CIS6930/4930 Mobile Networking - Spring 2010

Experiment 2

Due Date: April 7, 2010

1 Introduction

In the Experiment 1, you have been carrying mobile device and collecting Bluetooth and AP traces. Experiment 2 will use these traces and look into several p2p applications. Experiment 2 is divided into two parts. In the first part of this experiment you will be analyzing the traces collected by you and other students in the class. In the second part, you will be asked to run several existing applications on your devices. The goal of this experiment is to give you insight into the information available in the traces, to get you started with trace analysis, which you would need for your projects, and to provide you with sufficient building (code) blocks so that you can start implementing your own applications on mobile devices.

In the optional section, you are free to perform any analysis you may find interesting. This would count towards extra credit. You are encouraged to think beyond the stated questions and perform analysis which may help you in understanding the mobile users or in collecting relevant data for your project.

****Please continue the collection of traces as the Experiment-1 is still on-going****

If you have any questions, please email TA, Udayan Kumar (ukumar@cise.ufl.edu) or meet him during his office hours.

2 Trace Analysis

In this section you would analyze the traces belonging to your device and to the other students in the class. If you did not collect the traces please use the traces belonging to device N810-9/N810-12. Traces can be downloaded from: http://www.cise.ufl.edu/∼ukumar/bttraces-5-march.zip

Important: if you make your own assumption, please state it clearly the reason in your submission. The most important part in your report is reasonable analysis and argument with supporting examples and specific details, not the answer to the questions. Questions listed here are intended to help your own analysis, therefore, try to provide observation, adequate reasoning, analysis and necessary assumption for your answers with detailed examples or pointers rather than simply stating the answers. In many of the following questions, mere answers without supporting proof and reasoning or unclear statement will not contribute for getting full credit. These questions are open-ended question. Therefore, you can add more results or analysis with reasonable assumption that are not asked in the question.

For the following analysis you (may) have to:

1. Write a parser to convert the raw traces into a format suitable for analysis. (you can collaboratively develop parsers with other students in the class)

2. Provide

   (a) Data table

   (b) Graph plot with proper labeling.

   (c) Explanation with proper reasoning of the results.

2.1 Questions

1. The following questions are about encounter traces belonging to your device.

   (a) Write a brief description of the process you followed to collect the measurements. Did you maintain a log of the measurement? What were the challenges?

   (b) What is the total number of encounters?

   (c) What is the total number of unique encounters? (each Bluetooth MAC address counts as a single encounter no matter how many times they have met)

   (d) Plot the graph of number of encounters per day for the whole length of the trace. Is there a pattern?

   (e) Plot the graph of number of encounters per device. Is there a pattern ?

   (f) Plot the access points(AP) and the number of times they appear in the traces. (top 20)

   (g) Plot APs with corresponding number of bluetooth encounters (top 20). Is there a correlation between location and encounters ?

   (h) Can you identify from the traces if you were moving or stationary? plot your movement patterns wrt to time.

   (i) At what are time (morning, evening, afternoon, night) do you have least Bluetooth encounters? Plot for all and provide an analysis.

   (j) How many of the encounters device belong to your friends? How many of them are added in your social network sites (Facebook, Orkut or MySpace etc) ?

   (k) Can you identify the users of the devices with whom you had the most number of encounters (consider top 10 encountered devices)? and how?

   (l) Rank all the MAC addresses of the devices encountered in the order of trust you have for the device owners. Please state the criteria you used for trust.

2. Select at least two traces belonging to other students in the class and answer the questions asked above (except question (a)) using those traces. Select the traces with large file size (>9 MB) so that you can find significant data to compare with. Compare these results with the results from your own trace. Mention commonalities and differences and whenever possible provide a reason.

3. (Optional : Extra points)

   Come up with interesting questions and analyze the traces to get the insight into user behavior (e.g. how many times did you encounter students from the class outside the classroom and at which locations, etc.).

   You can also analyze traces coming from other sources and compare with your traces.

   Some of the other sources are :

   (a) For traces imote-trace1/2/3, see descriptions at
   http://crawdad.cs.dartmouth.edu/meta.php?name=cambridge/haggle

   (b) For the reality mining trace see
   http://crawdad.cs.dartmouth.edu/meta.php?name=mit/reality

   (c) For the Singapore University trace (anonymized BT log) see
   http://crawdad.cs.dartmouth.edu/meta.php?name=nus/bluetooth

   (d) Another imote-trace is the trace collected in the city-wide experiment in Cambridge (imote-trace-cambridge), see
   http://crawdad.cs.dartmouth.edu/meta.php?name=upmc/content

3 Bluetooth Applications

We have developed several applications that use p2p networking over bluetooth radio. The purpose of this experiment is to familiarize you with the basic building block for programing Bluetooth devices. These code blocks can be directly incorporated into your projects. All the source code and usage instructions are available here on this website:
http://nile.cise.ufl.edu/pages/experiments-amp-testbeds/nokia-8x0-tips-and-tricks.php. You can also modify the code to your needs. We will be looking into the following applications:

1. Bluetooth File Transfer (compulsory): As the name suggests this program allows file transfer between two devices over bluetooth radio. Using this program on two devices (can be done in a group of two students), please answer the following questions:

   (a) How does file transfer time varies with distance between the devices? Plot the results

   (b) Does movement of the device affects the on-going file transfer time? Plot the results

2. Friend Finder (optional): This program allows discovery of bluetooth devices and added them to friend's list. Whenever the devices present in the friend list are in bluetooth radio range a voice alert is generated.

3. Profile-Cast (optional): Program provides implementation of Target mode of Profile-Cast [1]. This includes building of profiles and calculation of svd. We also provide several profiles so that you can simulate profile-cast.

4. SOS (optional): Sending On demand Stress signals (SOS) is an on-campus emergency alert service that will be able to augment or aid the police and emergency response teams to help victims that may need help immediately but are unable to dial 911 or call out for help. A detailed report is accessible here: http://nile.cise.ufl.edu/wb/media/ukumar/sos-report.pdf.

4 Submissions

Write a full report on the analysis above and all of your other findings. Send the file (in PDF) of your report to the TA before the deadline. Do not forget to mention the names of the students with whom you collaborated for either parser design or bluetooth experiment.

References

[1] Weijen Hsu, Debojyoti Dutta, and Ahmed Helmy. Profile-cast: Behavior-aware mobile networking. In *Proc. IEEE WCNC*, Las Vegas,NV, March 2008.