COMP4336/9336 Mobile Data Networking

Lab 2: Experimental study of wireless signal strength and noise

Objectives

1. To learn WiFi tracing, filtering, and data export using Wireshark
2. To observe some fundamental properties of wireless signal strength and noise through capturing and analysing real WiFi traces [*noise measurement is optional as some platforms may not be able to measure noise and signal-to-noise ratio*]

Prerequisites

- Access to two mobile devices, such as a laptop and a mobile phone with WiFi interfaces
- Wireshark (and any additional monitoring software, e.g., Network Monitor for Windows users) installed in one of the devices, such as in the laptop
- Familiarity with Wireshark, such as completion of Lab 1

Task 1 [2 marks]

For this task, you will be using a pre-collected WiFi trace available for you to download from [https://cloudstor.aarnet.edu.au/plus/s/wVjxpWUJaEsgUgj]. This trace was collected by a laptop connected to a mobile phone WiFi hotspot configured with SSID=COMP4336. The trace was collected while the mobile phone was moved away from the laptop slowly, then moved back close to it again, and moved a *mode*, so it also includes packets from other nea

Your tasks are:

- Plot signal strength (S), noise (N), and signal-to-noise ratio (SNR) as a function of time for the beacon packets transmitted by the COMP4336. **[1 mark]**
- Provide a short (one paragraph) commentary about your observation of the dynamics of S, N, and SNR over time as the mobile phone moved back and forth (**Hint:** *Did S increase/decrease? How about N and SNR? Why they did or did not increase/decrease, or why some increased/decreased more than others and why the increase/decrease followed certain parameters?*) **[1 mark]**

Here are the 5 steps to complete the plotting/graphing tasks:

- **Step 1:** Import the trace into Wireshark
- **Step 2:** Use *display filter* to remove all other packets except the **beacons** from SSID=COMP4336
- **Step 3:** Add signal strength, noise level, and SNR columns to the display (Hint: Find one of the beacon frames of COMP4336 and in the packet details in 802.11 radio information, find its Signal Strength. Right click on it and select "*apply as column*". A new column should be appeared in the packet list in the upper window. Do the same for Noise Level and SNR).
- **Step 4.** Export and save all beacon data (all columns) of SSID=COMP4336 into a CSV file (Hint: File menu usually will have this export option for most Wireshark versions).
- **Step 5.** Open the CSV file in your favourite graphing tool, e.g., Excel, Matlab, Python, etc., and plot the **S**, **N**, and **SNR** over time (Hint: There is a time associated with each packet capture, which is available in one of the Wireshark trace columns).

Task 2 [2 marks]

For this task, you are required to capture and analyse your traces as follows [*do not worry about noise and SNR if your platform cannot capture them*].

- Set your phone as a WiFi hotspot setting the SSID to your UNSW ZID, e.g., Z1234567 (usually you must change your *phone name* in settings to achieve this; check the manual for your mobile phone). Connect your laptop (with Wireshark pre-installed) to this WiFi hotspot and start capturing using Wireshark (Network Monitor for Windows users). While WiFi is being captured in the laptop, move the mobile phone as follows: first move it away slowly from the laptop to a distant location (not more than 20 meters) and then slowly bring it back close to the laptop without stopping anywhere. The capture duration should be about 60 seconds or so depending on how far and fast you travel/walk.

- After the capture, follows the 5 steps described under Task 1 to plot the S, N, and SNR graphs for the beacon packets you captured for SSID=”your ZID”. [**1 mark]**

- Write a commentary for the graphs **[1 mark]**

What to submit?

Submit the following two files, one PDF and the other ZIP, via Moodle:

1. A **PDF** report t
    a. Task 1: isplay of all beacon frames visible) including columns for S, N, and SNR
    b. Task 1: 3 graphs (S, N, and SNR)
    c. Task 1: Commentary on the graphs following the guidelines given under Task 1
    d. Task 2: Wireshark screen shot showing the filter expression, display of all beacon frames from SSID=”your ZID” (“your ZID” should be visible) including columns for S, N, and SNR
    e. Task 2: 3 graphs (S, N, and SNR)
    f. Task 2: Commentary on the graphs following the guidelines given under Task 1
2. A compressed **ZIP** file containing the following files (name them clearly to identify which is what):
    a. Task 1: The CSV file
    b. Task 2: The CSV file and the trace file (Wireshark should be able to open the trace file)

Penalty at the rate of 5% for each day late will be strictly enforced for all lab submissions.

All submissions will be subject to strict UNSW plagiarism rules.

End of Lab 2 (We hope you enjoyed this lab)