

## 5 GHz Wi-Fi Information and Analyzer Android Application

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**Abstract:** This paper presents the design and implementation of an Android application that acts as an information and analyzer tool for 5 GHz Wi-Fi networks. The rapid development and widespread use of mobile devices have led to an increasing demand for reliable and high-speed wireless networks. One of the most popular wireless network standards is Wi-Fi, which operates in the 2.4 GHz and 5 GHz frequency bands. The 5 GHz band is considered to be less congested and therefore offers better performance, making it a preferred choice for high-bandwidth applications such as streaming and gaming. However, selecting the best channel for a 5 GHz Wi-Fi network can be challenging, especially in environments with a large number of other Wi-Fi networks.

**Keywords:** Wi-Fi Analyzer, Wi-Fi scanner, Access Points, 5GHz Wi-Fi, Optimize Network

### 1. Introduction

Wi-Fi (Wireless Fidelity) Analyzer is an application that can help people to find and analyze Wi-Fi connections, troubleshoot and optimize Wi-Fi connections, and display every necessary information of the connection. The primary objectives of a Wi-Fi analyzer are to evaluate the connection, gather information, and identify the problems that are resulting in a poor Wi-Fi signal. Wi-Fi analyzers gather information from the numerous access points and channels in your network and display it in an understandable way via visual reports and dashboards.

Wi-Fi users notice that their internet speed, stability, and signal strength fluctuate from time to time but have no idea why. All network issues are commonly caused by a location with low coverage, a large number of tall buildings that disrupt the signal, and a crowded area of people using the same network. Depending on the supporting band, a single device can also be a problem for the network.

The goal of this project was to develop a user-friendly application that allows users to easily identify their connection issues and understand the information about surrounding available Wi-Fi connections

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by displaying the signal strength, also the app is able to suggest the best connection and export and share every Wi-Fi connection information.

The expected outcome of the 5GHz Wi-Fi Information and Analyzer project is the development of a functional and user-friendly Android application that can scan and display information about nearby Wi-Fi networks, including the network name, signal strength, and channel. Additionally, the application should include a feature for analyzing and optimizing the performance of the user's own Wi-Fi network by suggesting the best channel to use. The application should be easy to use and provide useful information for both personal and professional use. The users should be able to easily identify their connection issues, understand the information about surrounding available Wi-Fi connections, and share and export the information.

## **2. Materials and Methods**

The methodology of android application development required a lot of understanding with the Integrated Development Environment (IDE), device specification and compatibility and coding flow. The arrangement of code in an Integrated Development Environment (IDE) is important as it will determine how the android application will work when interacting with it. Wrong input or arrangement of code will surely make the android application not responding to the user's request or even breaks the application.

### **2.1 Materials**

The materials required to build a Wi-Fi analyzer Android application will vary depending on the specific requirements of the project and the development environment. However, some common materials that may be needed include:

- I. A computer or Laptop
- II. Software Development Kit (SDK)
- III. Integrated Development Environment (IDE)
- IV. Android Device
- V. Wi-Fi Adapter

It's important to note that this is not an exhaustive list, and additional materials may be required depending on the specific requirements of the project. It's also essential to have good knowledge of android app development and Wi-Fi networks.

### **2.2 Methods**

The project is done by multiple parts in order to provide a functional application with easy to navigate user interface. The main part of the project is being building the first page of the application, menus, functional action buttons or toggle and building graphs and ratings for the scanned data. The whole application will be built using Android Studio with Java as its programming language.

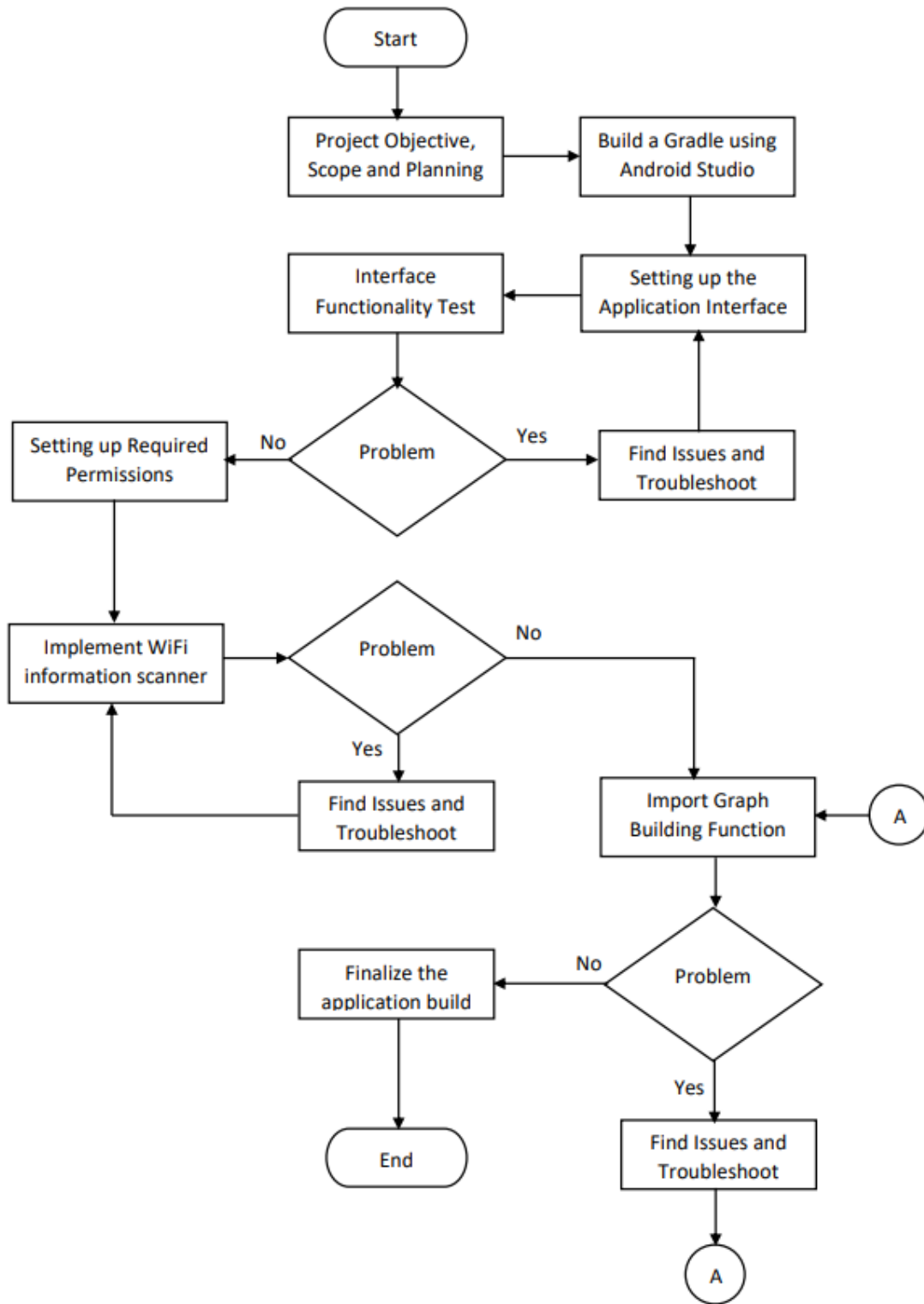


Figure 2.1 Project Flowchart

## 2.3 Application First Interface

The virtual devices and application will be restarted every time a new button is added to the application to make sure it is at proper placement and doesn't overlap with other buttons or text. Some functions that are found unnecessary during the development will be hidden instead of removing it in case they will be needed in the future.

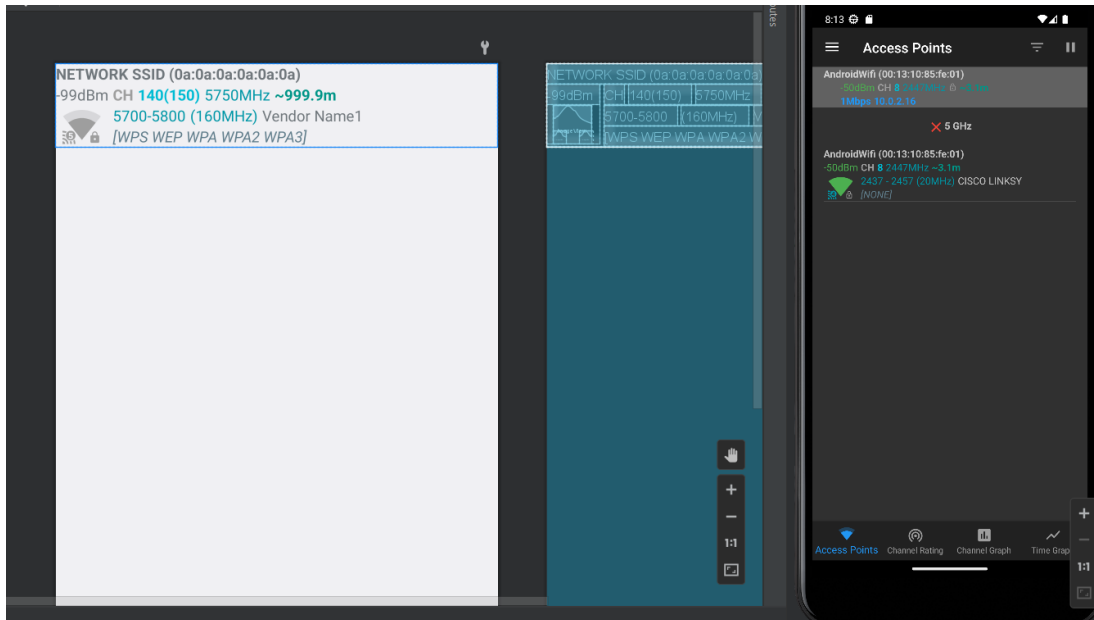
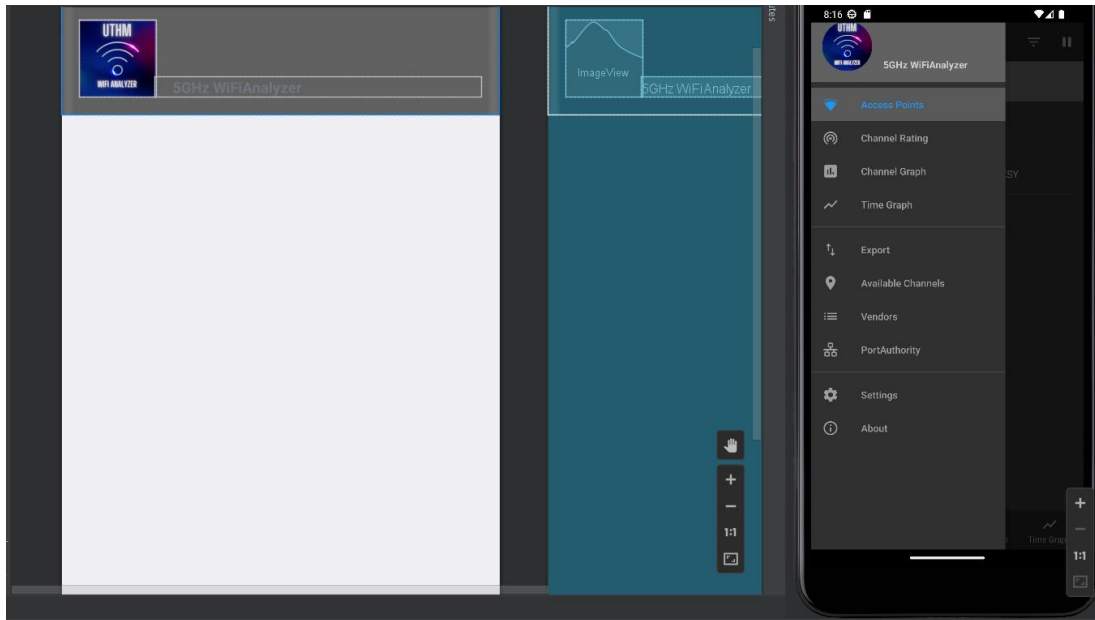


Figure 2.2 Application First Interface

## 2.4 Menu

Implementing icons into each button in the menu and interface required a lot of testing as a lot of errors can occur such as the icon is at the wrong size, overlapping with other text or buttons, misplacement and visibility issues. A lot of repeated steps are done here in order to get the image matched with the button size so it can be proper icon.



**Figure 2.3 Application Menu Interface**

## 2.5 Function

The purpose of this application is to scan the connection and stability of surrounding available Wi-Fi services. In order to make sure the application is functional, the application needs to scan the surrounding Wi-Fi services and provide accurate information about each connection. The information that will be shown is the signal strength, stability, decibel-milliwatts (dBm) value, security type, Wi-Fi type, Wi-Fi Name and Wi-Fi band.

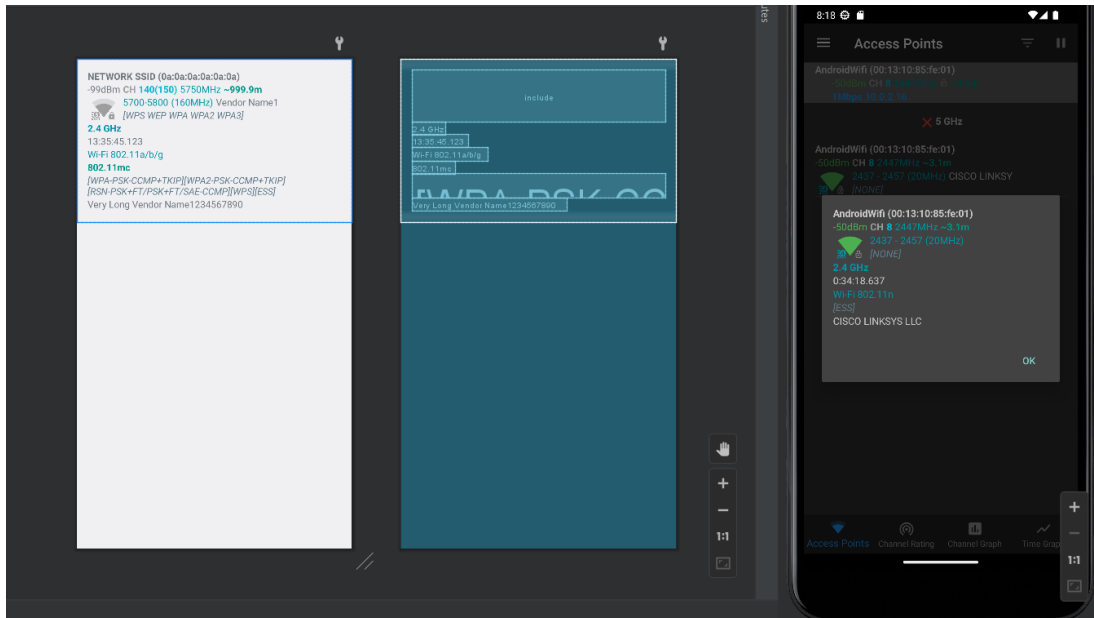


Figure 2.4 Application Wi-Fi Information Display

## 2.6 Converting Data

The application will also display the best channel in rating type and signal strength in the channel graph view and time graph view. The scanned Wi-Fi data and information will be converted into channel rating, channel graph and time graph view for the signal strength. The graph allows users to compare each available Wi-Fi connection with ease in real time.

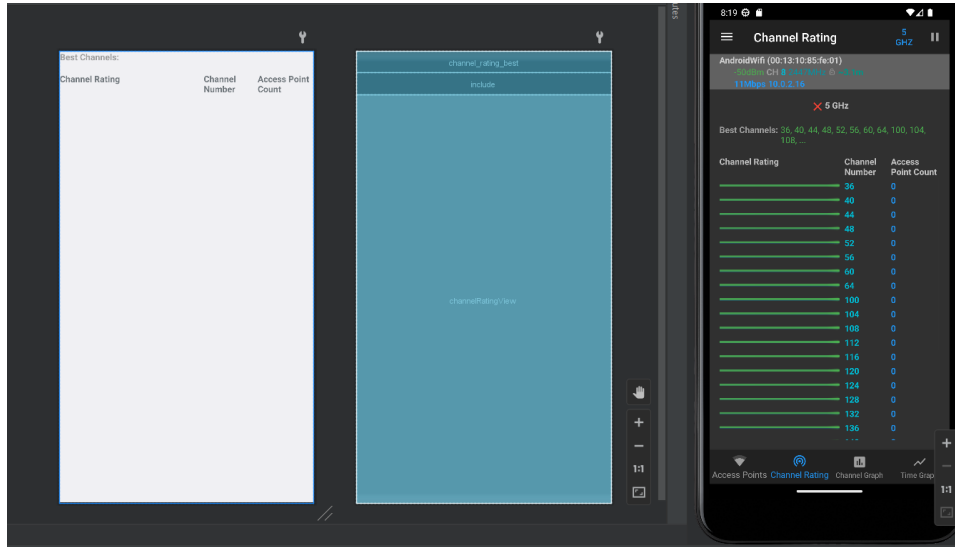


Figure 2.5 Application Channel Rating Interface

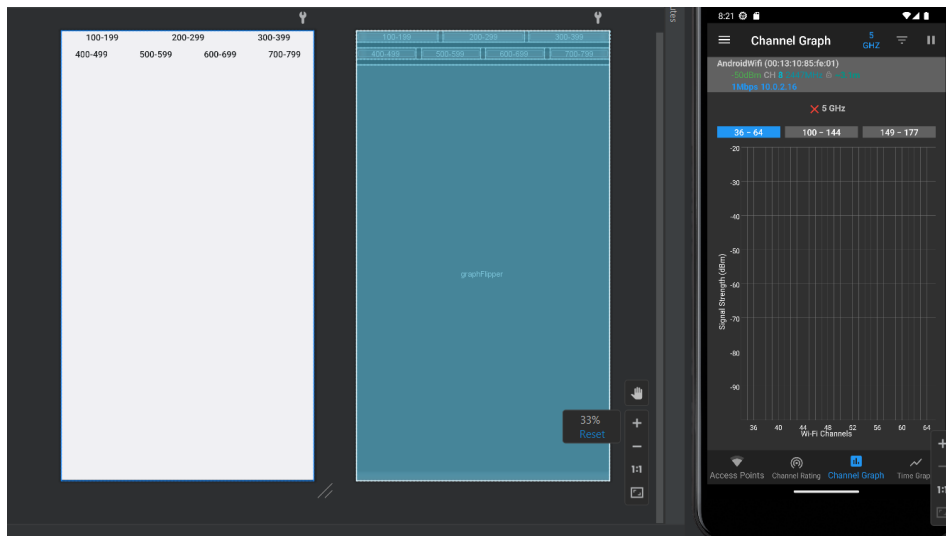
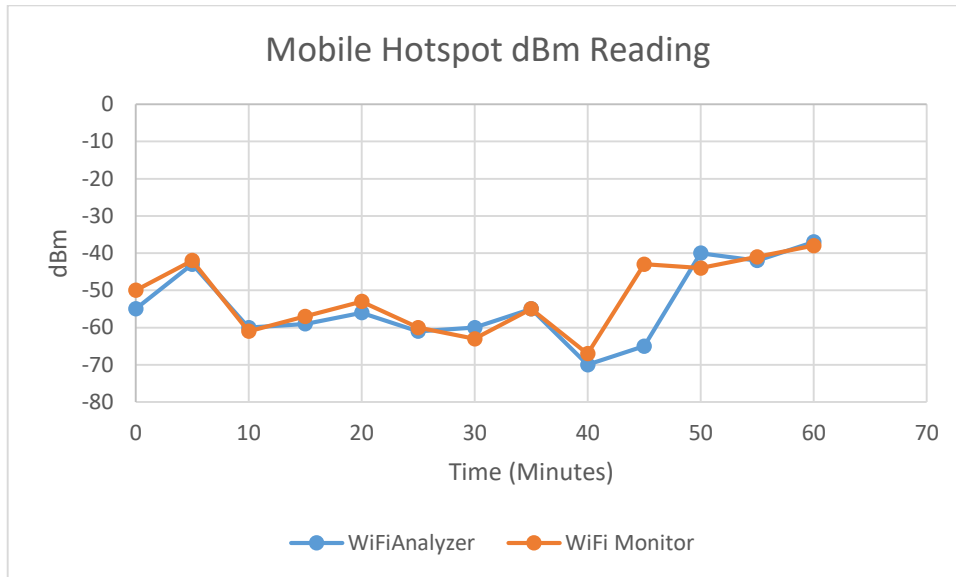


Figure 2.6 Channel Graph Interface

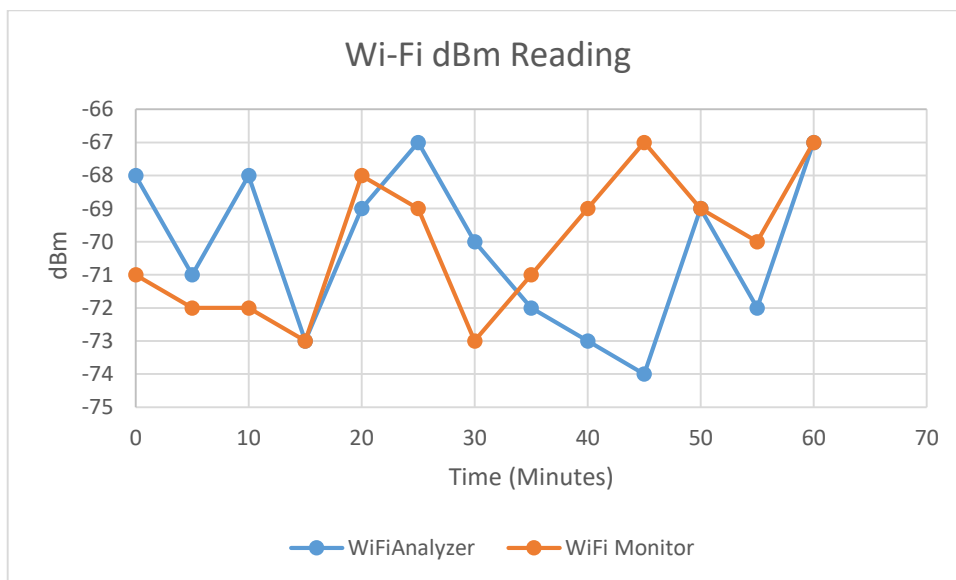
### 3. Results and Discussion

The purpose of this chapter is to present the final product viability and functionality for public usage. The method is done by comparing the dBm reading with other Wi-Fi Analyzer or Wi-Fi Scanner application available on Google Play Store. The comparison is done two times with Wi-Fi connection and Mobile Hotspot connection. Both analyzer applications will compare with the same SSID and at least two users are connected to them.

#### 3.1 Results



**Figure 3.1 Mobile Hotspot dBm Reading Result**



**Figure 3.2 Wi-Fi dBm Reading Result**



### 3.2 Discussions

Figure 3.1 shows the values and pattern of dBm reading after an hour of observing and collecting data. Both of the readings are recorded at the same location and time. The first forty minutes of the data are recorded with slight distance between the access point and connected devices which resulting the dBm reaching -70dBm at peak. The last 20 minutes are done with the distance between the access point and connected device much closer, the distance between devices and the access point affect the signal strength as a closer distance gives better dBm reading. Both applications recorded almost similar patterns which means the Wi-Fi analyzer is working as well as a proper analyzer application with minor differences in the reading.

The next test to collect the data of dBm reading is by using Wi-Fi connection. Wi-Fi connection gives a slightly different pattern when collecting the dBm reading for an hour compared to a mobile hotspot connection. Similar to the mobile hotspot connection test, both of the applications are scanning the same Wi-Fi network as data. Based on figure 3.2, both of the application gives different dBm reading most of the time compared to the mobile hotspot which is almost the same with a tiny difference. This is most likely due to the Wi-Fi dBm value always changing but the application did not have the same uptime to record every value instantly which resulting different results between the applications.

## 4. Conclusion

The main function of 5 GHz WiFi Analyzer is to scan the surrounding Wi-Fi network available and suggest the best channel available is working properly. The objectives of the project are achieved because the application is able to show the signal strength of every Wi-Fi network and its interface is also quite simple and user-friendly which makes it easy to navigate. The application is also able to export every Wi-Fi network data; however, it is only able to export basic data.

The 5 GHz WiFi analyzer is currently limited to analyzing Wi-Fi networks within its range. The ability to analyze networks remotely will be in the plan for the next improvement. The application also only supports 5 GHz network but 2.4 GHz and even 6 GHz network will be included to be supported by the application later in the future. As mentioned previously the export function is only able to export the basic data of every Wi-Fi network which also a limitation of the application that has been planned to improve by providing more details such as the manufacturer, number of users connected and every IP address of the connected users.

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