5G Analysis using Wi-Fi Analyzer Application

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Abstract*: In the current cellular communication,5G connection is the most popular way to connect people together for real-time communication and data transmission. In order to improve the quality of service, researchers are studying the data generated from cellular communication systems to predict user. For the research analysis, Wi-Fi Analyzer applications that can measure parameters related to cellular communication and has been used as a measurement tool. The application shows the available signal networks in the nearby area together with the signal strength level. At the end of the research, it is concluded that the networks give good connection for the users*

Keywords: 5G Communication, Wi-Fi Analyzer, Cellular Communication, Connection Speed, Cell Tower.

I. INTRODUCTION

The advent of 5G technology has ushered in a new era of connectivity, promising a wide array of advancements and opportunities across various sectors. In this study, the objective is to delve into the intricate details of 5G and explore its distinctive characteristics. Enhanced Mobile Broadband (eMBB) stands out as one of the key features of 5G, offering significantly faster data speeds and increased network capacity compared to its predecessors. This empowers users with seamless streaming, high-quality multimedia experiences, and unparalleled gaming capabilities [1]. Furthermore, Ultra-Reliable Low Latency Communications (URLLC) is another noteworthy aspect of 5G, providing extremely low latency and enabling real-time applications such as autonomous vehicles, remote surgery, and industrial automation. The reduced delays in data transmission allow for instantaneous responses, revolutionizing critical sectors where split-second decisions are paramount.

Moving beyond the technical aspects, the research also aims to shed light on the manifold advantages of 5G. Faster speeds are a prominent benefit, enabling quicker downloads, effortless streaming, and enhanced user experiences [2]. Additionally, 5G's lower latency is crucial for applications demanding real-time interactions, such as virtual reality, augmented reality, and Internet of Things (IoT) devices. The capacity of 5G networks to accommodate a massive number of connected devices simultaneously facilitates the growth of IoT, enabling seamless connectivity between smart cities, smart homes, and various other IoT applications [3]. Moreover, the improved reliability of 5G networks ensures stable connections even in densely populated areas or during periods of high network traffic, reinforcing its suitability for mission-critical services. Finally, 5G acts as a catalyst for innovation, offering the potential to transform industries, drive new business models, and unlock novel applications that were previously unattainable.

II. METHODOLOGY

For this project, we use Wi-Fi Analyzer application to analyze telecommunication signals in the nearest area. We conduct this experiment at Pasir Gudang, Johor. The first step is to search and download a Wi-Fi analyzer application suitable for android operating system. For this experiment, we use Wi-Fi Analyzer which available and free in Microsoft Store. Then, locate the application on the device and launch it. After that, grant any necessary permissions requested by the application, such as access to the device's location or Wi-Fi settings. Within the Wi-Fi analyzer application, look for a scanning or discovery feature. Initiate a scan to detect Wi-Fi networks in nearby area.

For Wifi Analyzer, the signals available near the device will be scanned and detected automatically. The application will display a list of available networks, along with their signal strength, channel, frequency, and other relevant details. Review the signal strength of each Wi-Fi network listed in the application. This information is typically represented in the form of signal bars or a numerical value (measured in dBm). Higher signal strength indicates better coverage and

potential for faster connection speeds [4].Wi-Fi networks operate on different channels and overcrowding on a particular channel can lead to interference and reduced performance.

Analyze the Wi-Fi analyzer application's display to identify channels that are heavily congested. Look for channels with many networks overlapping or using the same channel. Wi-Fi channels can overlap, causing interference and reduced performance. Analyze the application's display to identify networks that are using the same or overlapping channels. Some Wi-Fi analyzer applications provide additional features to assess the quality and speed of a Wi-Fi connection. Utilize these features to evaluate the connection quality, latency, and throughput of a specific network [5].Record and analyze the signals. The Wi-Fi Analyzer application is shown in Fig. 1.
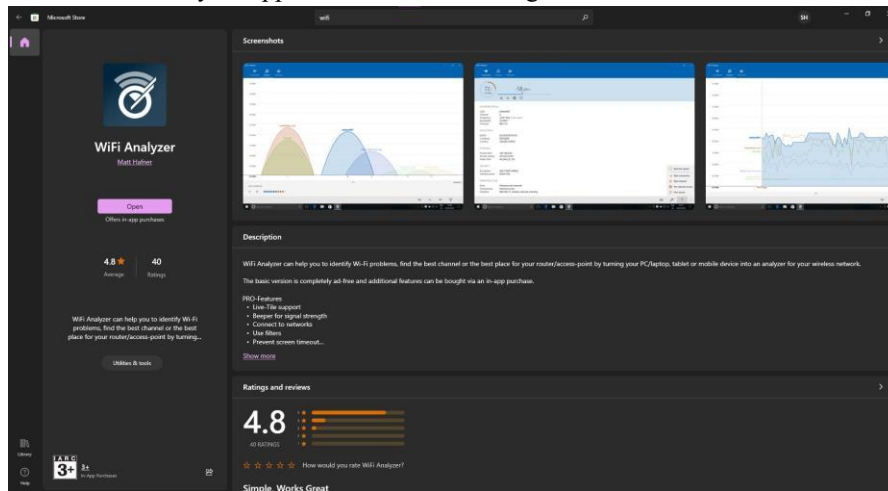

Fig. 1 Wi-Fi Analyzer Application

III. RESULT AND DISCUSSION

The analysis has been done using the Wi-Fi Analyzer application and the results are discussed in the following sections. The results also are combined with further explanation regarding to the application used. The related figure also included to explain briefly about the analysis.

Result and Analysis

Based on the scanning using Wi-Fi analyzer application, the result is shown in Fig. 2 below. The list of available signals near the location also shown in the figure. The available signals are from the networks located in the nearby area. There are a lot of available networks from the surrounding area and it will keep shown in the application as long it is detected by the application.

For each listed network signals, there are also value of dBm alongside the networks. The value indicates the level of signal strength for each scanned network. Wi-Fi signal strength is measured in decibel milliwatts (dBm). The measurements are displayed as negative numbers on a scale from -30 dBm to -90 dBm. A Wi-Fi signal strength of -30 dBm is considered a perfect signal. While at the signal strength of -90 dBm is considered as disconnected. For the signal strength in between -30 dBm to -90 dBm, users can still access online services that require a reliable connection and Wi-Fi signal strength.

Interference and signal degradation occur when multiple Wi-Fi networks use the same channel. Interfering signals reduce signal strength, resulting in slower data transfer speeds, increased latency, and potential connectivity issues [6]. Data collisions occur, resulting in packet loss and retransmissions, which have an impact on network performance. The shared channel becomes congested, resulting in signal delays, decreased throughput, and instability.
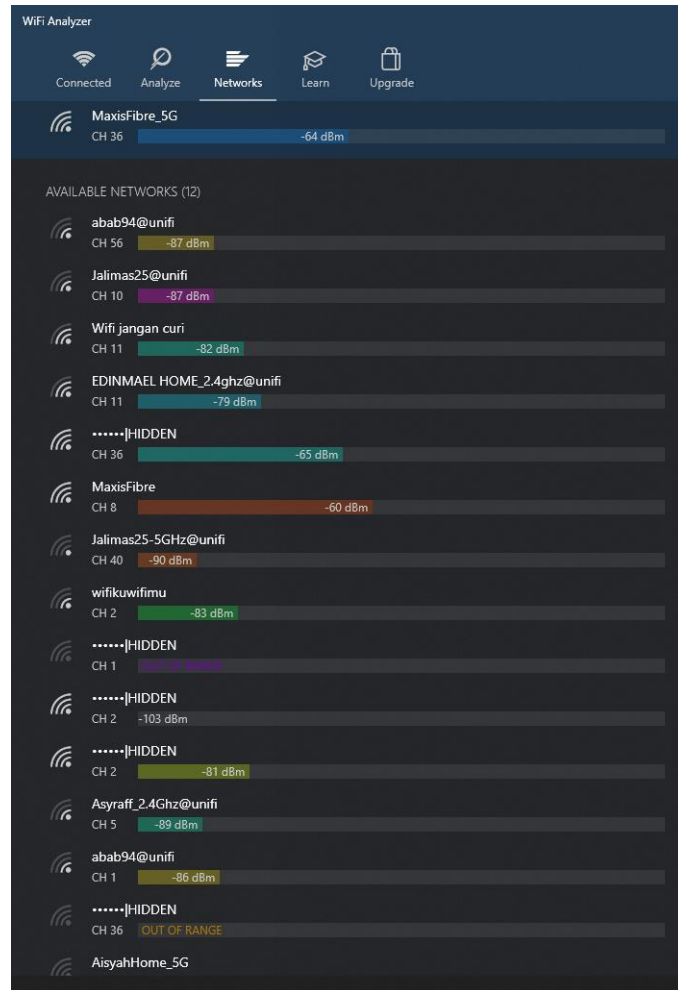
Fig. 2 List of Available Networks in Nearby Area.

IV. DISCUSSION

When it comes to applications, 5G has a wide range of transformative uses. It plays a crucial role in building smart cities, enabling efficient traffic management, intelligent infrastructure, and real-time monitoring of urban systems. In healthcare, 5G enables telemedicine, remote surgeries, and remote patient monitoring, improving access to medical services [7]. Industries benefit from 5G through real-time monitoring and control of manufacturing processes, driving increased productivity and efficiency. Additionally, 5G enhances multimedia experiences, allowing for high-quality streaming, augmented reality, and immersive gaming

MaxisFibre_5G typically offers better connection quality compared to MaxisFibre on the 2.4GHz band. The 5GHz frequency band has a larger number of non-overlapping channels and less interference from other devices like microwaves or cordless phones. This results in a more stable and reliable connection.MaxisFibre_5G generally provides faster speeds compared to MaxisFibre on the 2.4GHz band. The 5GHz band supports higher data transfer rates and can accommodate more simultaneous connections. As a result, it can expect faster download and upload speeds with MaxisFibre_5G. MaxisFibre_5G typically offers lower latency compared to MaxisFibre on the 2.4GHz band. Lower latency means reduced delay in data transmission, resulting in more responsive connections for real-time applications like online gaming or video conferencing.

V. CONCLUSION

In conclusion, 5G networks bring a host of advantages that set them apart from previous generations. With their high speeds and low latency, 5G enables faster downloads, seamless streaming, and real-time communication for various applications. Whether it is enjoying lag-free gaming, experiencing immersive virtual reality, or benefiting from the instantaneous response times of autonomous vehicles, 5G delivers an enhanced user experience.Furthermore, 5G's ability to handle massive connectivity makes it ideal for the Internet of Things (IoT). It allows for seamless integration of countless devices, paving the way for interconnected smart homes, wearables, and industrial sensors. The reliability of 5G ensures uninterrupted connectivity, while its increased capacity caters to the growing demand for seamless connectivity and supports the rise of connected devices.

Overall, 5G networks usher in a new era of connectivity and open up possibilities for innovative applications and services across industries. With their speed, low latency, massive connectivity, and transformative potential, 5G networks are poised to revolutionize how we live, work, and interact with technology.

VI. ACKNOWLEDGMENT

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