Makerere University
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A study of the negative impact of inappropriate network booster placement on Wi-fi signal strength in University Hall

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Abstract

This research looks at the correlation between network signal strength and the placement of network boosters around University Hall. The findings are based on original data collection from within the Hall. The goal is to find appropriate location for placement of these boosters in the future.

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- The students of University Hall for their invaluable contribution to the data collection process and in particular the Chairman, Mr. Collins Namara for his honest and precise answers.

- My family and friends.

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Chapter 1

Introduction

1.1 Motivation and Objectives

It has long been a complaint that while the university does provide free internet access to students, it is not of an appropriate quality, speed and has a limited bandwidth in comparison with the students' needs. The purpose of this study is to:

- Collect data on the general opinion about the network
- Provide concrete benchmarks on the signal booster positions and quality of the network
- Make recommendations that will guide future placement of these devices within the hall
- There have been constant complaints from students that abide on rooms whose windows face outside the hall of unstable and weak network signals

1.2 Statement of Originality

There has not been any previous research in this area and at this scale across the campus or in University Hall. Previous sentiments about the network have been expressed both through the respective students' representatives and freely on social media.

Chapter 2

Background Theory

2.1 Introduction

Wi-fi routers provide a signal that degrades with distance. Signal boosters are therefore normally required to increase signal strength, in essence 'repeating' the signal. University Hall has three signal repeaters that are meant to serve the entire hall of residence.

2.2 Summary of Findings

Participants in the survey were asked three simple questions.

- What device do you use to access the network?
- On a scale of zero to five, what is the quality of the network that you can access from your room?
- On a scale of zero to five, what is the quality of the network that you can access from outside your block?
- On a scale of zero to five, what is the best quality of the network you have ever experienced on MakAir from within the hall? Where was this?

Block	Room?	Outside?	Best location?	Where?
B	2	3	3.5	Right Booster
C	0	1	3.5	Right Booster
D	0	1	3	Right Booster
F	2	2	2	Right Booster
G	2	3	4	Left Booster
H	0.5	1	2.5	Central Booster
L	0	1	2.5	Left Booster
M	0	2	4	Left Booster
N	3	4	4	Left Booster
P	0	4	4	Left Booster
R	0	3	4	Left Booster
S	1	3	4	Left Booster

Table 2.1: Summary of statistics from interview findings

I present the averages gathered from each block. A total of three participants were interviewed from each block.

There were a few strong observations from this data.

- Individuals whose windows faced outside the hall had next no network signal or none at all.
- Individuals accessing the network with mobile phones generally hard a weaker signal than those with personal computers
- Individuals whose rooms were located behind a booster had a poor signal strength
- The strongest signals were reported while standing right in front of the left, center or right boosters
- The signal strength starts to degrade at 15m from the booster

Chapter 3

Conclusion

3.1 Summary of Thesis Recommendations

I therefore propose the following changes.

- Installation of 3600 boosters to replcace the current 1800 range boosters
- Installation of the said boosters on poles rather than on the sides of buildings which would prevent signal obstruction by the buildings

3.2 Future Work

Future research and improvements will focus on drawing more people into the interviewee pool and attempt to expand it to other halls of residence.