|  |  |
| --- | --- |
| Student name: | Simon Llewellyn |
| Supervisor name: | Mehmet Aydin |
| Title of Project: | Optimisation of Wireless Network Access Point Positioning Using Artificial Intelligence |

Date 9th October 2018

EMAILS NOTES TO SUPERVISOR

Notes sent to Mehmet to layout my plan for doing the WiFi modelling

**----------------------------------------------------------**

**Creating a Wireless Network Model using AI**

Upon researching my idea for WiFi modelling I came up with a possible solution to try and represent possible solutions and gauge their fitness quality.

**Mapping the problem**

The solution requires the use of a 2D array and MatLab software. The key concept is to use a spreadsheet/2d array as plot locations for a 2d map.   
Each cell will contain an array containing values holding relevant information such as:

* Need for signal – the degree to which the wifi signal is needed e.g. heavily populated areas like offices will have a greater value than say a store room. (Float)
* Ability to house an Access Point(AP) – To make sure the plot is valid and not in dead space like inside a ‘wall’. (Boolean)
* Signal strength – holds value of the signal strength. This will be amended when a AP has been placed on the ‘map’. (Float)
* Has signal - flag that to say if the cell currently contains a signal, if so it can be ignored. (Float)
* Signal degradation – If the cell is a wall or object that will block the signal how much of the signal it will drop.
* Total value of the cell – this is calculated using the other values in the array using a formula. It will show the value of the signal in the cell and thus gauge the quality of the solution.

These maps can be made using excel and VBA menu to populate the cells with the required values. This can then be converted into a CSV file and imported into MatLab.

**Gauging the fitness**

To test the fitness of the solution the easiest method would be to count the total amount of plot points that do not have a ‘Has Signal’ flag over a certain value.  
However, I will be looking to use the values of each cell to create a more accurate solution.  
This will also make it easier to produce a heatmap with MatLab by assigning colours to number ranges.

Hopefully it will be able to provide a list of possible solutions with how many APs are needed, the coordinates in which to place them, and the % of coverage.

**Access point (AP)**

Currently the plan would be to treat APs as a grid of . The grid will change the value of the cell’s ‘Signal strength’ with the highest value being in the middle with the outer cell’s values being lower the further away from the centre.

**Expansion**

If I can create a working model and I have time I might be able to expand this solution to incorporate a 3D array and there for allow to create multiple floors.

There may also be a possibility while working on it to adapt this current method so the scaling of the problem space will not increase the computational time.