CSC8360 S2 2022 Practice 3

**RF Fundamentals** Due Date: xx/xx/2022

# Objective

The objective of this assignment is to gain an understanding of the following:

* + RF Behaviour (propagation characteristics, frequency band selection and range)
  + Relationship between frequency (f) and distance (d)
  + Signal to Noise Ratio (SNR)
  + Impact of Interference (sources of noise and interference)
  + Antenna Systems (type selection)
  + Channel Bandwidth (vs frequency bands)
  + Shannons Law
    - C = W log2(1 + S/N)
  + System Gain
    - Free Space Loss
    - Antenna Gain
    - Feeder Loss
    - Transmitter Power
    - Receiver Sensitivity
  + Reflection and Refraction (LOS and nLOS)
  + RF Safety

**Practice Question 1:**

What are the components that form a wireless network?

**Practice Question 2:**

What are various considerations needed to be taken into account when planning a wireless network.

**Practice Question 3:**

Describe the impact of selecting higher frequency bands over lower frequency bands.

**Practice Question 4:**

Describe the impact of multi-path signals (reflected and/or refracted) reaching the receiver of a wireless network access point and what measures can be used to reduce the impact of these signals.

**Practice Question 5:**

Using Shannons Law, calculate the maximum theoretical data rate for a cellular wireless connection where the channel bandwidth is 20MHz, the Signal Power Level is 50 watts and the Noise Level is 0.5 watts. Use “R” software to calculate and plot the maximum theoretical data rate for this example where the Noise Level ranges from 0 watts to 50 watts.