CprE 546: PA4

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1. What function did you call to control TX power, and with what parameters?
   Function used: NETSTACK_RADIO.set_value();
   Parameters passed: RADIO_PARAM_TXPOWER and tx_level
   RADIO_PARAM_TXPOWER is the parameter declared in netstack.h where the required transmission power is stored
   tx_level is the variable declared for storing the value

   To check the actual TX power transmitted,
   Function used: NETSTACK_RADIO.get_value();
   Parameters passed: RADIO_PARAM_TXPOWER and &tx_level

   This function gives the value of actual transmitted power by sensor node.

2. What appears to be the relationship between RSSI, TX power, and distance?
   RSSI (received signal strength indicator) depends on the TX power and the separation distance between the nodes. RSSI improves if TX power is increased or the distance is reduced or both.
   The received power, transmitted power and distance are related as:

$$P_r = P_t * c/L^{\alpha}$$

   Pr is received power,
   Pt is transmitted power
   L is distance between transmitter and receiver
   α is path loss exponent

3. Compare and contrast the curves for the different environments and discuss reasons for differences.

   Similarities:
   1. Overall it can be seen that RSSI improves with increasing TX Power and smaller distance for both places.
   2. The rate of change is also similar.
   3. For smaller distance values i.e. 1m, 2m the RSSI is similar.

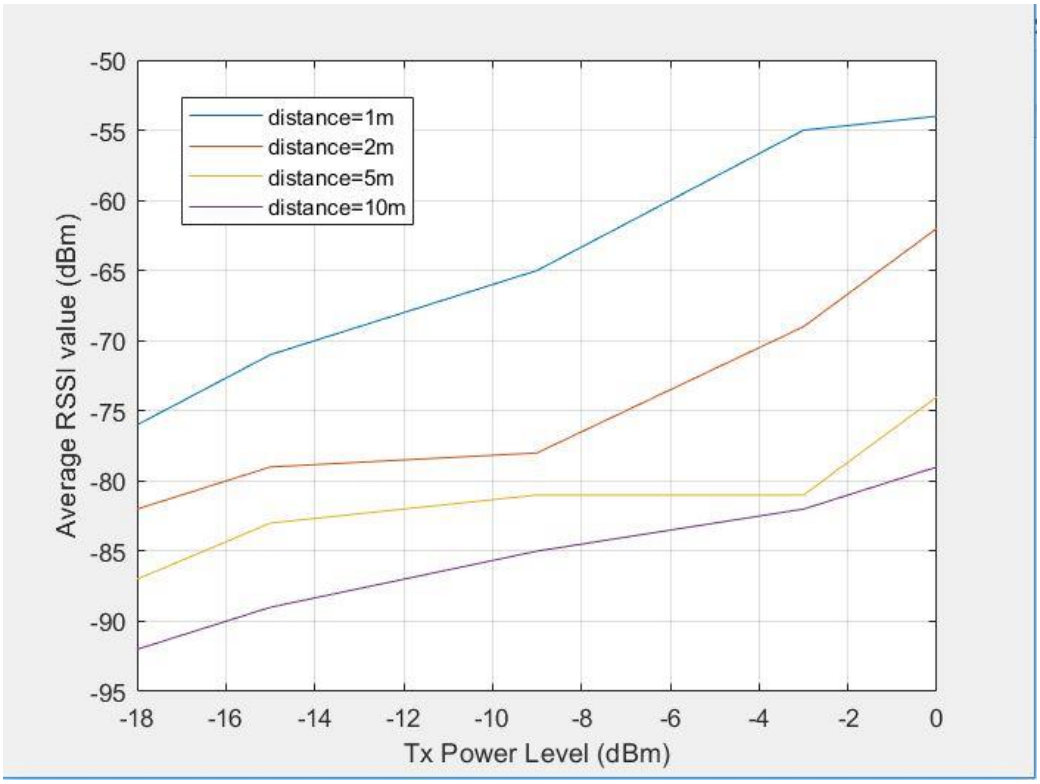
Differences:

1. For larger distances, i.e. 5m and 10 m, RSSI is less at crowded environment which makes sense as there are obstacles and noise present. Where as in the open area, such sources of interference and losses are not present thus RSSI is more for same values of Tx power and distance.

4. If your results are not consistent with theory, what might have caused the inconsistencies?
    1. For 1m and -20dBm, RSSI in open environment is lesser than crowded. This could be because of some hardware errors than might have affect instantaneous readings.
    2. The changes in neighboring readings of RSSI are not smooth every time. This could also be because of the hardware limitations resulting in erroneous readings.

Requested TX power (from NETSTACK_RADIO.set_value())	Actually transmitted power (from NETSTACK_RADIO.get_value())
-20	-18
-15	-15
-10	-9
-5	-3
0	0

TLA (crowded environment):



Parking lot (open space):