

INFCI 1072/ TELCOM 2700: Wireless Networks

About the Project

The class project can be an individual or a group (3 or less) effort covering an aspect of wireless networks (not covered in class) in depth. A variety of projects are possible such as a tutorial/survey paper on a particular wireless topic; a research oriented technical paper - reproducing the results of a published paper or comparing various models; a business case study type paper focusing on wireless service pricing/market economics; or a hands on project implementing a software/hardware/measurement project related to wireless systems. A written report will be required of each project and should relate the project to the material covered in class. The project report should follow the [IEEE Conference Paper Format](#). Potential project topics are given below – please feel free to propose your own project (subject to the instructor’s approval).

Time Line Requirements –

½ to 1 page project proposal: Due September 22 (Topic, team members, brief outline)

1-2 page project report outline and progress report: Due October 27th

Final Report: Due November 22nd or earlier

A. Survey/tutorial/business case/analysis paper topic ideas

1. Survey software defined wireless networking.
2. Research regulation of Software/Cognitive Radios.
3. Do a survey on the different LTE bands and their limitations/features. A starting point is here: <http://www.apple.com/iphone/LTE/>
4. Study the health concerns with wireless systems by surveying the scientific literature.
5. Business case market study for wireless virtual network offerings by cellular service providers.
6. Survey 802.22 standard for wireless rural area networks using secondary spectrum
7. Survey wireless based disaster recovery networks.
8. Survey the application development environment for smartphones (APIs that can be accessed, SDKs, emulators, etc.)
9. Survey and categorize known wireless network security attacks (focus on a specific technology/OS)
10. Survey integrated security and location techniques (e.g., location based access control for WLANs) for wireless networks.
11. Survey the use of wireless technology in Smart Grid Electrical systems.
12. Survey the use of wireless technology as a power source (e.g., recharging batteries in sensors)

B. Hands on Projects

1. Benchmark the accuracy of various indoor and or outdoor propagation models with 802.11 a/b/g/n equipment.
2. Test if you can *fingerprint* a location by observing the MAC addresses of devices that are connected to WiFi at that location.
3. Install the DD-WRT firmware on 802.11 APs and explore the features that can be tuned (prioritization of traffic, signal boosting, etc.). See <http://lifelacker.com/178132/hack-attack-turn-your-60-router-into-a-600-router>

4. Site survey the SIS building comparing the number of 802.11 devices that can be determined by a variety of devices (e.g., smartphones, low end phones, laptops, tablets). Does this change with time? How? Can you estimate a location just by looking at what access points you see (no RSS measurements)?
5. Experimentally evaluate is the throughput improvement with and without channel bonding in 802.11n?
6. Benchmark data rate attacks on 802.11 a/b/g/n – (a malicious user can force all users of an AP to a lower data rate).
7. Set up a test bed of 802.11 equipment and run controlled experiments to measure the packet loss due to various causes (collisions, channel errors, buffer overflow, malicious dropping).
8. Site survey the SIS building creating a signal strength map of the building using tools such as Ekahau Heatmapper, Kismet or Netstumbler.
9. Develop an interesting application with Cloudbits and test it with Wireshark
10. Analyze Wireless Network Coverage/Throughput/RSS data