My topic is Reducing the wireless scanning time with the use of an access point (AP) candidacy list. The reason I chose this topic is because it is a subset of my thesis which is, Decreasing Handoff time in Roaming Wireless LAN’s. I chose this sub-topic of my thesis because I didn’t know how candidacy lists work, so I figured it would give me a head start on my thesis by doing some of the work now. That way I can make adjustments in my thesis sooner rather than later if I need to based on what I learn from this project.

Before I get to far in to the report I want to talk about what I understand a candidacy list is. A candidacy list contains mac addresses of AP on a network, which is then pushed out to client devices. Once client devices have the candidacy list, they can then use the stored mac addresses of the APs to connect to a different AP without scanning for it. There are some obvious issues with how candidacy lists work in general, like what if the AP the client is trying to connect to using the candidacy list is out of range. Or what if the AP cannot support anymore clients. These questions lead into my objectives for this project.

My objective for this project is to reduce/remove the scanning time of a client device while roaming. In order to accomplish that objective though I need to understand a few things first though. First off, I need to know how candidacy lists work, how is the candidacy list generated, is the AP making it or is a person manually making it or is another program doing it? Next I need to know how that list should/could be stored on a client device, I had no idea on how this should be done. The last thing, for this project not my thesis, I needed to know was how then to implement the candidacy list from the client device, again I had no idea on how this could be implemented. My next step would be to start working my way toward an understanding of my objectives.

After setting down my objectives I started researching candidacy lists. After spending some time researching candidacy lists I came to the conclusion that I was kind of on my own with this topic as I was not finding anything out there. Now it might be because I was looking in the wrong place, using the wrong terms or just didn’t spend enough time looking I don’t know. However, I will spend more time this summer looking as having some research to go off over will make things easier, but if not then at least I have started. Once I decided that I wasn’t going to find anything I decided it was time to start thinking about how I could design a simulation with the limited knowledge I have. Now for some reason I had only thought of candidacy lists from the AP point of view, I never thought about how the client device works with it. That being said and still being focused on the AP side, I wanted to run my simulation as a real network device, i.e. simulate and AP that you connect to over the network and also simulate a client device that can connect to the AP over the network. It did not work out as planned. I think the biggest reason I stalled is because I did not understand all the factors involved with candidacy lists, (I know I still don’t, but I have a better understanding now) and I was to focused on the AP side of the issue. After struggling for about a week and a half, I decided to step back and reevaluate the problem.

I spent a couple of days thinking about the project and what I was going to do, I wasn’t sure if I was going to need to find a new project or not. Before I gave up completely on the project I realized that I had not been think of the client side for whatever reason. Once I realized that and I started thinking about how candidacy lists work with client devices and from there I decided to do an overview of the how candidacy lists work instead of a more specific (much harder to do with my current knowledge) project. I then went back and re-worked my objectives to what they are now and then I started doing research based on my objectives. After doing some research I than started working on how I wanted to run my simulation, unfortunately due to the lost time, I had less time to work on designing my simulation so I was designing as I went. Right now the simulation works, but it is a work in progress and could use more work.

Once I had my simulation running (not finished or perfect) I was able to see some results. With the research I have done I think it is possible for candidacy lists to reduce/remove the scanning time from roaming. I also discovered how candidacy lists can work. More specifically I learned that candidacy lists can be generated in a couple of different ways. One way, which is what I am doing in my simulation, is to manually add each APs mac address to a file and then give it to each AP so they can then hand it out to client devices. Another way this could be done, is to run a self-discovering that knows about the other APs. From here one of two things could happen, have one “master” AP that creates a master candidacy list that once built is sent back out to the other APs. Or Each AP just discovers its neighboring APs and adds their mac addresses to that APs candidacy list. So in short one list with all AP mac addresses in the list or every AP has a unique list with just the neighboring AP mac addresses in it.

I also learned how the candidacy list could be stored on the client device. I am not sure yet how exactly it should work, but I did learn that your current network information is stored as an XML file in the registry. A couple of ways that might work for storing the candidacy list could be to store in the same XML file as the network information. Or store it as a separate XML in the same location in the registry. Now either way, so far as I can tell at this point, the client device will need to be modified to read either the current network XML file different or read and new XML first. For this project though how this is done is outside the scope of the project, but it is something I will need to figure for my thesis.

Now that I have some ground work done, it is time to start thinking about how it can be improved and done better on the next iteration. One of the many things I need to do in the future is to re-write the simulation so that it is running over a network and interacting like an AP in that regard. I also need to simulate multiple APs in order to test scanning from one AP to another AP. Next, I need to figure out what is going to be the best way to use the candidacy list. Again, one big candidacy list with all AP mac addresses for the network or unique candidacy lists for each AP. If using one candidacy list how to store the mac addresses within so that when a client device needs to switch to another AP it doesn’t get a mac address for an AP that is out of range. Or if using the unique candidacy lists how to generate the list more efficiently if not using a self-discovery network. Also if using the unique candidacy lists then each AP would need to push out a new list to the client device.

Something else I will need to figure out is how to store files to the registry. I currently know nothing about storing anything in the registry, but I think by learning more about how current network information is stored and read from the registry, it will give me a better understanding of how I can do that with candidacy lists. Another thing I mentioned in the presentation is should it be a static or dynamic candidacy list. Should I design my network to be a self-discovery, dynamic, network or create the candidacy list myself, static network. Right now I am leaning more towards the static than dynamic, but I have some time before I need to make that decision.

While working on this project I have learned some new things and re-learned other things. One of the things that I have re-learned is that projects are always bigger, more complex than we originally think they are. As like most people that don’t have a lot of experience in something I approached this project with little knowledge of what it really encompasses. Along with that, I learned that I need to spend more time looking at a project from different sides so that I will have a better understanding of it before I start researching it. Which will give me multiple ways in which I want to focus on it and helps me with researching the topic in general. I learned that there is much more to candidacy lists than I originally thought there was. Again I was just thinking about it from the AP angle and hadn’t put too much thought into anything else. So it was a good thing that I got stuck and had to re-think what I was going to do, as I made me realize there was more to the project than what I was thinking. Otherwise I would have just focused on the AP and maybe not even realized what I have about the client devices until much later.

Some of the ways in which this project ties into software engineering are as follows. In designing my simulation I spent some time designing the architecture of my program (not so much time in my current simulation due to time constraints). I have used what-if analysis throughout my project, I have used them for finding possible scenarios with candidacy lists which I will need to be aware of.