# A Study on the Variation of Telecommunication Network Signal Strength on the Campus of The University of Ghana

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## Introduction

***Abstract***:Poor cell phone connections are a common issue on the University of Ghana campus, and students report comparable issues such as; The reasons for signal failure may be classified into two types. The geographical distance or barriers to the base station nearest to the mobile phone are a variety of localized faults caused by building materials or destructive interference.

- ***Objective*:** The study aims at investigating the network coverage on the University of Ghana campus.
- ***Methodology:***First stage of research is browsing and reviewing journals and required information pertaining to the topic area.
- Second stage of this research is the collection of Received Signal Strength Indicator (RSSI) along the various locations stated in the scope.
- ***Results:*** For the purposes of this study, the mobile signal strength of the top three (3) network providers, namely MTN, VODAFONE, and AIRTELTIGO, was assessed. The signal readings were done at selected halls of residence on the main campus of University of Ghana(Akuafo, Mensah Sarbah, Legon to Commonwealth, Jubilee, and the Diaspora halls).
- ***Conclusion:*** From the study is evident that Volta hall is the best place to carry out academic activities such as research work or any online course work.

## Objectives

At the end of this study students involved will be able:

- Outline the causes of signal strength variation of mobile phone networks (MTN, Vodafone, and Airteltigo) in the University of Ghana Campus.
- Create a connectivity maps that will depict the network connectivity per network provider or place on campus.This would be done by using the data collected to create a web application that will provide you with the required information by a query search.
- The outcome of this research work could be used as a reference point when deciding a venue for activities that rely heavily on strength of the signal received by one's device.
- Outline a proper solution to the problem stated.

## Problem Statement

- The cellular telephone system has been the best communication device nationwide. A study on causes of signal strength variation of the three big network service providers (i.e., taking into consideration MTN, Vodafone, and AirtelTigo) to identify where there usually exist dead zones and poor quality of services on campus.
- And to investigate factors that affect the smooth delivery of optimum network coverage

## Literature Review

- A mobile network signal is the signal strength that is measured in dBm which is received by a mobile phone from a cellular network or mobile network. Based on the variety of the factors that affect mobile network signal are such as proximity between the phone receiving and a tower or mast, the battery of the mobile phone dying, obstruction or blockage such as buildings, trees or materials or metals that hinder mobile network signal transmission in the way in the path of the transmitting signals will the signal strength vary.

There are various factors that affect the variation of mobile signals, and some are ;

- ***Proximity between the tower and the mobile cell or phone***
- ***Physical obstructions***
- ***Weather***
- ***Tower output power***
- ***Congestion on Network or on a Tower***

## Methodology

A site survey is a technique for measuring cell signal strength location by location within a service region. This approach is used by the writers to begin measuring in this chapter.

The information was gathered from student-populated locations on the University of Ghana's Main Campus ( i.e. the traditional hall and the diaspora hall). Signal strength was considered at different times of day (morning, afternoon, and evening), as well as signal strength with a distance of different mobile carriers (i.e. MTN, Vodafone, and AirtelTigo ).

## OVERVIEW OF METHODOLOGY

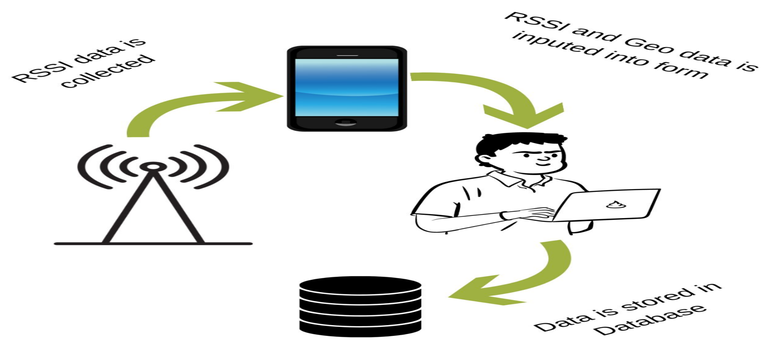
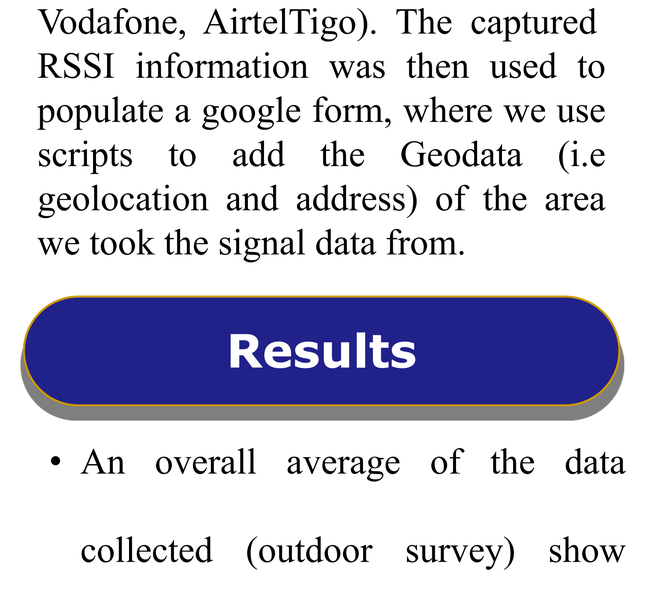



*Figure 1: Data Collection Process*

In order to do so, we had to move about campus and check the signal strength from selected points. We used Network Cell Info Lite to pick the RSSI from the capture devices (Cell phones) for the service providers that have been sampled, at strategic places. We went around campus to the various hostels, i.e. Diaspora halls and the traditional halls. For each checkpoint, we repeated the process three times for the three main telecoms service providers (ie MTN, Vodafone, AirtelTigo). The captured RSSI information was then used to populate a google form, where we use scripts to add the Geodata (i.e geolocation and address) of the area we took the signal data from.

## Results

- An overall average of the data collected (outdoor survey) show 29% of Excellent signal strength, 46.2% of Good signal strength, 24.5% of Fair network signal strength, 0.3% of poor network signal strength and 0% of no signal coverage.




*This image show the results of various category of network signals across campus in*

## Conclusion

- All three networks at the various halls focused on recorded good signal strength. Jean Nelson hall had fairly good network signal strength followed by Elizabeth Sey hall. Hilla Limann hall and Alexander Kwapong Hall also recorded fairly good network signal strength but experienced some downtime. Amongst the traditional halls, Volta hall recorded excellent signal strength for all three networks throughout the day followed by Mensah Sarbah hall amongst the traditional halls With the above analyzed data for the various networks at each survey site, the area which/that is most suitable for academic activities such as research is Volta hall. Academic work can go on smoothly with minimum network disruptions. Other areas that offer suitable signal strength that may be used for academic purposes include Legon, Commonwealth, Jubilee and Mensah Sarbah halls. This indicates that students in the traditional halls are able to carry out academic activities smoothly as compared to students in the other halls.

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