

CIS6930/4930 Mobile Networking - Spring 2009

Mobile Networking Experiment #1

Due Date: Monday, March 2, 2009

Start Date: February 8, 2009

Abstract

The goal of this lab is to investigate the underlying assumption of Mobile Node (MNs) encounters in a Wireless LAN (WLAN) and to develop fundamental understanding of realistic user behavior to communicate information in wireless networks. In the WLANs, MNs connect and disconnect with several Access Points (APs) intermittently as opposed to the always-on nodes. In a big WLAN deployment such as university campuses, this activity happens among several APs with thousands of MNs together. An encounter event among MNs has the following assumption: The MNs can communicate with each other directly if they are associated with the same AP or the same switch port (as in USC trace) at the same time. The duration of an encounter between two or more MNs is the overlapped time intervals derived from WLAN traces. In this experiment, the students will gain hands-on experience to explore the possibility for inter-device communication through collecting WiFi encounter traces and investigating the assumption that if two MNs logged in at the same time under the same AP, have a valid encounter. They will also do brainstorming on how to utilize this encounter information in delay tolerant networks (DTNs).

Experiment Guidelines

There are three parts in this experiment: **Part I** is a preliminary data collection stage for (a) WiFi device encounter traces (via sniffing); and (b) APs syslog traces during the activity (a). Each group is given a pair of two laptops or two network cards with a program to sniff and log encounters with other WiFi-enabled devices. The objective of this stage is to collect trace data in order to analyze and use it in the latter parts of the experiment. It also gives the hands on experience and knowledge of trace data collection methods. During this activity, teams will design a systematic method to sweep surrounding areas for other active MNs and also collect connected APs location traces.

In **Part II** of the experiment, team will process these traces and investigate the possibility of true encounters when:

1. MNs logged in to the same AP can communicate.
2. MNs logged in to the same AP cannot communicate.
3. MNs logged in to different APs can communicate, and;
4. MNs logged in to different APs and cannot communicate.

This experiment is open ended and teams are free to add more possible scenarios. Optionally, the usage pattern of the devices, individual and group usage patterns etc.

Part III of this experiment is to validate the above possibilities and provide their own analysis. Teams are required to validate the aforementioned assumption of "encounters" and provide a report of their understanding and investigation.

Optional Dimensions of Analysis

Teams can also identify the similarities and differences from the different environments presented by the traces and the potential applications of the findings on user modeling and protocol design. They can also provide best case, average case and worst case scenarios for actual encounters and their distribution. Adding to these investigation, teams can also provide a probabilistic model based upon valid statistical inferences that corroborate the assumption of encounters where communication between devices can actually be possible.