Introduction to Wireless and Mobile Networking — Homework 1

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Github: https://github.com/awinder0230/2017-Spring-Wireless-and-Mobile-Networking

Problem Description:

A base station and a mobile device locate in an urban area with temperature 27°C. Here, we consider a downlink case. The channel bandwidth is 10MHz. The power of the base station is 33dBm. The transmitter gain and the receiver gain are both 14 dB. The height of the base station is 1.5m, which is located on the top of a 50m high building. The position of the mobile device is 1.5m high from the ground.

Submission Files:

- report: b03901032_hw1_report.pdf
- readme: b03901032_hw1_readme.pdf
- codes:
    - main.m
    - dB_2_watt.m: a function convert units from dB to Watt.
    - dBm_2_watt.m: a function convert units from dBm to Watt.
    - watt_2_dB.m: a function convert units from Watt to dB.
    - SINR.m: a function a function given signal, interference, and noise power, calculate SINR.
    - thermal_noise_power.m: a function given temperature and bandwidth, calculate thermal noise power.
    - two_ray_ground_model.m: given distance, height of transmitter and receiver, calculate gain of channel.

Usage:

1. Put all the *.m codes under the same directory.
2. Open Matlab and run main.m to get the simulation result.

Result:

1. Consider the **path loss** only radio propagation without shadowing and fading. Use **Two-ray-ground model** as the propagation model for simulation.
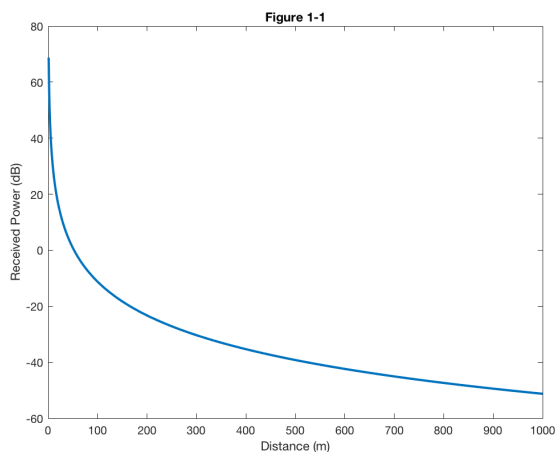

Figure 1-1
   - x-axis: distance between the BS and the mobile device
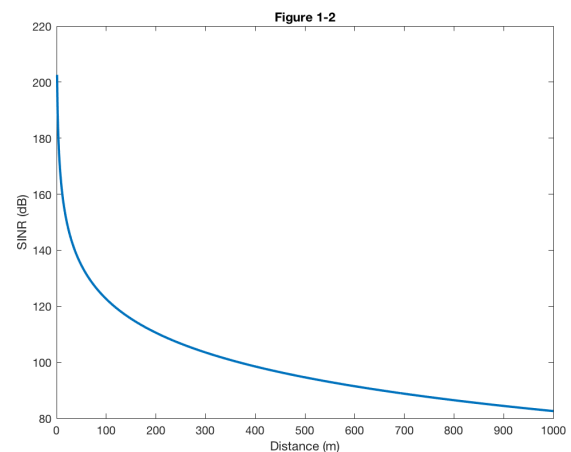   - y-axis: received power of the mobile device

Figure 1-2
   - x-axis: distance between the BS and the mobile device
   - y-axis: SINR of the mobile device

2. Consider both the **path loss** and **shadowing.** Apply **log-normal shadowing** to model the shadowing effect. The path loss model should be the same as 1-1.
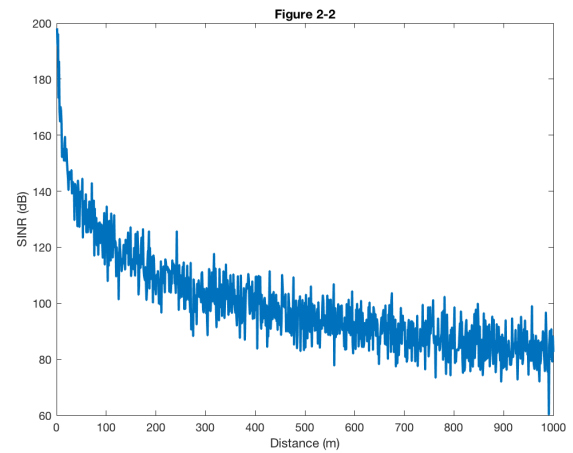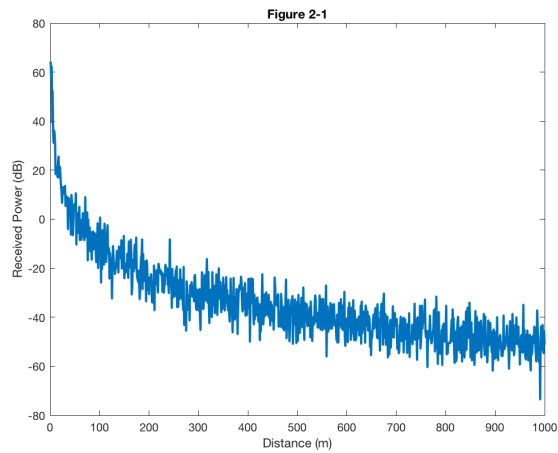

Figure 2-1
- x-axis: distance between the BS and the mobile device
- y-axis: received power of the mobile device

Figure 2-2
- x-axis: distance between the BS and the mobile device
- y-axis: SINR of the mobile device