Assignment for COMP4336/9336 Mobile Data Networking
Semester 2, 2017
(Up to 2 students allowed to form a group; individual submissions also allowed)
Due: 11:59pm Friday 13 October
Weighting: 20%
Version 290817 – Released on 29 August 2017

NOTE: This hands-on assignment option is available to both UG and PG students. Please read carefully and discuss any issues on Discussion Forum in Moodle.

Title: Experimental Study of an Enterprise-Wide Wireless LAN

Background and Motivation

To provide ubiquitous enterprise-wide wireless connectivity, many corporations are rolling out large-scale wireless LANs to cover an entire campus. Thousands of interconnected WiFi access points (APs) are deployed all over the campus to provide rich on-line experience for the employees and visitors. UNSW is one such institution with close to 4,000 APs deployed in its Sydney campus. The interconnected campus-wide wireless LAN is called UniWide. Everyday, UniWide is used by thousands of students and employees from hundreds of different locations in the campus, both indoor and outdoor. Unfortunately, the true performance of UniWide at every single location of the campus is difficult to predict. The only way to obtain such a network performance map is to carry out a comprehensive measurement campaign. This assignment involves designing and executing an experimental study to generate a wireless performance map of UniWide.

Learning objectives

Upon completing this assignment, students will:

1. Master the network performance concepts relevant to large-scale wireless LANs,
2. Gain experience in designing experiments to measure enterprise-wide WLANs,
3. Learn how to program a personal mobile device to measure WLAN performance, and
4. Demonstrate report writing skills and abilities to work in a small team

Measurement Tasks

The assignment involves measuring/observing various performance metrics and statistics of UniWide using a personal mobile device, and submit a written report explaining the study and the outcomes. The measurements should cover the following metrics:

Link-layer Analysis: Students should visit as many locations as possible within the campus and collect the following data for UniWide at each location:

1. 802.11 protocol: identify which protocols/standards, e.g., 802.11a/b/g/n/ac, are available
2. Signal strength: obtain signal strength statistics
3. Data Rate: obtain 802.11 data rate statistics
4. AP Density: record coverage density for the location, i.e., how many APs are covering the location

Mobility Analysis: Students should measure the following mobility-related performance by measuring data while moving from one location to another within the campus:

1. L4 connectivity: Is TCP connection lost or preserved while moving from one location to another. Ideally, it would be good to identify some pairs of location between which TCP connection is preserved, and some other pairs for which TCP connection is lost.

2. L3 handoff: For location pairs experiencing TCP connection loss, measure the time it takes to obtain a new IP number. The time from losing the IP address to the moment a new IP address is obtained is called the IP handoff delay. Collect statistics for IP handoff delay.

3. L2 handoff: While moving from one location to another, record AP changes. The time it takes to disassociate from an AP and re-associate to a new one is called L2 handoff delay. Collect L2 handoff delay statistics.

Report Submission

Write a report explaining the following:

- How you designed your experiments to collect a particular statistics
- How you programmed your device for these experiments (you can show some key parts of your code and any relevant screen shots)
- How you executed (carried out) the experiments (you can provide some photographic evidence)
- How the performance of the WLAN varies within the campus (be creative to present the data you collected in easy-to-understand graphs/tables/charts)

The report must be submitted in PDF format using Turnitin in Moodle. The report must comply with the following format:

- Name of the file should be in the format of <first name>_<last name>.pdf [if two students are involved, concatenate another first and last names after the first]
- The first page of the report must include the names and student IDs of the students involved
- The report must be limited to a maximum of 25 pages, 2 cm margins on all sides, 11-pt Times New Roman font, single spacing and single column.
- The size of the PDF file should be less than 10 MB

Late penalty at the rate of 10% per day late will apply. Any detected plagiarism will be penalised severely (please check the course outline for course policies on late submission and plagiarism).

The End (We hope you enjoy doing this assignment)