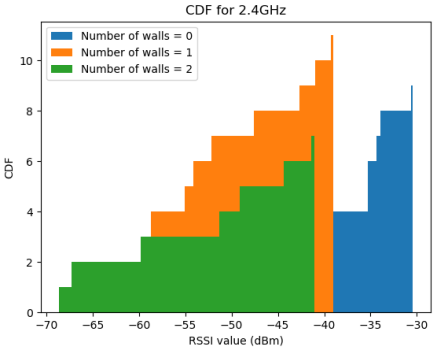

Fig. 1. 2.4GHz

We can clearly see from the plots that as the number of walls increases, the RSSI decreases. This clearly due to losses due to obstacles. An anomalous result is observed for the 5GHz case, this could be due to the fact that we're not accounting for the thickness of the walls.

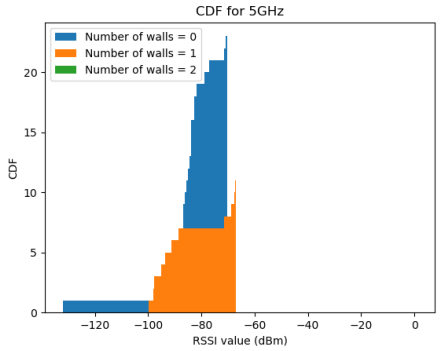

Fig. 2. 5GHz

Scatter plot of RSSI in 2.4GHz vs 5GHz

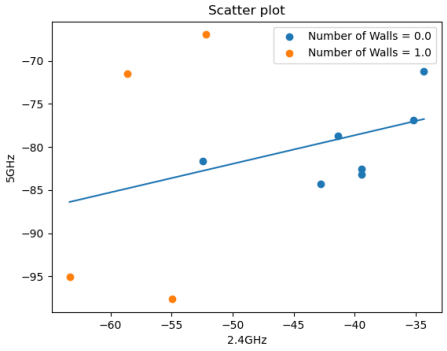

Fig. 3. Scatter Plot

The scatter plot was approximately linear, as expected. The coefficients of the linear regression were found to be: $[0.33138618 - 65.37868845]$.

Path loss coefficients regression

```
RSSIref=-34.62612848693432, path_loss_exp=-0.7950429132911006, walls_attenuation_factor=-5.19527426890893
RSSIref=-71.94769916622457, path_loss_exp=-0.782464843264093, walls_attenuation_factor=2.332060969165119
```

Fig. 4. Values of regression obtained from Python Code. The first row is for 2.4GHz and the second row is for 5GHz.

The path loss was found to be similar in both cases, which is an anomalous result.

Scatter Plot of Signal vs Interferer RSSI values

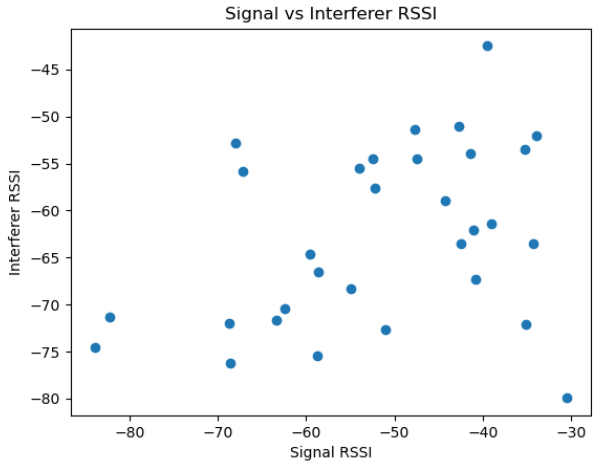

Fig. 5. Signal Interferer Patter for 2.4 GHz

REFERENCES

[1] Python Documentation https://docs.python.org/3/
[2] Scapy Documentation https://scapy.readthedocs.io/en/latest/