Assignment 1: Analyzing Wi-Fi Performance

(SN 714 Wireless Security)

[Assignment Due: Feb 1, 11:59 pm]

Description:

The goal of this assignment is to create, configure, and experiment with your own Wi-Fi network in the ns-2 simulation environment. The assignment has three primary components: 1) improve your ns-2 skills to the point that you can create your own Tcl scripts, 2) familiarize yourself with the different network configuration capabilities, and 3) experiment with client density and mobility and their effects on performance. Please get started on this assignment as early as possible.

Tasks:

a) **Simple Wi-Fi**: Create a Wi-Fi network - Simulate a Wi-Fi network with a single access point (AP) and a variable number of clients, ranging from 1 to 10. Arrange the clients equally spaced on a circle around the AP. For each number of clients, simulate 20 seconds worth of network traffic using the existing parameters. Repeat (or batch) the simulation for 20 trials, using a different seed for the random number generator each time, and compute the average total data delivered to the AP over the 20 simulation runs. Plot this quantity as a function of the number of clients, and describe your findings.

b) **Apartment Wi-Fi**: Create several competing Wi-Fi networks - Building on the previous task, add more Wi-Fi access points with different numbers of users, simulating what you might expect to happen in an apartment complex where each unit has their own Wi-Fi network sharing the same channel. Choose the locations of the multiple APs as you see appropriate for the apartment scenario. Perform a similar study to the previous, but for different numbers or densities of APs in the apartment. Plot your results and describe your findings.

c) **Amrita Wi-Fi**: As the number of APs increase, there is increasing amount of network contention among different APs which may negatively impact the performance of clients. Your task is to show the impact on performance such as throughput and delay for varying number of APs in a campus-wide network. Building on the previous task, vary number of traffic sources and mobility of clients while APs remain static using ns-2. Plot your results for throughput and delay for varying densities of APs and describe your findings.

Deliverables: Each student will submit a written summary of their efforts in the above tasks, including the following:

- A brief description of what you did to fulfill each task, including parameters modified in the code,
- Properly labeled and easy-to-understand plots created in each task, and
- Detailed descriptions of the results of each study, and any conclusions you reached in your experimentation.

Submission Instructions: Each student should submit a .pdf version of their written summary using the format requested above along with the source scripts. All students are expected to complete the assignment on their own; discussion about the assignment is allowed and encouraged, but the writing and coding should be done individually.