

# Project Requirements Document

## Version 2

Team SmartRG

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### Introduction

SmartNetwork is a mobile application that connects to a home router and displays useful statistics and data about a home's wifi. In addition, the app displays a heat-map depicting the wifi signal strength throughout a home or building and will have this data stored in the cloud for further use.

### What is it?

The app will contain an option in the navigation bar that will display wifi speed and statistics real-time. A visual will elegantly display the current speed while having graphs and statistics on request. The next big feature is to generate a heat map on google maps that shows the connectivity in a household. The user will be required to set a pin on the location of the router and on the spot they currently think they are. The user will set a pin for his/her current location, then start a test. The test will gather wifi traffic statistics and calculate a connectivity value. This is repeated until the user has tested every room (or is satisfied with the number of tests done). Using the connectivity values, a visual will be overlaid on a map that gives the user a good idea of how the wifi connectivity is throughout the house and stored in the cloud for later use. The last big feature is to allow the user to view previously created heatmaps. Any user can view any heatmap and can search via router MAC address, or house address.

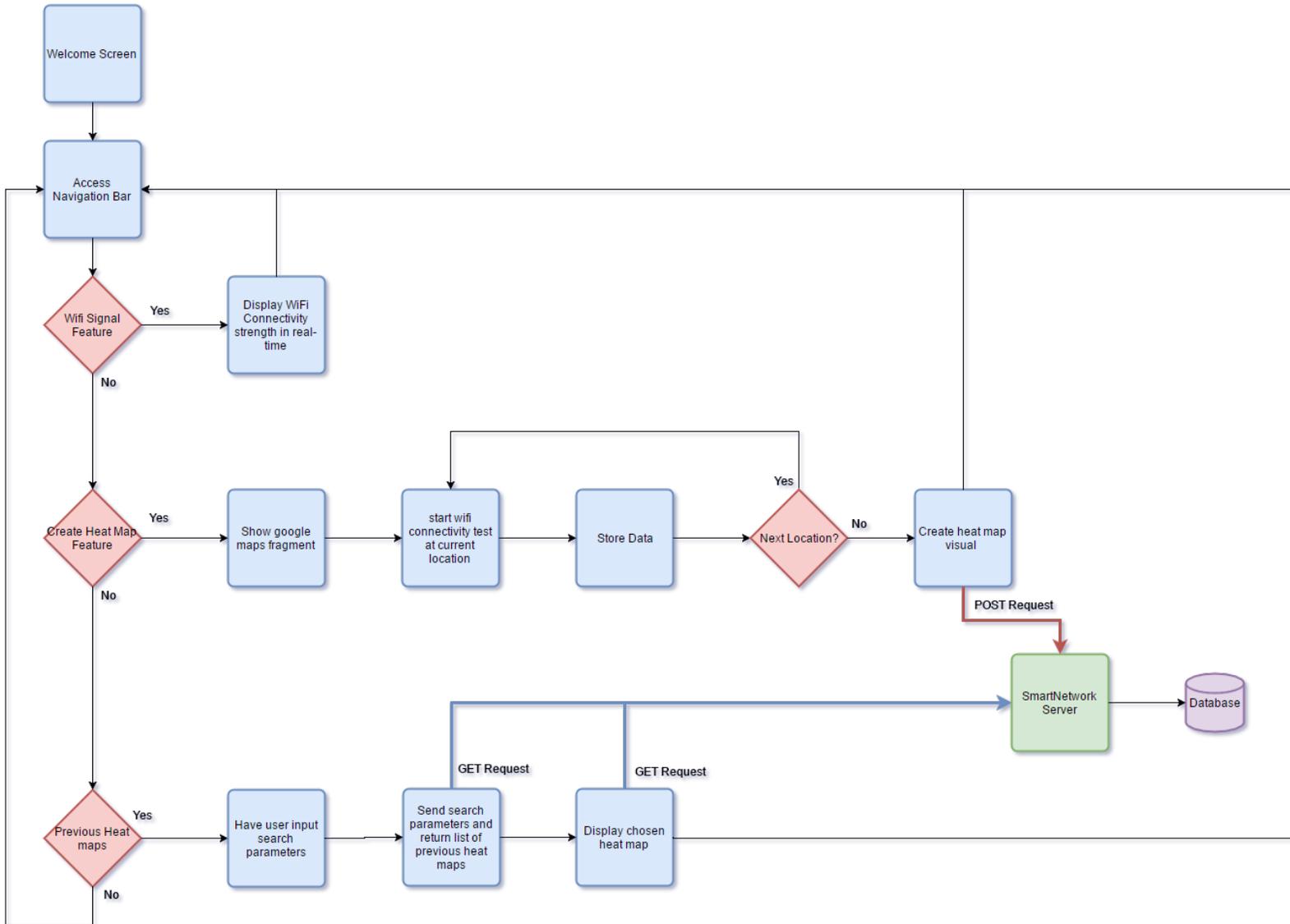
## Who will use it?

1. Technicians - ISP technicians who are installing routers into households and other buildings.
2. Developers - Software developers who are developing new software that goes on a router or interacts with one.
3. Home wifi user - Anyone who wants to check the connectivity to their router and determine which areas of their house has weak wifi.

## Why is it useful?

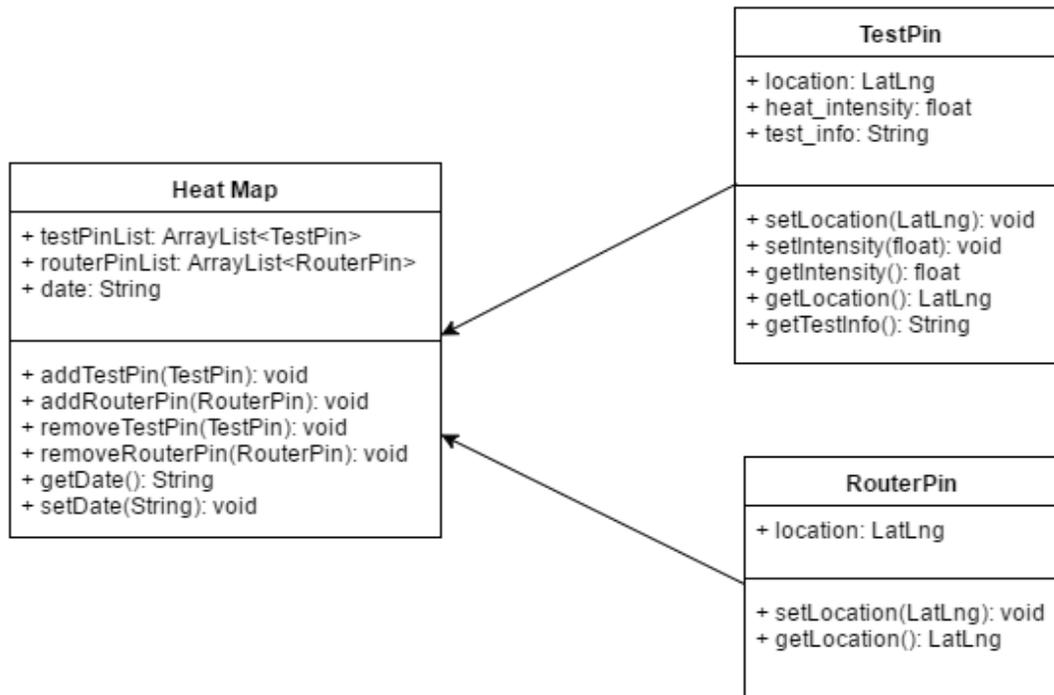
Using real-time wifi speed display, a technician can test whether he/she has set the router in the correct spot for the signal to reach his/her current location. It is also useful for developers who are tuning the routers software and need to test if their changes have manipulated the wifi signal. The heat map creating feature is very useful for developers debugging routers, as they can see how the changes affected the entire house and for technicians installing routers in a home who can easier decide if the router is placed properly. A technician can also determine if the home needs additional hardware to strengthen the WiFi connection. Finally, viewing anyone's previous heatmaps allows technicians to debug wifi connectivity issues and move routers to a better location whether it was a different technician who created it or not.

# System Architecture Overview

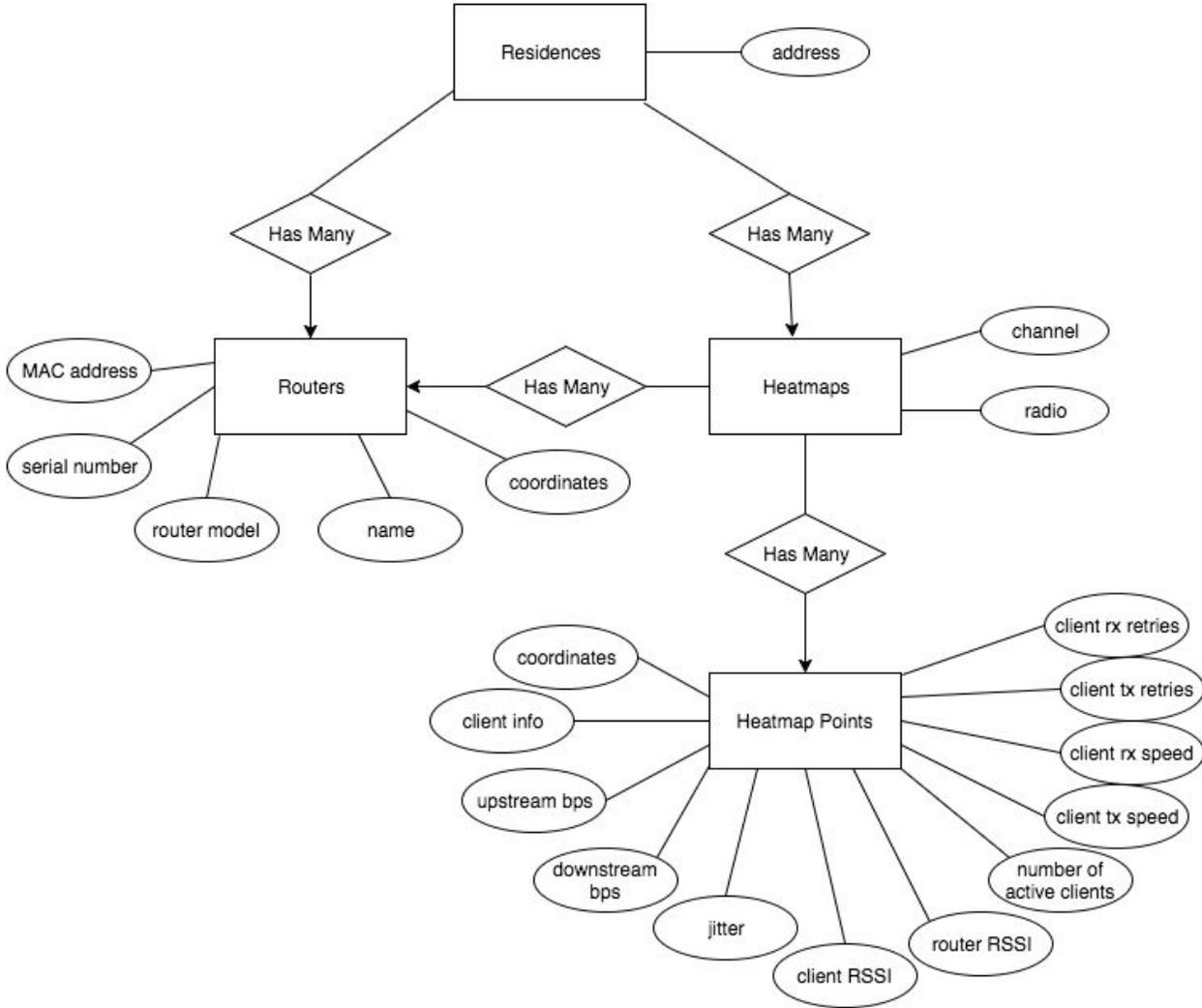


# Requirements & System Models

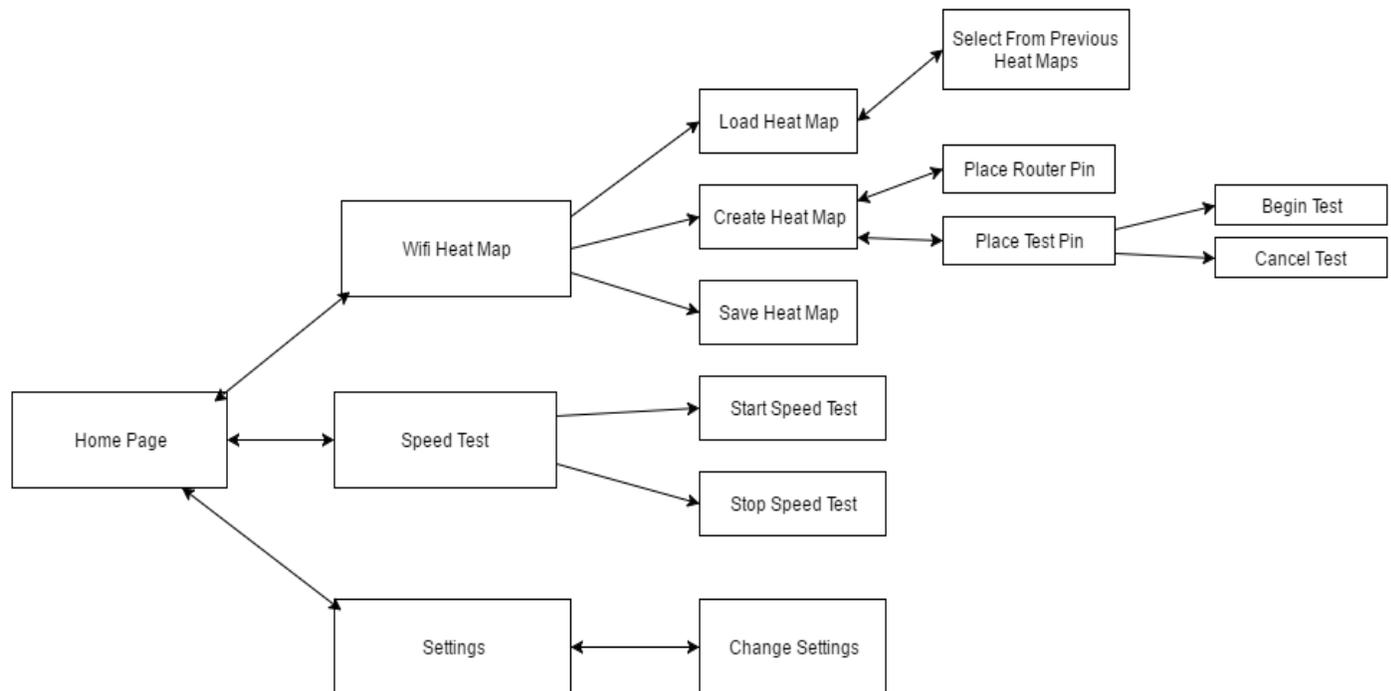
## UML Class Diagram for HeatMaps



# Database Diagram



## UI Functionality Diagram



## User Stories

- A user can view Wifi connectivity strength in real-time.
  - Acceptance test: Current Wifi data including Mb/sec is displayed on the screen.
  - <https://github.com/vincegando/capstoneProject/commit/d808bb0e488ba14868e5b2db1a0f631c21bf935d>
- A user can drop a pin on the map to designate the location of the router
  - Acceptance test: Pin exists on map; coordinates of pin match the coordinates of router; pin is labeled as router
  - <https://github.com/vincegando/capstoneProject/commit/d2971c72082dfea6aa0b2dbe0065d10c4301657e>
- A user can drop a pin on the map to designate a point in the house.
  - Acceptance test: Pin exists on map, coordinates of pin match the location where user intended to drop pin.
  - <https://github.com/vincegando/capstoneProject/commit/d2971c72082dfea6aa0b2dbe0065d10c4301657e>

- A user must first place a pin at their router location before any test pins can be placed
  - Acceptance test: The user will be limited to initially being able to only place a router pin as their first pin when creating a heat map. After a router pin is placed, the user can then place test pins or add more router pins as they choose.
- A user can view speed tests results at point of pin drop.
  - Acceptance test: Selected pin displays speed test data including drops and retries over a certain amount of time.
- A user can generate a Wifi heat map of the house.
  - Acceptance test: After the user has dropped pins around the house and the app has generated speed test data, a color-coded heat map of the house is displayed on the screen.
  - <https://github.com/vincegando/capstoneProject/commit/d2971c72082dfe6aa0b2dbe0065d10c4301657e>
- A user can save a Wifi heat map.
  - Acceptance test: After heat map has been stored, it can be brought up again later.
  - <https://github.com/vincegando/capstoneBackend/pull/5>
- A user can create additional Wifi heat maps.
  - Acceptance test: A user can select option to generate another heat map, and go through the steps specified in earlier user stories.
- A user can navigate previous saved heat maps.
  - Acceptance test: A list of all heat maps is displayed (assuming no search criteria has been entered) and each one can be selected to show the saved map.
  - <https://github.com/vincegando/capstoneBackend/pull/5>
- A user can add additional tests to a previous heat map.
  - Acceptance test: After loading a previously created heat map, a user should be able to add additional pin drops to expand their heat map if they choose to.
- A user will be able to search for a previous heat map by router mac address.
  - Acceptance test: When searching for previous heat map, the search field can be switched to MAC address and return heat maps with routers whose MAC address match the query.
- A user will be able to search for a previous heat map by house address.
  - Acceptance test: When searching for previous heat map, the search field can be switched to house address and return heat maps with routers whose location match the query.

- A user can change the type of map their heat map will be displayed on.
  - Acceptance test: The user is provided the option to change the type of map from either normal, terrain, or satellite. Any current heat map and pins associated with it will remain on the map after changing map type.
- A user can view basic router information during real-time speed testing.
  - Acceptance test: A list of router specifications will be accessible while also being able to access the current wifi speed.
- A user will know if they need additional hardware to strengthen wifi signal in their house
  - Acceptance test: If the wifi in a part of a house is too slow, a recommendation for additional hardware will be given.
- A user can block certain websites from being accessible in their home network
  - Acceptance test: If a certain website is blocked, users in that network won't be able to visit said website.
- A user can send their heat map data to their internet provider
  - Acceptance test: A copy of the user's heat map will be sent to their internet provider to better diagnose problems
- A technician can pull up heat map data for the house he or she is at
  - Acceptance test: Technicians will be able to access heat maps for a specific house address
- A technician will be advised where to place additional hardware if needed
  - Acceptance test: A designated area for additional hardware will be designated to the technician when he or she accesses the heat map for a specific address
- A user is shown a home screen on app launch with their currently connected device and some basic information about it such as MAC address, router model, name, etc.
  - Acceptance test: Upon launching the app, the user is immediately shown a home screen with their home networking device that they have connected to, along with the correct information corresponding to that device.
  - <https://github.com/vincegando/capstoneProject/commit/5201e94b5e00d10be2a079f215506c536cc8cf83>
- A user can rename their connected devices on the home screen
  - Acceptance test: The user is able to input a name of their choosing for each device they have connected to either currently or in the past for better organization.

## Prototyping and Test Code

GitHub URLs:

- **Android App:** <https://github.com/vincegando/capstoneProject>
- **Backend:** <https://github.com/vincegando/capstoneBackend>

## Appendices

### Technologies Used:

- MySQL
- Ruby on Rails
- Android (SDK & NDK)
- Iperf3
- Linux
- Docker
- Google Maps API
- Google Heat Map API