

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

In telecommunication, a path profile is referred to as the physical features of a propagation path in the vertical plane containing both endpoints of the path, showing the surface of the Earth and including trees, buildings, and other features that may obstruct the radio signal, for cellular network or mobile network.(Federal Standard 1037C, 1996). These obstructions caused by buildings and terrain affects coverage areas and system performances is called path loss.

Path loss, or path attenuation, is the reduction in power density (attenuation) of an electromagnetic wave as it propagates through space. Path loss is a major component in the analysis and design of the link budget of a telecommunication system. (Thiele and Gary 1981).

This term is commonly used in wireless communications and signal propagation. Path loss may be due to many effects, such as free space, path loss refraction, diffraction, reflection, aperture-medium coupling loss, and absorption. Path loss is also influenced by terrain contours, environment (urban or rural, vegetation and foliage), propagation medium (dry or moist air), the distance between the transmitter and the receiver, and the height and location of antennas.

Path loss normally includes propagation losses caused by the natural expansion of the radio wave front in free space (which usually takes the shape of an ever-increasing sphere), absorption losses (sometimes called penetration losses), when the signal passes through media not transparent to electromagnetic waves, diffraction losses when part of the radio wave front is obstructed by an opaque obstacle, and losses caused by other phenomena. The signal radiated by a transmitter may also travel along many and different paths to a receiver simultaneously; this effect is called multipath. Multipath waves combine at the receiver antenna, resulting in a received signal that may vary widely, depending on the distribution of the intensity and relative propagation time of the waves and bandwidth of the transmitted signal. The total power of interfering waves in a Rayleigh fading scenario varies quickly as a function of space (which is known as small scale fading). Small-scale fading refers to the rapid changes in radio signal amplitude in a short period of time or distance of travel.

In the study of wireless communications, path loss can be represented by the path loss exponent, whose value is normally in the range of 2 to 4 (where 2 is for propagation in free

space, 4 is for relatively lossy environments and for the case of full specular reflection from the earth surface—the so-called flat earth model). In some environments, such as buildings, stadiums and other indoor environments, the path loss exponent can reach values in the range of 4 to 6. On the other hand, a tunnel may act as a waveguide, resulting in a path loss exponent less than 2. (Stutzman Warren,1981)

Calculation of the path loss is usually called prediction. Exact prediction is possible only for simpler cases, such as free space propagation or the flat-earth model. For practical cases the path loss is calculated using a variety of approximations.

Statistical methods (also called stochastic or empirical) are based on measured and averaged losses along typical classes of radio links. Among the most commonly used such methods are Okumura–Hata, the COST Hata model, W.C.Y.Lee, etc. These are also known as radio wave propagation models and are typically used in the design of cellular networks and public land mobile networks (PLMN). For wireless communications in the very high frequency (VHF) and ultra high frequency (UHF) frequency band (the bands used by walkie-talkies, police, taxis and cellular phones), one of the most commonly used methods is that of Okumura–Hata as refined by the COST 231 project. Other well-known models are those of Walfisch–Ikegami, W. C. Y. Lee, and Erceg. For FM radio and TV broadcasting the path loss is most commonly predicted using the ITU model.

Deterministic methods based on the physical laws of wave propagation are also used; ray tracing is one such method. These methods are expected to produce more accurate and reliable predictions of the path loss than the empirical methods; however, they are significantly more expensive in computational effort and depend on the detailed and accurate description of all objects in the propagation space, such as buildings, roofs, windows, doors, and walls. For these reasons they are used predominantly for short propagation paths. Among the most commonly used methods in the design of radio equipment such as antennas and feeds is the finite-difference time-domain method.

The path loss in other frequency bands (medium wave (MW), shortwave (SW or HF), microwave (SHF)) is predicted with similar methods, though the concrete algorithms and formulas may be very different from those for VHF/UHF. Reliable prediction of the path loss in the SW/HF band is particularly difficult, and its accuracy is comparable to weather predictions. Path loss is usually expressed in dB. (Stutzman Warren,1981)

1.2 PROBLEM STATEMENT

Adequate documentation of a path profile for the university of Benin environment, specifically the faculty of engineering and its environs is not readily available

1.3 AIM AND OBJECTIVES

1.3.1 AIM

To determine Path profiles of two internet service providers A and B within faculty of engineering.

1.3.2 OBJECTIVES

- To determine the Received Signal Strength Indicator of service providers A and B.
- To determine the signal strength per distance of the two service providers.
- To determine the path loss of the received signals of the two service providers.

1.4 METHODOLOGY

The research is based on survey, theoretical modeling using received signal strength indicator application software to analyze signals.

1.5 SCOPE OF STUDY

This work is centered on a single base station containing two service providers within the faculty of engineering in the University of Benin.

CHAPTER TWO

LITERATURE REVIEW

2.1 DEFINITION OF TERMS

2.1.1 RECEIVED SIGNAL STRENGTH (R.S.S.I);

RSSI stands for Received Signal Strength Indicator. It is an estimated measure of power level that a RF client device is receiving from an access point or router.

At larger distances, the signal gets weaker and the wireless data rates get slower, leading to a lower overall data throughput. Signal is measured by the receive signal strength indicator (RSSI), which in most cases indicates how well a particular radio can hear the remote connected client radios.

2.1.2 CELL ID;

A GSM Cell ID (CID) is a generally unique number used to identify each base transceiver station (BTS) or sector of a BTS within a location area code (LAC) if not within a GSM network.

2.1.3 BASE STATION

Base station (or base radio station) is a term used in the context of mobile telephony, wireless computer networking and other wireless communications and in land surveying. In surveying, it is a GPS receiver at a known position, while in wireless communications it is a transceiver connecting a number of other devices to one another and/or to a wider area. In mobile telephony, it provides the connection between mobile phones and the wider telephone network. In a computer network, it is a transceiver acting as a switch for computers in the network, possibly connecting them to another local area network and/or the Internet.

2.1.4 2G (Second Generation)

2G (or 2-G) is short for second-generation cellular network. 2G technologies enabled the various networks to provide the services such as text messages, picture messages, and MMS (multimedia messages). All text messages sent over 2G are digitally encrypted, allowing the transfer of data in such a way that only the intended receiver can receive and read it.

2G networks are digital. Both systems use digital signaling to connect the radio towers

(which listen to the devices) to the rest of the mobile system.

With General Packet Radio Service (GPRS), 2G offers a theoretical maximum transfer speed of 40 kbit/s. With EDGE (Enhanced Data Rates for GSM Evolution), there is a theoretical maximum transfer speed of 384 kbit587/s.

2.1.5 3G (third Generation)

3G is the third generation of wireless mobile telecommunications technology. It is the upgrade for 2G and 2.5G GPRS networks, for faster data transfer speed.

3G telecommunication networks support services that provide an information transfer rate of at least 144 kbit/s. Later 3G releases often denoted 3.5G and 3.75G also provide mobile broadband access of several Mbit/s to smartphones and mobile modems in laptop computers. This ensures it can be applied to wireless voice telephony, mobile Internet access, fixed wireless Internet access, video calls and mobile TV technologies.

2.1.6 GLOBAL SYSTEM FOR MOBILE COMMUNICATION (GSM)

Gsm (global system for mobile communication is a digital mobile network that is widely used by mobile phone users around the world. GSM uses a variation of time division multiple access and is the most widely used of the three digital wireless, telephony technologies; TDMA, GSM and code division multiple access (CDMA). Gsm digitalizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either 900 or 1800 MHz frequency band.

Gsm together with other technologies, is part of the evolution of wireless mobile telecommunication that include high speed circuit-switched data(HCSD), General packet radio service, enhanced data Gsm environment (EDGE) and universal mobile telecommunication system(UMTS).

2.1.7 UNIVERSAL MOBILE TELECOMMUNICATIONS SERVICE (UMTS)

Umts is a third generation (3G) broad band, packet- based transmission of text, digitalized voice, video and multimedia at data rates up to two megabits per seconds (mbps). Umts offers a consistent set of service to mobile computers and phone users, no matter where they are located in the world. Umts is based on Gsm communication standard. Umts offers a consistent set of service to mobile computer and phone users, no matter where they are located in the world.

2.2 TOOLS

2.2.1 MEASURING TAPE

A tape measure or measuring tape is a flexible ruler and used to measure distance.

It consists of a ribbon of cloth, plastic, fiber glass, or metal strip with linear-measurement markings. It is a common measuring tool. Its design allows for a measure of great length to be easily carried in pocket or toolkit and permits one to measure around curves or corners. Today it is ubiquitous, even appearing in miniature form as a keychain fob, or novelty item. Surveyors use tape measures in lengths of over 100 m.



Fig 2.0 Measuring tape

2.2.2 CHALKS

A chalk is a soft compact calcite, with varying amount of silica which is used for marking, drawing or writing on a surface. It was used in marking out various points away from the base station.



Fig 2.1 Chalk

2.2.3 STICKS

This is a wooden pole like structure which was used in marking points or distances at intervals on the soil away from the base station.



Fig 2.2. Sticks

2.3 RELATED WORKS

2.3.1 MEASUREMENTS OF RADIO WAVE SIGNAL STRENGTH AND PATH LOSS PROPAGATION USING EGLI MODEL.

Nawawi Bin Ismail (2017) carried out a research on the measurement of radio frequency (RF) signal strength in the field and interpreting the results as radio signal coverage. This work only centered on comparative analysis of Egli model for determining path loss.

2.3.2 EVALUATION AND ANALYSIS OF GSM SIGNALS IN WARRI.

Anamonye U. G. et al., (2016) carried out a research comparison between the signal path-loss as predicted by the Free-space model and the Okumura-Hata model with values obtained through practical measurements. Their work only centered on comparative analysis of Okumura - Hata model and the free space model for determining path loss.

2.3.3 PERFORMANCE ANALYSIS OF GSM NETWORKS IN MINNA METROPOLIS OF NIGERIA.

Ozovehei and A. U. Usman (2015) carried out a research that discussed the performance of a cellular network in terms of key performance indicators (KPI) based on statistics, Generated from drive tests or network management systems. In this work the transmission frequency of the base station was not stated, the received signal strength at each location was not ascertained and the path loss was not determined.

2.3.4 COMPARISON OF SIGNAL STRENGTHS OF 2G/3G/4G SERVICES ON A UNIVERSITY CAMPUS.

Begüm Korunur and Çetin Kurnaz. (2016) carried out a research that aims to determine the signal strengths of three cellular system operators for 2G, 3G and 4G services. In this work the various propagation models they used were not discussed and the empirical and predicted path loss was not determined.

2.3.5 PERFORMANCE ANALYSIS OF GSM NETWORK (RELIANCE GSM) IN ALIGARH CITY, UP, INDIA

Rajesh Kumar Upadhyay. Et al. (2014) carried out a research talks about, two approaches used to evaluate the network performance, namely: key performance indicators (KPIs) and drive test. In this work the various propagation models were not discussed and the empirical and predicted path loss was not determined.

2.3.6 SURVIVABILITY ANALYSIS OF GSM NETWORK SYSTEMS

Qaysar S. Mahdi (2018) carried out a research that presents a methodology for availability assessment of GSM systems. The availability block diagram model is selected to model the system, taking into account the signal strength and signal covering overlaps exist in GSM systems. In this work the various propagation models were not discussed and the empirical and predicted path loss was not determined.

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CHAPTER THREE

METHODOLOGY

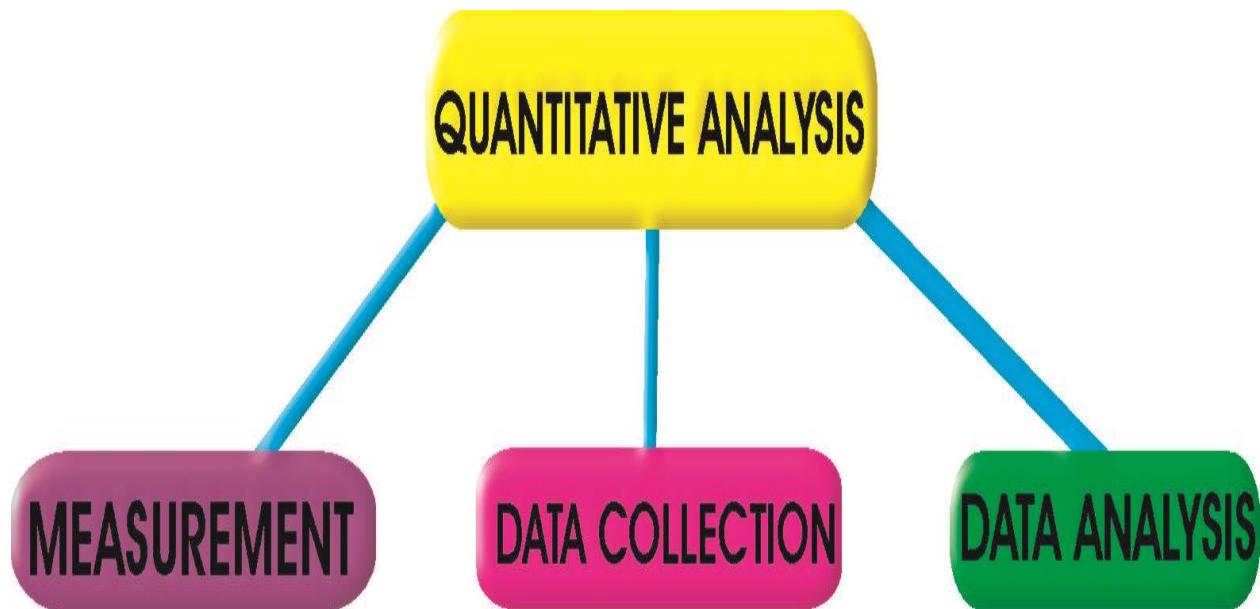


Fig 3.0. Block Diagram

3.1.1 MEASUREMENT

Measurements were taken at different points to be able to get readings at those intervals for data collection purposes.

3.1.2 DATA COLLECTION

This stage involved the extraction of data from the field at different points away from the base station.

3.1.3 DATA ANALYSIS

This stage involved the analysis of data gotten from the field in respect to the propagation model.

3.2 PROPAGATION MODEL

The most suitable propagation model selected for this project was the Okumura Hata model taking note of the environment of interest and its specification.

3.2.1 OKUMURA- HATA PROPAGATION MODEL

In mobile communications, the terrain between the transmitter and the receiver plays a very important role in determining the signal strength at the receiver. Okumura-Hata model is one of the popular models, especially used for urban or suburban areas. It is generally applied for frequencies in the range of 150 MHz - 1920 MHz, for a distance separation ranging from 1 km to 100 km, and for antenna heights from 30 m to 1000 m.

In the first form, the path-loss (in dB) is written as

$$PL = PL_{freespace} + A_{exc} + H_{cb} + H_{cm}$$

Where $PL_{freespace}$ is the Free-space path-loss, A_{exc} is the excess path-loss (as a function of distance and frequency) for a BS height is h_b , and a MS height is h_m . H_{cb} and H_{cm} are the correction factors that are provided in graphs. The more common form is a curve fitting of Okumura's original results. In that implementation, the path-loss is written as;

$$PL = A + B \log(d) + C$$

A, B, and C are factors that depend on frequency and antenna height.

$$A = 46.3 + 33.9 \log(f_c) - 13.82 \log(h_b) - a(h_m)$$

$$B = 44.9 - 6.55 \log(h_b)$$

Here f_c is given in MHz and d in km.

The function $a(h_m)$ and the factor C depend on the environment, which is suburban as related to the scope of study.

For suburban environment; $C = -2 \left[\log \left(\frac{f_c}{28} \right) \right]^2 - 5.4$

The function $a(h_m)$ in suburban and rural areas is the same as for urban (small and medium-sized Cities) areas.

For rural areas; $C = -4.78[\log(f_c)]^2 + 18.33\log(f_c) - 40.98$

3.3 THEORY BEHIND METHODOLOGY

Received signal strength (RSS) is a readily available and cost effective method of location estimation, or localization, in wireless local area network (WLAN) and GSM. It is represented as an average of signal received through different paths at a given location. The received signal strength is a function of distance between the transmitter and the receiving device, which varies due to various in-path interferences. It is used to measure

the power present in a received radio signal. Therefore, the higher the RSSI number, the stronger the signal vice versa.

3.4 MOBILE PHONE

Two mobile phones were used; A Xiaomi Pocophone and Infinix hot 6.

The **Xiaomi Pocophone** has a specification of 6 GB Ram, Android Os 8.1, Octa-Core processor.

The **Infinix hot 6** has a specification of 1 GB Ram, Android Os 8.0, Quad-Core processor.



Fig 3.1 Xiaomi Pocophone



Fig 3.2 Infinix Hot 6

Two mobile phones were used to get values to ensure accuracy. Measuring tapes (Fig. 2.3.1) was used to take readings at 2m intervals up to 2km as shown in the table at appendix.

BASE STATION SPECIFICATIONS:

Height of the cell tower: 45m

Height of the mobile station; 1.5m

Frequency of transmission; 1800 MHz for 3G and 900MHz for 2G

Transmission power of the base station; 25000mW

3.5 SOFTWARE

The methodology used in this project is based on comparative study, which the execution of this research is to obtain the Gsm data analysis to over various distance away from the base station using two application software such as net monitor and signal strength. This programs were selected because of their easy use and installation. These programs run on android and ios mobile phones.

3.5.1 SIGNAL STRENGTH APPLICATION SOFTWARE

Signal strength application software is an innovative. Gsm signal analyzer that gives good coverage analysis for Gsm communication networks at a short period of time and it is cost effective. It has a clear and intuitive interface where to display the various cell towers and signals strength at different points from the base station. The software was used to capture information such as; cell-id, Rssi, lac e.t.c. it is an android application software.

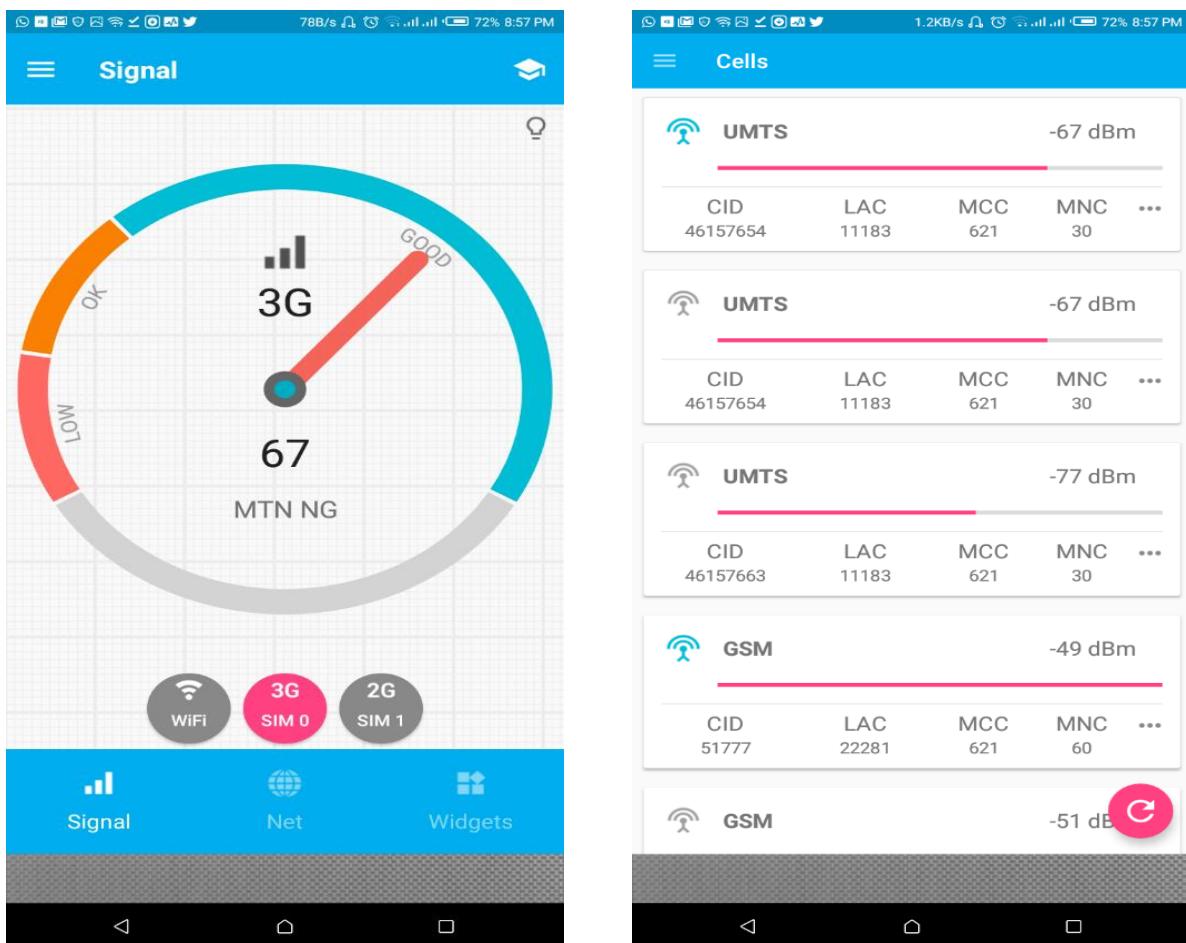


Fig 3.3. User interface of the signal strength application

3.5.2 NET MONITOR APPLICATION SOFTWARE

This is also an android application that displays information of the signal strength. It was used to measure the received signal strength at every distance away from the base station.

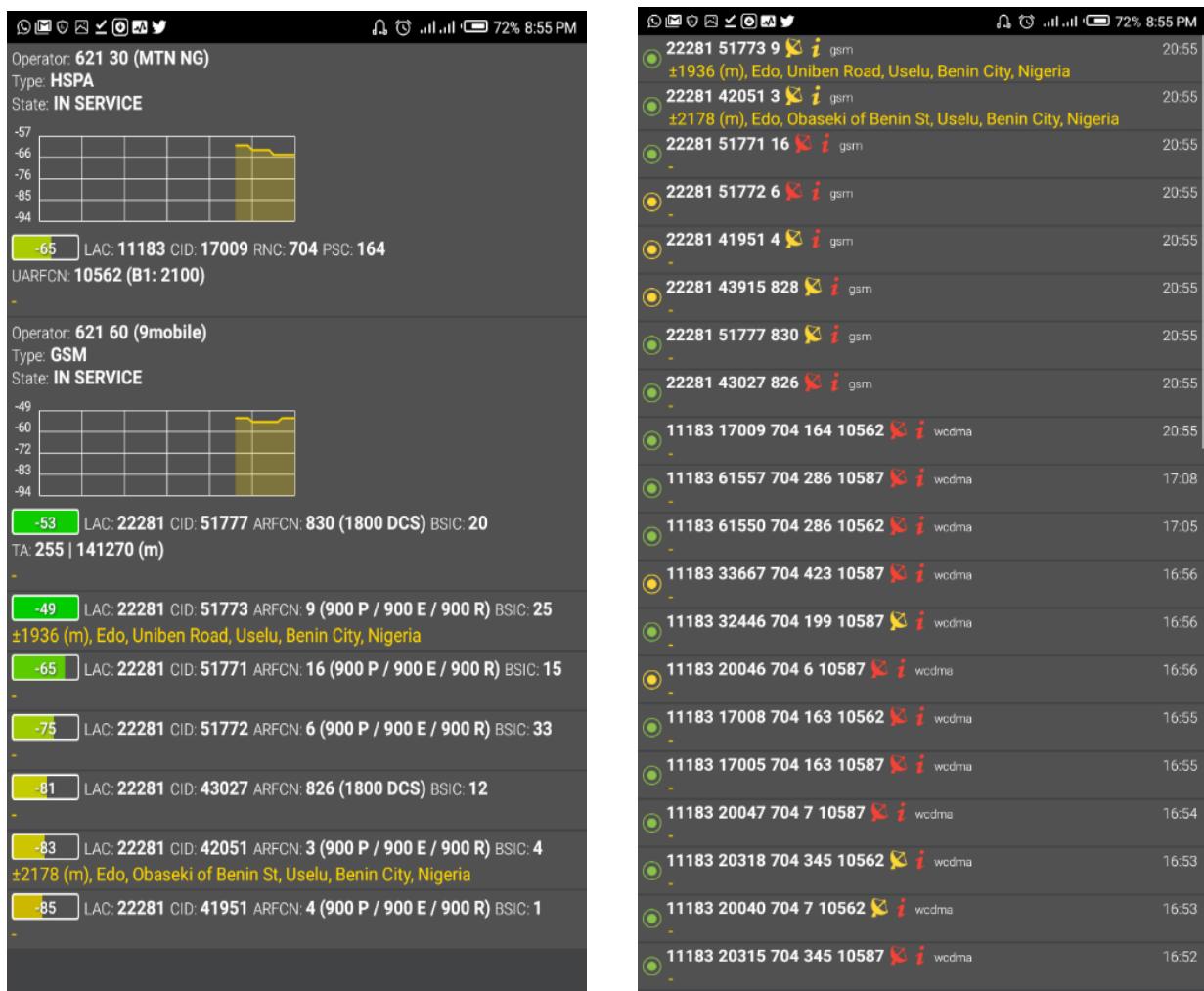


Fig 3.4. User Interface of The Net monitor Application

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 MEASUREMENT SPECIFICATIONS FOR BASE AND MOBILE STATION.

Height of the cell tower: 45m

Height of the mobile station; 1.5m

Frequency of transmission; 1800 MHz for 3G and 900MHz for 2G

Transmission power of the base station; 25000mW



Figure 4.1 base station

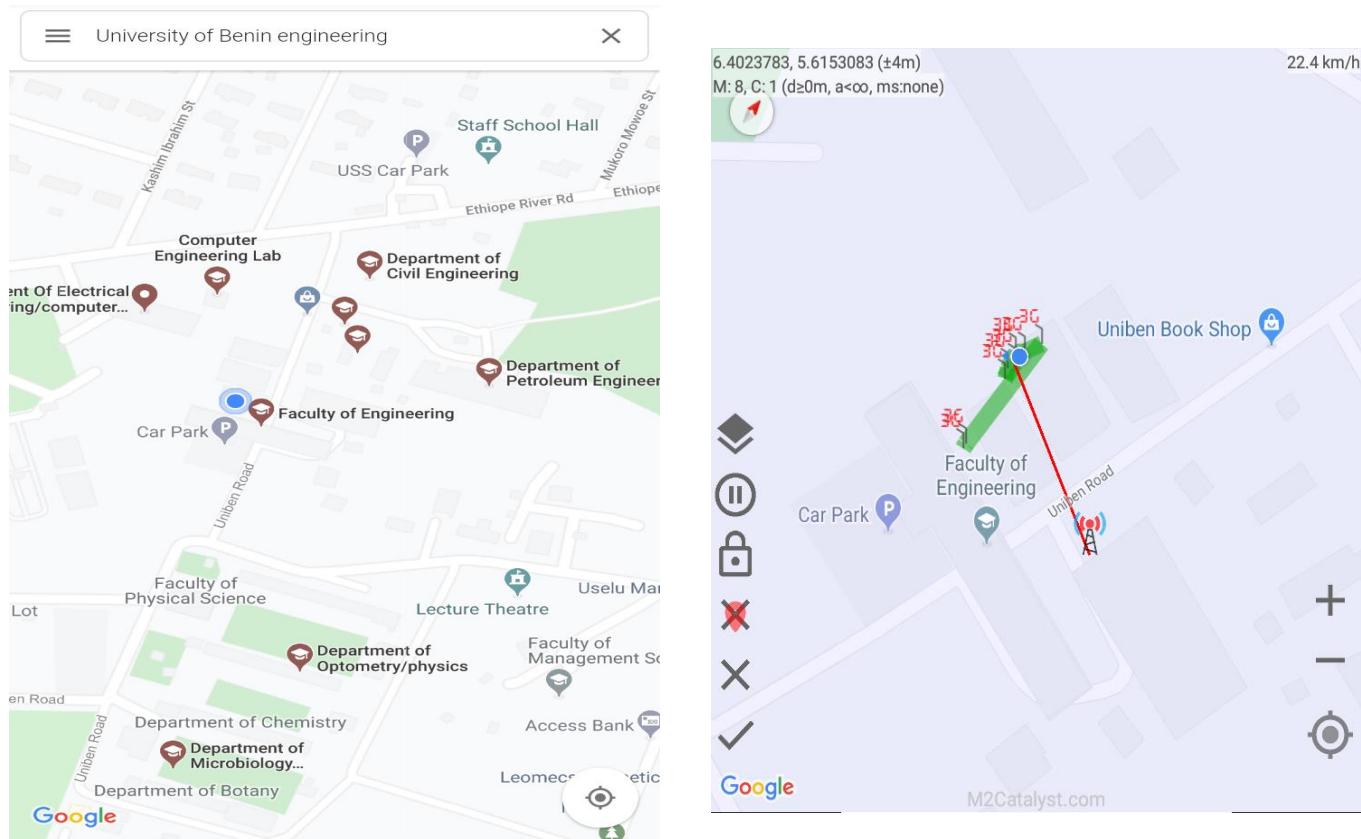


Fig 4.2 map of the area of study showing buildings and the base station of study

4.2 DISCUSSION

4.2.1 CALCULATIONS FOR EGLI MODEL (EMPERICAL PATH LOSS)

$$L_{path} = 40\log_{10}(d) - 20\log_{10}(hb) - 20\log_{10}(hm) - 10\log_{10}(\beta) \dots \text{Eqn 4.2}$$

$$\text{Where } \beta = \left(\frac{40}{f_{MHz}} \right)^2$$

Gain is zero

F is frequency

Pt is power transmitted

Lpath is path loss

β is clutter factor

hm is height of mobile station and hb is height of base station

RSL is received signal level

$$RSL = 10\log(25000\text{mW}) - L_{\text{path}} - 2\text{db}$$

$$RSL = 41.97 - L_{\text{path}}$$

$$L_{\text{path}} = 41.97 + RSL = 125.97$$

Assuming RSL= mean on the tables of the appendix

The graph of Path loss against Distance will be plotted using Microsoft Excel, for 3g, 2g Airtel and Mtn respectively.

Eqn 4.2 is the Okumura Hata model

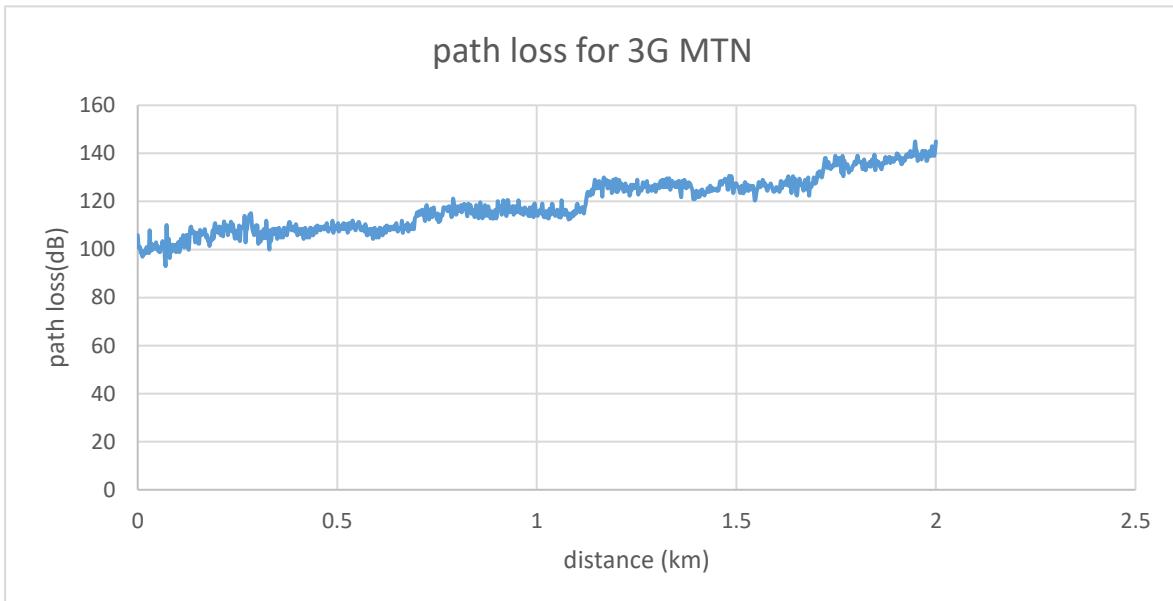


Fig 4.3 Path loss for 3G MTN (service provider A)

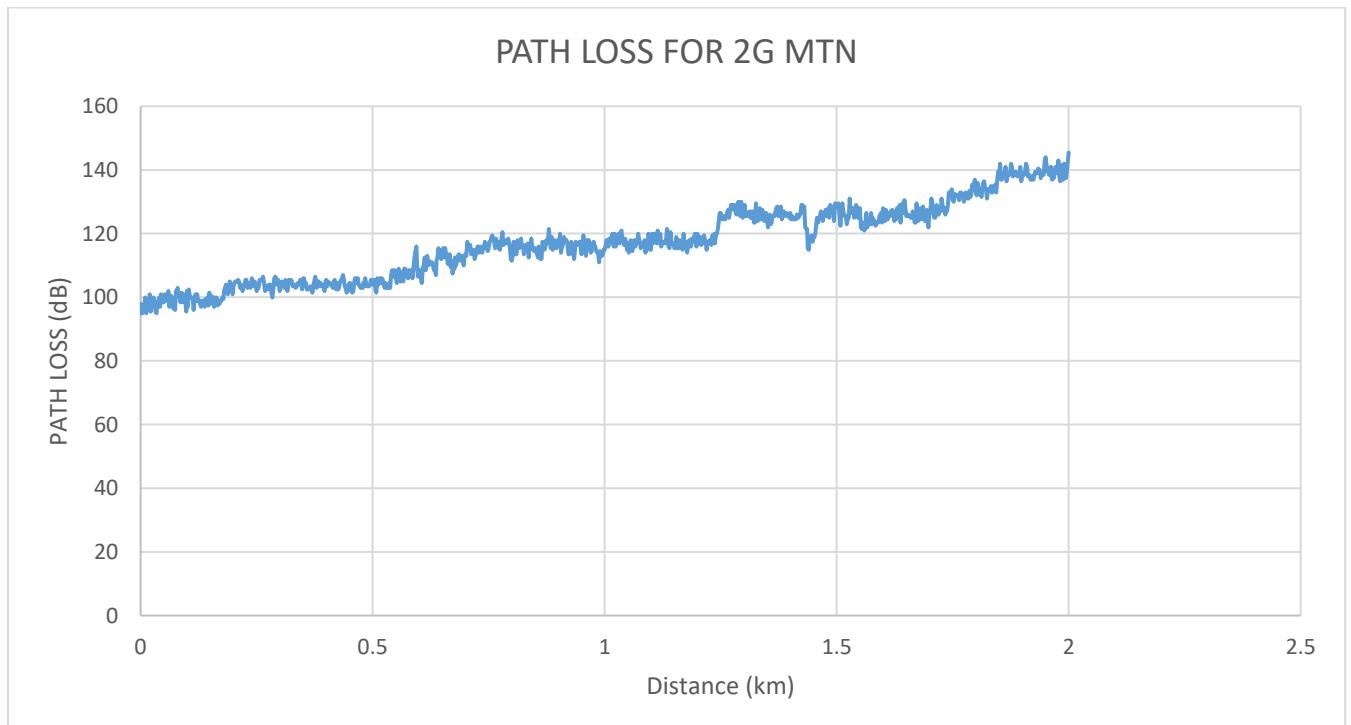


Fig 4.4 Path loss for 2G MTN (service provider B)

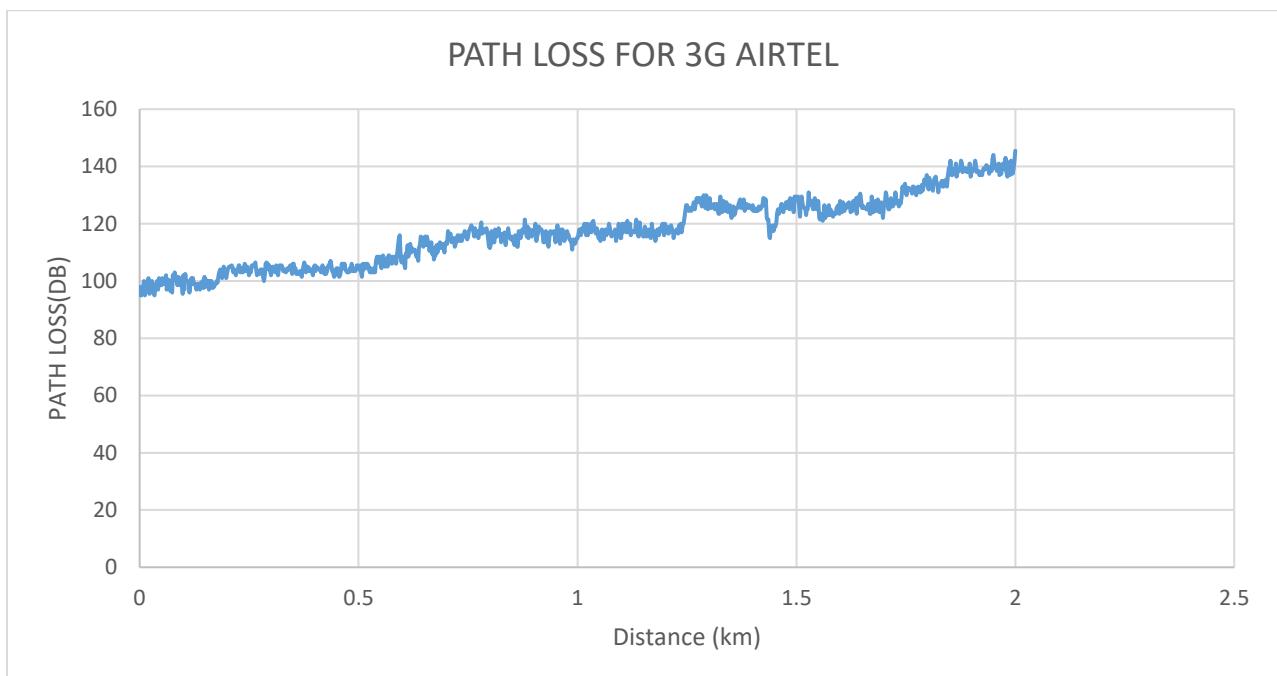


Fig 4.5 Path loss for 3G Airtel (service provider B)

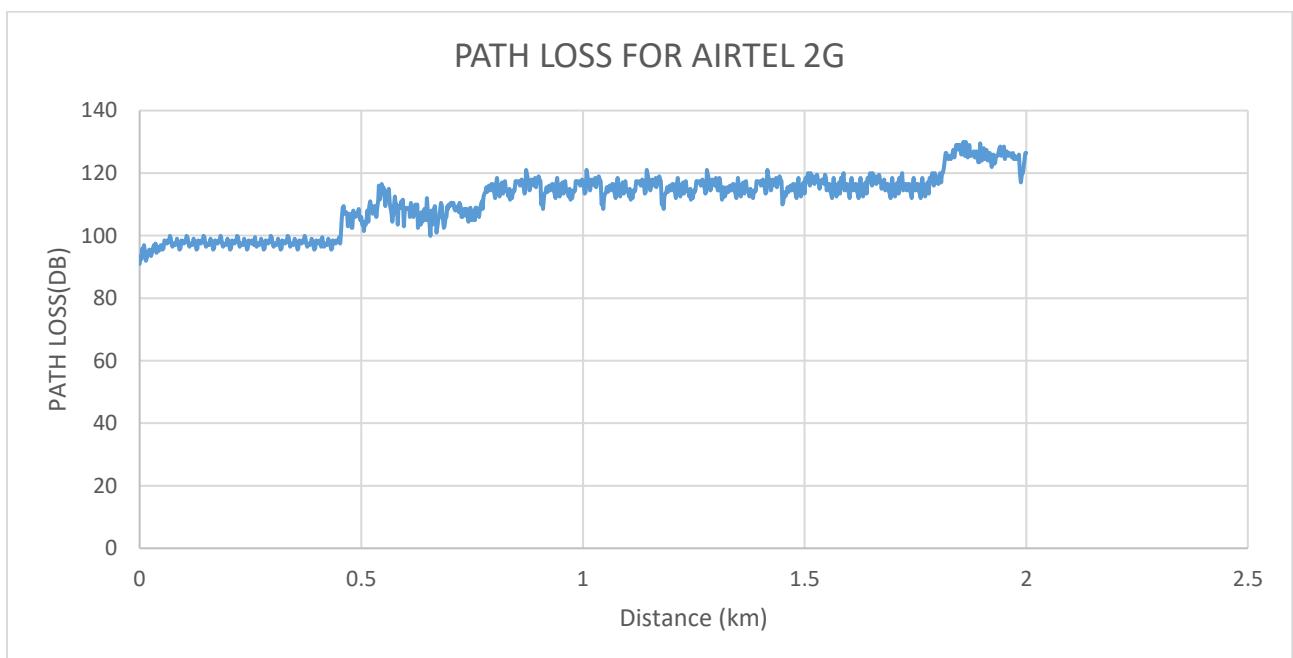


Fig 4.6 Path loss for 3G Airtel (service provider B)

4.2.2 OKUMURA HATA MODEL CALCULATION OF PATH LOSS

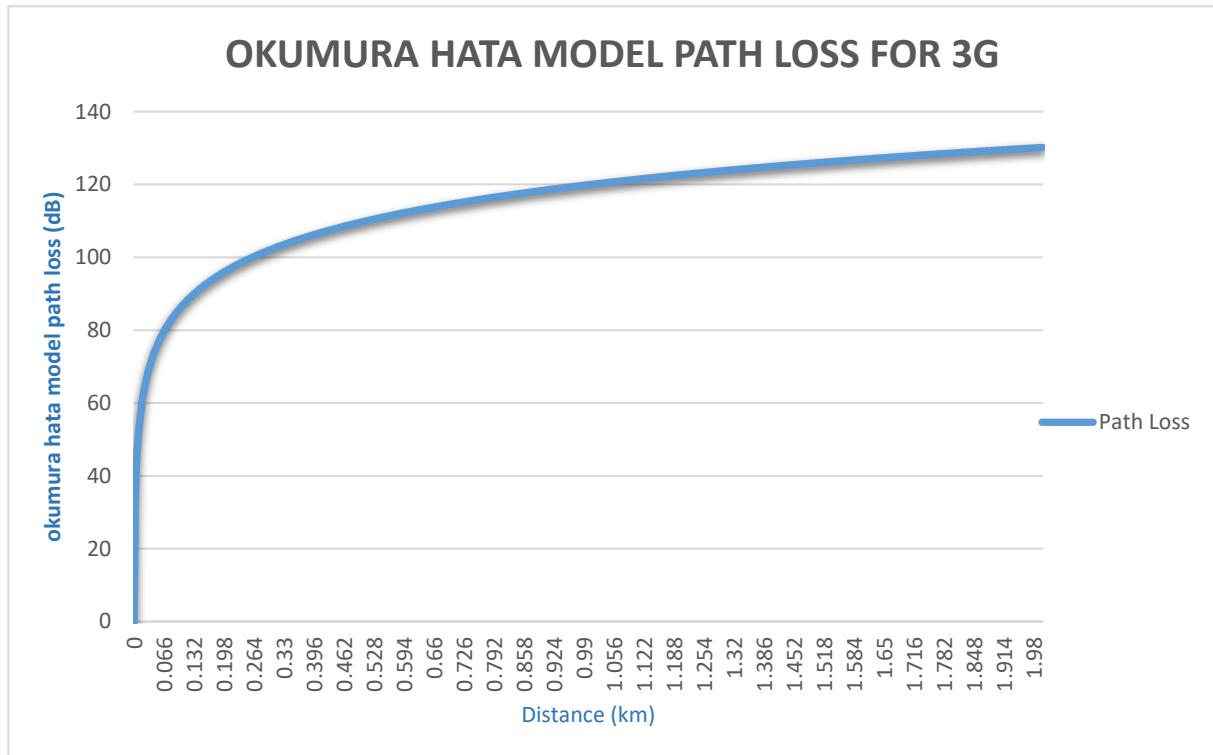


Fig 4.7 Okumura Hata model Path Loss for 3G

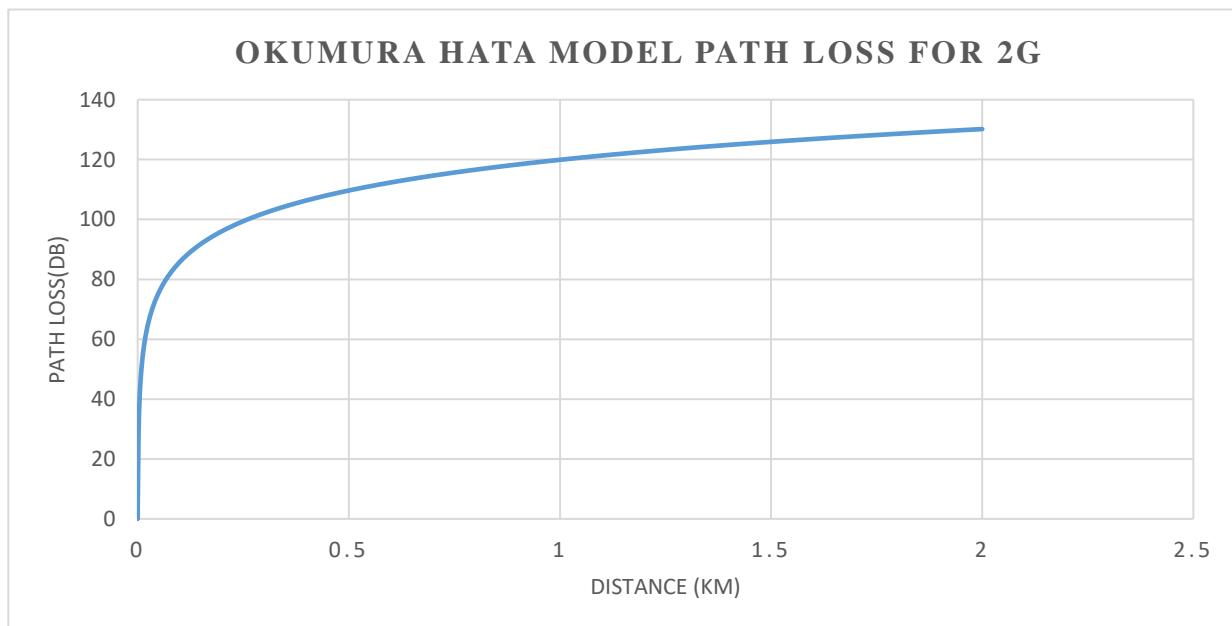


Fig 4.8 The Okumura Hata model Path loss for 2G

4.2.3 ACCURACY OF MEASURED PATH LOSS AND OKUMURA

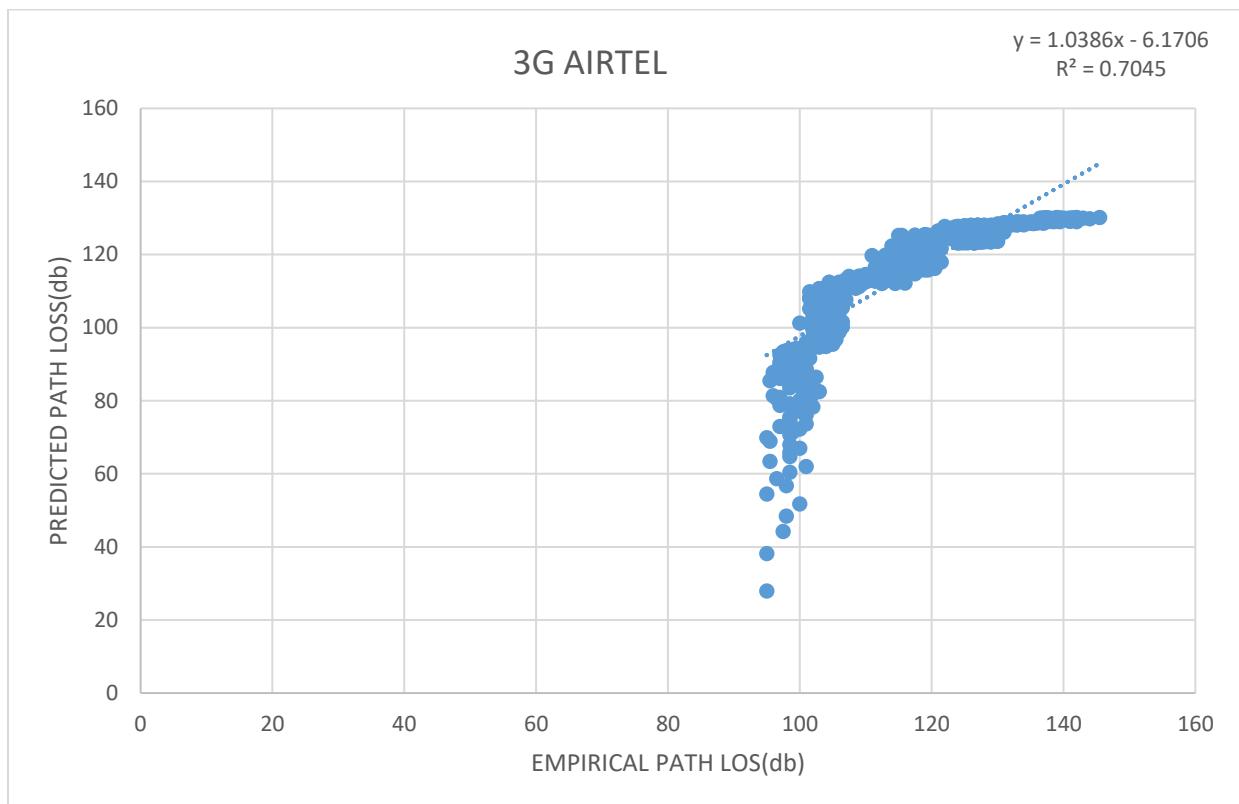


Fig 4.9 as observed above there's a 70% accuracy between the measured path loss and the Okumura Hata model for 3G AIRTEL which was obtained from the table 1.3 in the appendix.

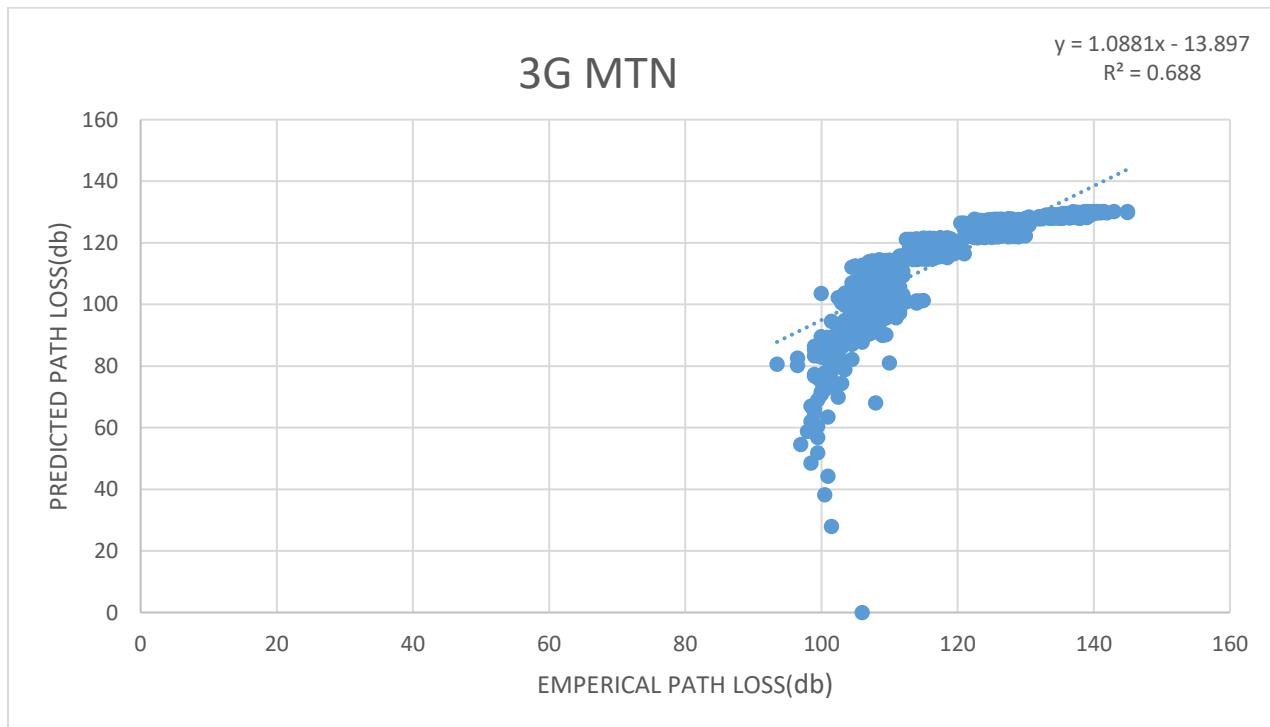


Fig 4.10 As observed above there's a 68% accuracy between the measured path loss and the Okumura Hata model for 3G MTN which was obtained from the table 1.1 in the appendix.

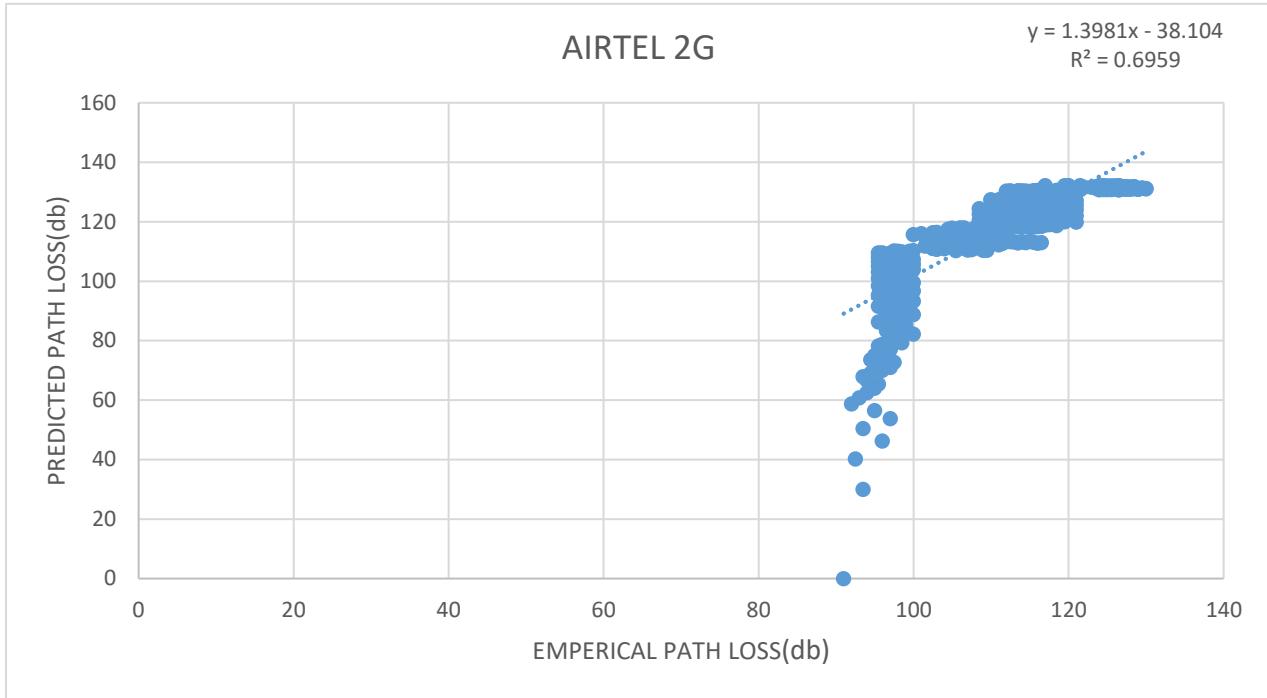


Fig 4.11 As observed above there's a 68% accuracy between the measured path loss and the Okumura Hata model for 2G AIRTEL which was obtained from the table 1.4 in the appendix.

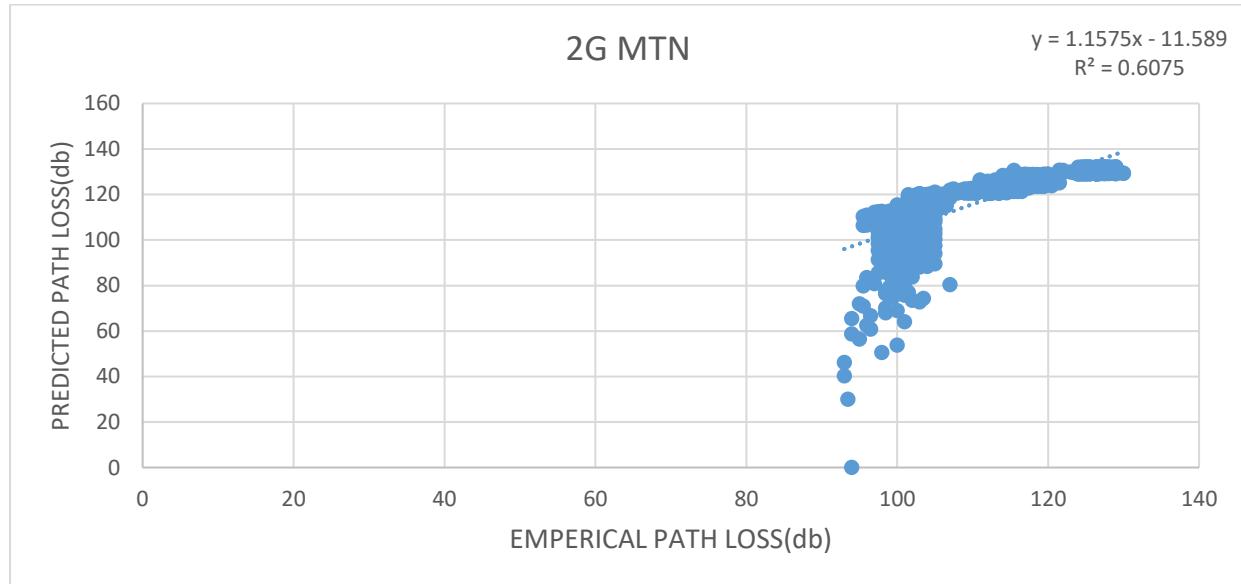


Fig 4.12 As observed above there's a 60% accuracy between the measured path loss and the Okumura Hata model for 2G MTN from table 1.2 in appendix.

We discovered that the Okumura-Hata model was very good at giving a good estimate of the path-loss at the area under consideration. The accuracy of the Okumura-Hata model path-loss (**Fig 4.9**,

Fig 4.10, Fig 4.11 and Fig 4.12) gotten through the modellings when compared with the egli model only got better as the distance from the base station is increased. It is also very close to the measured path-loss obtained from measurements. This shows us that the Okumura-Hata model is quite suitable to calculate for the path-loss in this areas. Secondly, it was observed that the measured path-loss, as seen from the graph, usually settles for the same value as the Okumura-Hata model as the distance increases. This also adds to the already high reliability of the Okumura-Hata model.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

This project has been able to determine the path profile for the faculty of engineering, analyze the received signal strength gotten from the base station using cell signal monitor application and signal strength application for two internet service providers “MTN and AIRTEL”.

The predicted path loss was calculated and it was compared with the okumura hata model path loss. The path loss increase as the distance increase from the base station and this resulted the Receive Signal Level (RSL) decrease as distance increase.

5.2 RECOMMENDATION

There is a whole lot of path loss prediction models such as COST231–Walish–Ikegami Model, The ITU-Advanced Channel Model, Free-space Propagation Model, The ITU-R Models and The Okumura Hata model.

These propagation models are used for the design, simulation and planning of wireless systems. These models represent important properties of propagation channels that affect the transmission of electromagnetic signals. They also help the design engineer to make changes to blueprints and analyze the cost of these changes without spending much time, money and effort. An important aspect of these models is the path-loss of the propagation channel. This can be defined as the loss of energy in free space due to the conservation of energy and geometric reasons. These reasons are due to the effects of reflection, refraction, diffraction, scattering etc.

The Okumura Hata model is recommended as the best model for analyzing path loss as it can be used to calculate for path loss for different environment i.e. rural, suburban and urban area. It is generally applied for frequencies in the range of 150 MHz - 1920 MHz, for a distance separation ranging from 1 km to 100 km, and for antenna heights from 30 m to 1000 m.

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APPENDIX

TABLE 1.1: RESULTS FOR THE R.S.S.I FOR 3G MTN

CELL ID; 32448

S/N	DISTANCE (METERS)	RSSI FOR MTN 3G(-dbm) signal strength app	RSSI FOR MTN 3G(-dbm)(net monitor app)	MEAN(dbm)
1	0	-67	-61	-64
2	2	-59	-60	-59.5
3	4	-58	-59	-58.5
4	6	-61	-57	-59
5	8	-58	-55	-56.5
6	10	-63	-52	-57.5
7	12	-54	-56	-55
8	14	-61	-54	-57.5
9	16	-53	-59	-56
10	18	-58	-57	-57.5
11	20	-56	-57	-56.5
12	22	-59	-59	-59
13	24	-56	-58	-57
14	26	-54	-60	-57
15	28	-51	-62	-56.5
16	30	-69	-63	-66
17	32	-57	-58	-57.5
18	34	-63	-58	-60.5
19	36	-61	-55	-58
20	38	-57	-59	-58
21	40	-60	-57	-58.5
22	42	-61	-59	-60
23	44	-57	-61	-59
24	46	-59	-63	-61
25	48	-61	-55	-58

26	50	-60	-59	-59.5
27	52	-56	-59	-57.5
28	54	-57	-57	-57
29	56	-53	-61	-57
30	58	-55	-62	-58.5
31	60	-57	-61	-59
32	62	-59	-64	-61.5
33	64	-58	-61	-59.5
34	66	-59	-62	-60.5
35	68	-53	-56	-54.5
36	70	-52	-51	-51.5
37	72	-69	-67	-68
38	74	-59	-64	-61.5
39	76	-55	-63	-59
40	78	-60	-65	-62.5
41	80	-54	-55	-54.5
42	82	-57	-59	-58
43	84	-55	-59	-57
44	86	-59	-61	-60
45	88	-60	-58	-59
46	90	-57	-60	-58.5
47	92	-56	-59	-57.5
48	94	-59	-61	-60
49	96	-54	-60	-57
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392	782	-76	-72	-74
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406	810	-76	-77	-76.5
407	812	-75	-72	-73.5
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584	1166	-85	-87	-86
585	1168	-86	-90	-88
586	1170	-87	-84	-85.5
587	1172	-85	-88	-86.5
588	1174	-85	-89	-87
589	1176	-88	-81	-84.5
590	1178	-85	-82	-83.5
591	1180	-89	-84	-86.5
592	1182	-86	-85	-85.5
593	1184	-86	-86	-86
594	1186	-87	-85	-86
595	1188	-79	-84	-81.5
596	1190	-87	-84	-85.5
597	1192	-90	-84	-87
598	1194	-84	-81	-82.5
599	1196	-88	-82	-85
600	1198	-89	-86	-87.5
601	1200	-81	-83	-82
602	1202	-82	-82	-82
603	1204	-84	-81	-82.5

604	1206	-85	-89	-87
605	1208	-86	-83	-84.5
606	1210	-85	-82	-83.5
607	1212	-84	-87	-85.5
608	1214	-84	-83	-83.5
609	1216	-84	-82	-83
610	1218	-81	-83	-82
611	1220	-82	-84	-83
612	1222	-86	-85	-85.5
613	1224	-83	-82	-82.5
614	1226	-82	-84	-83
615	1228	-81	-85	-83
616	1230	-89	-79	-84
617	1232	-83	-78	-80.5
618	1234	-82	-80	-81
619	1236	-87	-83	-85
620	1238	-83	-83	-83
621	1240	-82	-85	-83.5
622	1242	-83	-87	-85
623	1244	-84	-84	-84
624	1246	-85	-84	-84.5
625	1248	-82	-85	-83.5
626	1250	-84	-85	-84.5
627	1252	-85	-89	-87
628	1254	-79	-83	-81
629	1256	-78	-86	-82
630	1258	-80	-85	-82.5
631	1260	-83	-84	-83.5
632	1262	-83	-82	-82.5
633	1264	-85	-83	-84
634	1266	-87	-85	-86
635	1268	-84	-84	-84
636	1270	-84	-85	-84.5
637	1272	-85	-86	-85.5

638	1274	-85	-83	-84
639	1276	-89	-84	-86.5
640	1278	-83	-81	-82
641	1280	-86	-83	-84.5
642	1282	-85	-82	-83.5
643	1284	-84	-83	-83.5
644	1286	-82	-84	-83
645	1288	-83	-82	-82.5
646	1290	-85	-84	-84.5
647	1292	-84	-82	-83
648	1294	-85	-83	-84
649	1296	-86	-84	-85
650	1298	-83	-81	-82
651	1300	-84	-85	-84.5
652	1302	-81	-86	-83.5
653	1304	-83	-87	-85
654	1306	-82	-85	-83.5
655	1308	-83	-85	-84
656	1310	-85	-88	-86.5
657	1312	-83	-85	-84
658	1314	-85	-89	-87
659	1316	-83	-86	-84.5
660	1318	-82	-86	-84
661	1320	-87	-87	-87
662	1322	-89	-79	-84
663	1324	-86	-87	-86.5
664	1326	-85	-90	-87.5
665	1328	-84	-84	-84
666	1330	-85	-88	-86.5
667	1332	-86	-89	-87.5
668	1334	-85	-81	-83
669	1336	-86	-82	-84
670	1338	-85	-84	-84.5
671	1340	-88	-85	-86.5

672	1342	-83	-86	-84.5
673	1344	-84	-85	-84.5
674	1346	-86	-84	-85
675	1348	-84	-84	-84
676	1350	-88	-84	-86
677	1352	-87	-81	-84
678	1354	-90	-82	-86
679	1356	-87	-86	-86.5
680	1358	-85	-83	-84
681	1360	-81	-82	-81.5
682	1362	-79	-81	-80
683	1364	-84	-89	-86.5
684	1366	-85	-83	-84
685	1368	-89	-82	-85.5
686	1370	-87	-87	-87
687	1372	-87	-83	-85
688	1374	-85	-82	-83.5
689	1376	-86	-83	-84.5
690	1378	-84	-84	-84
691	1380	-87	-85	-86
692	1382	-88	-82	-85
693	1384	-87	-84	-85.5
694	1386	-84	-85	-84.5
695	1388	-88	-79	-83.5
696	1390	-87	-78	-82.5
697	1392	-78	-80	-79
698	1394	-75	-83	-79
699	1396	-75	-83	-79
700	1398	-75	-85	-80
701	1400	-78	-87	-82.5
702	1402	-76	-84	-80
703	1404	-77	-84	-80.5
704	1406	-75	-85	-80
705	1408	-75	-85	-80

706	1410	-76	-89	-82.5
707	1412	-79	-83	-81
708	1414	-80	-86	-83
709	1416	-79	-85	-82
710	1418	-80	-84	-82
711	1420	-79	-82	-80.5
712	1422	-80	-83	-81.5
713	1424	-79	-85	-82
714	1426	-80	-84	-82
715	1428	-82	-85	-83.5
716	1430	-81	-86	-83.5
717	1432	-81	-83	-82
718	1434	-85	-84	-84.5
719	1436	-87	-81	-84
720	1438	-82	-83	-82.5
721	1440	-83	-82	-82.5
722	1442	-84	-83	-83.5
723	1444	-82	-84	-83
724	1446	-84	-82	-83
725	1448	-82	-84	-83
726	1450	-83	-82	-82.5
727	1452	-84	-83	-83.5
728	1454	-81	-84	-82.5
729	1456	-85	-81	-83
730	1458	-86	-85	-85.5
731	1460	-87	-86	-86.5
732	1462	-85	-87	-86
733	1464	-85	-85	-85
734	1466	-88	-85	-86.5
735	1468	-85	-88	-86.5
736	1470	-89	-85	-87
737	1472	-86	-89	-87.5
738	1474	-86	-86	-86
739	1476	-87	-86	-86.5

740	1478	-79	-87	-83
741	1480	-87	-79	-83
742	1482	-90	-87	-88.5
743	1484	-84	-90	-87
744	1486	-88	-84	-86
745	1488	-89	-88	-88.5
746	1490	-81	-89	-85
747	1492	-82	-81	-81.5
748	1494	-84	-82	-83
749	1496	-85	-84	-84.5
750	1498	-86	-85	-85.5
751	1500	-85	-86	-85.5
752	1502	-84	-85	-84.5
753	1504	-84	-84	-84
754	1506	-84	-84	-84
755	1508	-81	-84	-82.5
756	1510	-82	-81	-81.5
757	1512	-86	-82	-84
758	1514	-83	-86	-84.5
759	1516	-82	-83	-82.5
760	1518	-81	-82	-81.5
761	1520	-89	-81	-85
762	1522	-83	-89	-86
763	1524	-82	-83	-82.5
764	1526	-87	-82	-84.5
765	1528	-83	-87	-85
766	1530	-82	-83	-82.5
767	1532	-84	-82	-83
768	1534	-86	-83	-84.5
769	1536	-85	-84	-84.5
770	1538	-82	-85	-83.5
771	1540	-84	-82	-83
772	1542	-85	-84	-84.5
773	1544	-79	-85	-82

774	1546	-78	-79	-78.5
775	1548	-80	-78	-79
776	1550	-83	-80	-81.5
777	1552	-83	-83	-83
778	1554	-85	-83	-84
779	1556	-87	-85	-86
780	1558	-84	-87	-85.5
781	1560	-84	-84	-84
782	1562	-85	-84	-84.5
783	1564	-85	-85	-85
784	1566	-89	-85	-87
785	1568	-83	-89	-86
786	1570	-86	-83	-84.5
787	1572	-85	-86	-85.5
788	1574	-84	-85	-84.5
789	1576	-82	-84	-83
790	1578	-83	-82	-82.5
791	1580	-85	-83	-84
792	1582	-84	-85	-84.5
793	1584	-85	-84	-84.5
794	1586	-86	-85	-85.5
795	1588	-83	-86	-84.5
796	1590	-84	-83	-83.5
797	1592	-81	-84	-82.5
798	1594	-83	-81	-82
799	1596	-82	-83	-82.5
800	1598	-83	-82	-82.5
801	1600	-85	-83	-84
802	1602	-83	-84	-83.5
803	1604	-85	-82	-83.5
804	1606	-83	-84	-83.5
805	1608	-82	-82	-82
806	1610	-87	-83	-85
807	1612	-89	-84	-86.5

808	1614	-86	-81	-83.5
809	1616	-85	-85	-85
810	1618	-84	-86	-85
811	1620	-85	-87	-86
812	1622	-86	-85	-85.5
813	1624	-85	-85	-85
814	1626	-86	-88	-87
815	1628	-85	-85	-85
816	1630	-88	-89	-88.5
817	1632	-83	-86	-84.5
818	1634	-84	-86	-85
819	1636	-86	-87	-86.5
820	1638	-84	-79	-81.5
821	1640	-88	-87	-87.5
822	1642	-87	-90	-88.5
823	1644	-90	-84	-87
824	1646	-87	-88	-87.5
825	1648	-85	-89	-87
826	1650	-81	-81	-81
827	1652	-79	-82	-80.5
828	1654	-84	-84	-84
829	1656	-85	-85	-85
830	1658	-89	-86	-87.5
831	1660	-87	-85	-86
832	1662	-87	-84	-85.5
833	1664	-85	-84	-84.5
834	1666	-86	-84	-85
835	1668	-84	-81	-82.5
836	1670	-87	-82	-84.5
837	1672	-88	-86	-87
838	1674	-87	-83	-85
839	1676	-84	-82	-83
840	1678	-88	-81	-84.5
841	1680	-87	-89	-88

842	1682	-78	-83	-80.5
843	1684	-85	-82	-83.5
844	1686	-84	-85	-84.5
845	1688	-85	-83	-84
846	1690	-89	-82	-85.5
847	1692	-87	-84	-85.5
848	1694	-87	-89	-88
849	1696	-85	-86	-85.5
850	1698	-86	-85	-85.5
851	1700	-87	-85	-86
852	1702	-89	-87	-88
853	1704	-91	-89	-90
854	1706	-90	-87	-88.5
855	1708	-91	-90	-90.5
856	1710	-92	-89	-90.5
857	1712	-93	-86	-89.5
858	1714	-91	-85	-88
859	1716	-92	-87	-89.5
860	1718	-93	-90	-91.5
861	1720	-95	-92	-93.5
862	1722	-97	-95	-96
863	1724	-96	-96	-96
864	1726	-92	-94	-93
865	1728	-95	-89	-92
866	1730	-98	-91	-94.5
867	1732	-97	-90	-93.5
868	1734	-94	-91	-92.5
869	1736	-91	-92	-91.5
870	1738	-91	-93	-92
871	1740	-95	-91	-93
872	1742	-93	-92	-92.5
873	1744	-93	-93	-93
874	1746	-94	-95	-94.5
875	1748	-97	-97	-97

876	1750	-95	-96	-95.5
877	1752	-94	-92	-93
878	1754	-96	-95	-95.5
879	1756	-94	-98	-96
880	1758	-95	-97	-96
881	1760	-98	-94	-96
882	1762	-93	-91	-92
883	1764	-89	-91	-90
884	1766	-99	-95	-97
885	1768	-85	-92	-88.5
886	1770	-95	-95	-95
887	1772	-90	-96	-93
888	1774	-92	-94	-93
889	1776	-95	-89	-92
890	1778	-96	-91	-93.5
891	1780	-94	-90	-92
892	1782	-89	-91	-90
893	1784	-91	-92	-91.5
894	1786	-90	-93	-91.5
895	1788	-91	-91	-91
896	1790	-92	-92	-92
897	1792	-93	-93	-93
898	1794	-91	-95	-93
899	1796	-92	-97	-94.5
900	1798	-93	-96	-94.5
901	1800	-95	-92	-93.5
902	1802	-97	-95	-96
903	1804	-96	-98	-97
904	1806	-92	-97	-94.5
905	1808	-95	-94	-94.5
906	1810	-98	-91	-94.5
907	1812	-97	-91	-94
908	1814	-94	-95	-94.5
909	1816	-91	-92	-91.5

910	1818	-91	-95	-93
911	1820	-95	-96	-95.5
912	1822	-93	-94	-93.5
913	1824	-93	-89	-91
914	1826	-94	-91	-92.5
915	1828	-97	-90	-93.5
916	1830	-95	-91	-93
917	1832	-94	-92	-93
918	1834	-96	-93	-94.5
919	1836	-94	-91	-92.5
920	1838	-95	-92	-93.5
921	1840	-98	-93	-95.5
922	1842	-93	-95	-94
923	1844	-89	-97	-93
924	1846	-99	-96	-97.5
925	1848	-90	-92	-91
926	1850	-95	-95	-95
927	1852	-89	-98	-93.5
928	1854	-92	-97	-94.5
929	1856	-95	-94	-94.5
930	1858	-96	-91	-93.5
931	1860	-94	-91	-92.5
932	1862	-89	-95	-92
933	1864	-91	-92	-91.5
934	1866	-96	-92	-94
935	1868	-94	-93	-93.5
936	1870	-95	-93	-94
937	1872	-96	-95	-95.5
938	1874	-97	-96	-96.5
939	1876	-95	-93	-94
940	1878	-96	-95	-95.5
941	1880	-96	-96	-96
942	1882	-95	-97	-96
943	1884	-99	-94	-96.5

944	1886	-93	-95	-94
945	1888	-95	-97	-96
946	1890	-96	-96	-96
947	1892	-95	-97	-96
948	1894	-91	-98	-94.5
949	1896	-92	-99	-95.5
950	1898	-93	-98	-95.5
951	1900	-93	-99	-96
952	1902	-95	-101	-98
953	1904	-96	-98	-97
954	1906	-93	-102	-97.5
955	1908	-95	-96	-95.5
956	1910	-96	-97	-96.5
957	1912	-97	-92	-94.5
958	1914	-94	-93	-93.5
959	1916	-95	-93	-94
960	1918	-97	-95	-96
961	1920	-96	-96	-96
962	1922	-97	-93	-95
963	1924	-98	-95	-96.5
964	1926	-99	-96	-97.5
965	1928	-98	-97	-97.5
966	1930	-99	-94	-96.5
967	1932	-101	-95	-98
968	1934	-98	-97	-97.5
969	1936	-102	-96	-99
970	1938	-96	-97	-96.5
971	1940	-97	-98	-97.5
972	1942	-98	-99	-98.5
973	1944	-96	-98	-97
974	1946	-101	-99	-100
975	1948	-105	-101	-103
976	1950	-101	-98	-99.5
977	1952	-96	-102	-99

978	1954	-94	-96	-95
979	1956	-95	-97	-96
980	1958	-96	-99	-97.5
981	1960	-97	-96	-96.5
982	1962	-95	-100	-97.5
983	1964	-96	-95	-95.5
984	1966	-102	-96	-99
985	1968	-95	-101	-98
986	1970	-99	-95	-97
987	1972	-99	-96	-97.5
988	1974	-101	-97	-99
989	1976	-96	-94	-95
990	1978	-95	-95	-95
991	1980	-96	-97	-96.5
992	1982	-98	-96	-97
993	1984	-101	-97	-99
994	1986	-97	-98	-97.5
995	1988	-95	-99	-97
996	1990	-104	-98	-101
997	1992	-98	-99	-98.5
998	1994	-95	-101	-98
999	1996	-96	-98	-97
1000	1998	-97	-102	-99.5
1001	2000	-105	-101	-103

1.2 2G MTN

CELL ID; 20492

S/N	DISTANCE (m)	RSSI 2G (DbM) cell signal strength	RSSI 2G (DbM) net monitor	MEAN (dbm)
1	0	-51	-53	-52
2	2	-52	-51	-51.5
3	4	-50	-52	-51
4	6	-49	-53	-51
5	8	-57	-55	-56
6	10	-59	-57	-58
7	12	-55	-51	-53
8	14	-49	-55	-52
9	16	-53	-56	-54.5
10	18	-51	-57	-54
11	20	-57	-61	-59
12	22	-51	-53	-52
13	24	-51	-58	-54.5
14	26	-57	-56	-56.5
15	28	-57	-59	-58
16	30	-57	-56	-56.5
17	32	-53	-54	-53.5
18	34	-55	-51	-53
19	36	-63	-59	-61
20	38	-63	-57	-60
21	40	-63	-60	-61.5
22	42	-54	-61	-57.5
23	44	-61	-57	-59
24	46	-53	-60	-56.5
25	48	-58	-61	-59.5

26	50	-56	-57	-56.5
27	52	-59	-59	-59
28	54	-56	-61	-58.5
29	56	-54	-60	-57
30	58	-51	-56	-53.5
31	60	-69	-61	-65
32	62	-57	-53	-55
33	64	-60	-58	-59
34	66	-61	-56	-58.5
35	68	-57	-59	-58
36	70	-60	-56	-58
37	72	-61	-54	-57.5
38	74	-57	-51	-54
39	76	-59	-61	-60
40	78	-61	-57	-59
41	80	-57	-59	-58
42	82	-59	-55	-57
43	84	-59	-57	-58
44	86	-55	-56	-55.5
45	88	-53	-59	-56
46	90	-58	-54	-56
47	92	-57	-57	-57
48	94	-56	-58	-57
49	96	-59	-57	-58
50	98	-56	-59	-57.5
51	100	-59	-61	-60
52	102	-61	-61	-61
53	104	-62	-62	-62
54	106	-60	-60	-60
55	108	-59	-59	-59
56	110	-61	-61	-61
57	112	-63	-63	-63
58	114	-62	-62	-62
59	116	-59	-63	-61

60	118	-57	-61	-59
61	120	-57	-59	-58
62	122	-59	-55	-57
63	124	-59	-57	-58
64	126	-55	-56	-55.5
65	128	-53	-59	-56
66	130	-58	-54	-56
67	132	-57	-57	-57
68	134	-56	-58	-57
69	136	-59	-57	-58
70	138	-56	-59	-57.5
71	140	-59	-61	-60
72	142	-61	-61	-61
73	144	-62	-62	-62
74	146	-60	-60	-60
75	148	-59	-59	-59
76	150	-61	-61	-61
77	152	-63	-63	-63
78	154	-62	-62	-62
79	156	-59	-63	-61
80	158	-57	-61	-59
81	160	-57	-59	-58
82	162	-59	-55	-57
83	164	-59	-57	-58
84	166	-55	-56	-55.5
85	168	-53	-59	-56
86	170	-58	-54	-56
87	172	-57	-57	-57
88	174	-56	-58	-57
89	176	-59	-57	-58
90	178	-56	-59	-57.5
91	180	-59	-61	-60
92	182	-61	-61	-61
93	184	-62	-62	-62

94	186	-60	-60	-60
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632	1262	-75	-74	-74.5
633	1264	-78	-78	-78
634	1266	-73	-71	-72
635	1268	-76	-72	-74
636	1270	-75	-74	-74.5
637	1272	-79	-75	-77

638	1274	-75	-77	-76
639	1276	-78	-74	-76
640	1278	-81	-71	-76
641	1280	-78	-72	-75
642	1282	-75	-68	-71.5
643	1284	-74	-69	-71.5
644	1286	-79	-70	-74.5
645	1288	-75	-76	-75.5
646	1290	-74	-74	-74
647	1292	-72	-71	-71.5
648	1294	-70	-70	-70
649	1296	-72	-75	-73.5
650	1298	-75	-76	-75.5
651	1300	-74	-75	-74.5
652	1302	-72	-78	-75
653	1304	-73	-77	-75
654	1306	-77	-74	-75.5
655	1308	-72	-76	-74
656	1310	-72	-71	-71.5
657	1312	-74	-76	-75
658	1314	-81	-74	-77.5
659	1316	-74	-73	-73.5
660	1318	-73	-72	-72.5
661	1320	-72	-70	-71
662	1322	-77	-75	-76
663	1324	-75	-74	-74.5
664	1326	-74	-78	-76
665	1328	-76	-71	-73.5
666	1330	-72	-72	-72
667	1332	-71	-74	-72.5
668	1334	-75	-75	-75
669	1336	-74	-77	-75.5
670	1338	-75	-74	-74.5
671	1340	-77	-71	-74

672	1342	-73	-72	-72.5
673	1344	-76	-68	-72
674	1346	-75	-69	-72
675	1348	-68	-70	-69
676	1350	-69	-76	-72.5
677	1352	-70	-74	-72
678	1354	-71	-71	-71
679	1356	-73	-70	-71.5
680	1358	-71	-75	-73
681	1360	-70	-76	-73
682	1362	-73	-75	-74
683	1364	-78	-74	-76
684	1366	-75	-76	-75.5
685	1368	-76	-72	-74
686	1370	-78	-75	-76.5
687	1372	-77	-74	-75.5
688	1374	-75	-78	-76.5
689	1376	-79	-77	-78
690	1378	-77	-73	-75
691	1380	-75	-73	-74
692	1382	-78	-78	-78
693	1384	-73	-75	-74
694	1386	-76	-76	-76
695	1388	-75	-78	-76.5
696	1390	-79	-77	-78
697	1392	-75	-75	-75
698	1394	-78	-79	-78.5
699	1396	-81	-77	-79
700	1398	-78	-75	-76.5
701	1400	-75	-78	-76.5
702	1402	-74	-75	-74.5
703	1404	-79	-74	-76.5
704	1406	-75	-76	-75.5
705	1408	-74	-72	-73

706	1410	-72	-75	-73.5
707	1412	-70	-74	-72
708	1414	-72	-78	-75
709	1416	-75	-77	-76
710	1418	-74	-73	-73.5
711	1420	-72	-73	-72.5
712	1422	-73	-78	-75.5
713	1424	-77	-75	-76
714	1426	-72	-76	-74
715	1428	-72	-78	-75
716	1430	-74	-77	-75.5
717	1432	-81	-75	-78
718	1434	-74	-79	-76.5
719	1436	-73	-77	-75
720	1438	-72	-75	-73.5
721	1440	-71	-78	-74.5
722	1442	-75	-75	-75
723	1444	-74	-74	-74
724	1446	-76	-76	-76
725	1448	-72	-72	-72
726	1450	-75	-75	-75
727	1452	-74	-74	-74
728	1454	-78	-78	-78
729	1456	-77	-77	-77
730	1458	-73	-73	-73
731	1460	-73	-73	-73
732	1462	-78	-78	-78
733	1464	-75	-75	-75
734	1466	-76	-76	-76
735	1468	-78	-78	-78
736	1470	-77	-77	-77
737	1472	-75	-75	-75
738	1474	-79	-79	-79
739	1476	-77	-77	-77

740	1478	-75	-75	-75
741	1480	-78	-78	-78
742	1482	-73	-75	-74
743	1484	-76	-74	-75
744	1486	-75	-76	-75.5
745	1488	-79	-72	-75.5
746	1490	-75	-75	-75
747	1492	-78	-74	-76
748	1494	-81	-78	-79.5
749	1496	-78	-77	-77.5
750	1498	-75	-73	-74
751	1500	-74	-73	-73.5
752	1502	-79	-78	-78.5
753	1504	-75	-75	-75
754	1506	-74	-76	-75
755	1508	-72	-78	-75
756	1510	-70	-77	-73.5
757	1512	-72	-75	-73.5
758	1514	-75	-79	-77
759	1516	-74	-77	-75.5
760	1518	-72	-75	-73.5
761	1520	-73	-78	-75.5
762	1522	-77	-75	-76
763	1524	-73	-74	-73.5
764	1526	-72	-76	-74
765	1528	-74	-72	-73
766	1530	-81	-75	-78
767	1532	-74	-74	-74
768	1534	-73	-78	-75.5
769	1536	-72	-77	-74.5
770	1538	-71	-73	-72
771	1540	-75	-73	-74
772	1542	-74	-78	-76
773	1544	-76	-75	-75.5

774	1546	-72	-76	-74
775	1548	-75	-78	-76.5
776	1550	-74	-77	-75.5
777	1552	-78	-75	-76.5
778	1554	-77	-79	-78
779	1556	-73	-77	-75
780	1558	-73	-75	-74
781	1560	-78	-78	-78
782	1562	-75	-75	-75
783	1564	-76	-74	-75
784	1566	-78	-76	-77
785	1568	-77	-72	-74.5
786	1570	-75	-75	-75
787	1572	-79	-74	-76.5
788	1574	-77	-78	-77.5
789	1576	-75	-77	-76
790	1578	-78	-73	-75.5
791	1580	-73	-73	-73
792	1582	-75	-76	-75.5
793	1584	-76	-74	-75
794	1586	-79	-73	-76
795	1588	-80	-72	-76
796	1590	-79	-70	-74.5
797	1592	-80	-75	-77.5
798	1594	-79	-74	-76.5
799	1596	-80	-76	-78
800	1598	-79	-71	-75
801	1600	-80	-75	-77.5
802	1602	-82	-74	-78
803	1604	-81	-78	-79.5
804	1606	-81	-83	-82
805	1608	-85	-84	-84.5
806	1610	-87	-82	-84.5
807	1612	-82	-84	-83

808	1614	-83	-82	-82.5
809	1616	-84	-83	-83.5
810	1618	-82	-84	-83
811	1620	-84	-81	-82.5
812	1622	-82	-85	-83.5
813	1624	-83	-86	-84.5
814	1626	-84	-87	-85.5
815	1628	-81	-85	-83
816	1630	-85	-85	-85
817	1632	-86	-88	-87
818	1634	-87	-85	-86
819	1636	-85	-89	-87
820	1638	-85	-86	-85.5
821	1640	-88	-86	-87
822	1642	-85	-87	-86
823	1644	-89	-79	-84
824	1646	-86	-87	-86.5
825	1648	-86	-90	-88
826	1650	-87	-84	-85.5
827	1652	-79	-88	-83.5
828	1654	-87	-89	-88
829	1656	-90	-81	-85.5
830	1658	-84	-82	-83
831	1660	-88	-84	-86
832	1662	-89	-85	-87
833	1664	-81	-86	-83.5
834	1666	-82	-85	-83.5
835	1668	-84	-84	-84
836	1670	-85	-84	-84.5
837	1672	-86	-84	-85
838	1674	-85	-81	-83
839	1676	-84	-82	-83
840	1678	-84	-86	-85
841	1680	-84	-83	-83.5

842	1682	-81	-82	-81.5
843	1684	-82	-81	-81.5
844	1686	-86	-89	-87.5
845	1688	-83	-83	-83
846	1690	-82	-82	-82
847	1692	-81	-87	-84
848	1694	-89	-83	-86
849	1696	-83	-82	-82.5
850	1698	-82	-83	-82.5
851	1700	-87	-84	-85.5
852	1702	-83	-85	-84
853	1704	-82	-82	-82
854	1706	-83	-84	-83.5
855	1708	-84	-85	-84.5
856	1710	-85	-79	-82
857	1712	-82	-78	-80
858	1714	-84	-80	-82
859	1716	-85	-83	-84
860	1718	-79	-83	-81
861	1720	-78	-85	-81.5
862	1722	-80	-87	-83.5
863	1724	-83	-84	-83.5
864	1726	-83	-84	-83.5
865	1728	-85	-85	-85
866	1730	-87	-85	-86
867	1732	-84	-89	-86.5
868	1734	-84	-83	-83.5
869	1736	-85	-86	-85.5
870	1738	-85	-85	-85
871	1740	-89	-84	-86.5
872	1742	-83	-82	-82.5
873	1744	-86	-83	-84.5
874	1746	-85	-85	-85
875	1748	-84	-84	-84

876	1750	-82	-85	-83.5
877	1752	-83	-86	-84.5
878	1754	-85	-83	-84
879	1756	-84	-84	-84
880	1758	-85	-81	-83
881	1760	-86	-83	-84.5
882	1762	-83	-82	-82.5
883	1764	-84	-83	-83.5
884	1766	-81	-84	-82.5
885	1768	-83	-82	-82.5
886	1770	-82	-84	-83
887	1772	-83	-82	-82.5
888	1774	-85	-83	-84
889	1776	-83	-84	-83.5
890	1778	-85	-81	-83
891	1780	-83	-85	-84
892	1782	-82	-86	-84
893	1784	-87	-87	-87
894	1786	-89	-85	-87
895	1788	-86	-85	-85.5
896	1790	-85	-88	-86.5
897	1792	-84	-76	-80
898	1794	-85	-74	-79.5
899	1796	-86	-73	-79.5
900	1798	-75	-72	-73.5
901	1800	-81	-83	-82
902	1802	-85	-84	-84.5
903	1804	-87	-82	-84.5
904	1806	-82	-84	-83
905	1808	-83	-82	-82.5
906	1810	-84	-83	-83.5
907	1812	-82	-84	-83
908	1814	-84	-81	-82.5
909	1816	-82	-85	-83.5

910	1818	-83	-86	-84.5
911	1820	-84	-87	-85.5
912	1822	-81	-85	-83
913	1824	-85	-85	-85
914	1826	-86	-88	-87
915	1828	-87	-85	-86
916	1830	-85	-89	-87
917	1832	-85	-86	-85.5
918	1834	-88	-86	-87
919	1836	-85	-87	-86
920	1838	-89	-79	-84
921	1840	-86	-87	-86.5
922	1842	-81	-83	-82
923	1844	-85	-84	-84.5
924	1846	-87	-82	-84.5
925	1848	-82	-84	-83
926	1850	-83	-82	-82.5
927	1852	-84	-83	-83.5
928	1854	-82	-84	-83
929	1856	-84	-81	-82.5
930	1858	-82	-85	-83.5
931	1860	-83	-86	-84.5
932	1862	-84	-87	-85.5
933	1864	-81	-85	-83
934	1866	-85	-85	-85
935	1868	-86	-88	-87
936	1870	-87	-85	-86
937	1872	-85	-89	-87
938	1874	-85	-86	-85.5
939	1876	-88	-86	-87
940	1878	-85	-87	-86
941	1880	-89	-79	-84
942	1882	-86	-87	-86.5
943	1884	-81	-83	-82

944	1886	-85	-84	-84.5
945	1888	-87	-82	-84.5
946	1890	-82	-84	-83
947	1892	-83	-82	-82.5
948	1894	-84	-83	-83.5
949	1896	-82	-84	-83
950	1898	-84	-81	-82.5
951	1900	-82	-85	-83.5
952	1902	-83	-86	-84.5
953	1904	-84	-87	-85.5
954	1906	-81	-85	-83
955	1908	-85	-85	-85
956	1910	-86	-88	-87
957	1912	-87	-85	-86
958	1914	-85	-89	-87
959	1916	-85	-86	-85.5
960	1918	-88	-86	-87
961	1920	-85	-87	-86
962	1922	-89	-79	-84
963	1924	-86	-87	-86.5
964	1926	-81	-83	-82
965	1928	-85	-84	-84.5
966	1930	-87	-82	-84.5
967	1932	-82	-84	-83
968	1934	-83	-82	-82.5
969	1936	-84	-83	-83.5
970	1938	-82	-84	-83
971	1940	-84	-81	-82.5
972	1942	-82	-85	-83.5
973	1944	-83	-86	-84.5
974	1946	-84	-87	-85.5
975	1948	-81	-85	-83
976	1950	-85	-85	-85
977	1952	-86	-88	-87

978	1954	-87	-85	-86
979	1956	-85	-89	-87
980	1958	-85	-86	-85.5
981	1960	-88	-86	-87
982	1962	-85	-87	-86
983	1964	-89	-79	-84
984	1966	-86	-87	-86.5
985	1968	-81	-83	-82
986	1970	-85	-84	-84.5
987	1972	-87	-82	-84.5
988	1974	-82	-84	-83
989	1976	-83	-82	-82.5
990	1978	-84	-83	-83.5
991	1980	-82	-84	-83
992	1982	-84	-81	-82.5
993	1984	-82	-85	-83.5
994	1986	-83	-86	-84.5
995	1988	-84	-87	-85.5
996	1990	-81	-85	-83
997	1992	-85	-85	-85
998	1994	-86	-88	-87
999	1996	-87	-85	-86
1000	1998	-85	-89	-87
1001	2000	-85	-86	-85.5

1.3 RSSI FOR AIRTEL 3G

S/N	DISTANCE (m)	RSSI 3G (DbM) signal strength	RSSI 3G (DbM) net monitor	MEAN(dbm)
1	0	-59	-53	-56
2	2	-55	-51	-53
3	4	-52	-54	-53
4	6	-58	-53	-55.5
5	8	-57	-55	-56
6	10	-59	-57	-58
7	12	-55	-51	-53
8	14	-57	-55	-56
9	16	-53	-56	-54.5
10	18	-56	-57	-56.5
11	20	-57	-61	-59
12	22	-54	-53	-53.5
13	24	-55	-58	-56.5
14	26	-57	-56	-56.5
15	28	-57	-59	-58
16	30	-57	-56	-56.5
17	32	-53	-54	-53.5
18	34	-55	-51	-53
19	36	-54	-59	-56.5
20	38	-57	-57	-57
21	40	-59	-57	-58
22	42	-54	-56	-55
23	44	-61	-57	-59

24	46	-53	-60	-56.5
25	48	-58	-55	-56.5
26	50	-56	-57	-56.5
27	52	-59	-59	-59
28	54	-56	-61	-58.5
29	56	-54	-60	-57
30	58	-58	-56	-57
31	60	-59	-61	-60
32	62	-57	-53	-55
33	64	-55	-58	-56.5
34	66	-61	-56	-58.5
35	68	-57	-59	-58
36	70	-53	-56	-54.5
37	72	-56	-54	-55
38	74	-57	-51	-54
39	76	-59	-61	-60
40	78	-61	-57	-59
41	80	-62	-60	-61
42	82	-56	-61	-58.5
43	84	-61	-57	-59
44	86	-53	-60	-56.5
45	88	-58	-61	-59.5
46	90	-56	-57	-56.5
47	92	-59	-59	-59
48	94	-56	-61	-58.5
49	96	-54	-60	-57
50	98	-51	-56	-53.5
51	100	-59	-61	-60
52	102	-57	-53	-55
53	104	-63	-58	-60.5
54	106	-61	-56	-58.5
55	108	-57	-59	-58
56	110	-60	-56	-58
57	112	-61	-54	-57.5

58	114	-57	-51	-54
59	116	-59	-55	-57
60	118	-61	-57	-59
61	120	-59	-55	-57
62	122	-59	-59	-59
63	124	-57	-57	-57
64	126	-57	-57	-57
65	128	-56	-56	-56
66	130	-55	-55	-55
67	132	-57	-57	-57
68	134	-56	-56	-56
69	136	-59	-55	-57
70	138	-54	-56	-55
71	140	-57	-58	-57.5
72	142	-55	-59	-57
73	144	-59	-57	-58
74	146	-57	-54	-55.5
75	148	-58	-61	-59.5
76	150	-55	-57	-56
77	152	-57	-60	-58.5
78	154	-56	-59	-57.5
79	156	-59	-57	-58
80	158	-54	-56	-55
81	160	-57	-59	-58
82	162	-59	-55	-57
83	164	-59	-57	-58
84	166	-55	-56	-55.5
85	168	-53	-59	-56
86	170	-58	-54	-56
87	172	-57	-57	-57
88	174	-56	-58	-57
89	176	-59	-57	-58
90	178	-56	-59	-57.5
91	180	-59	-61	-60

92	182	-61	-61	-61
93	184	-62	-62	-62
94	186	-60	-60	-60
95	188	-59	-59	-59
96	190	-61	-61	-61
97	192	-63	-63	-63
98	194	-62	-62	-62
99	196	-59	-63	-61
100	198	-57	-61	-59
101	200	-60	-62	-61
102	202	-65	-60	-62.5
103	204	-67	-59	-63
104	206	-65	-61	-63
105	208	-63	-63	-63
106	210	-65	-62	-63.5
107	212	-63	-63	-63
108	214	-61	-61	-61
109	216	-62	-62	-62
110	218	-63	-60	-61.5
111	220	-61	-59	-60
112	222	-62	-61	-61.5
113	224	-61	-63	-62
114	226	-65	-62	-63.5
115	228	-64	-63	-63.5
116	230	-61	-61	-61
117	232	-63	-62	-62.5
118	234	-64	-60	-62
119	236	-63	-59	-61
120	238	-64	-61	-62.5
121	240	-65	-63	-64
122	242	-61	-62	-61.5
123	244	-63	-63	-63
124	246	-65	-61	-63
125	248	-61	-62	-61.5

126	250	-60	-60	-60
127	252	-63	-59	-61
128	254	-61	-61	-61
129	256	-64	-63	-63.5
130	258	-65	-62	-63.5
131	260	-64	-63	-63.5
132	262	-66	-61	-63.5
133	264	-67	-62	-64.5
134	266	-65	-60	-62.5
135	268	-61	-59	-60
136	270	-62	-61	-61.5
137	272	-60	-63	-61.5
138	274	-59	-62	-60.5
139	276	-61	-63	-62
140	278	-63	-61	-62
141	280	-62	-62	-62
142	282	-59	-60	-59.5
143	284	-57	-59	-58
144	286	-60	-61	-60.5
145	288	-65	-63	-64
146	290	-67	-62	-64.5
147	292	-65	-63	-64
148	294	-63	-61	-62
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677	1352	-82	-78	-80
678	1354	-84	-80	-82
679	1356	-85	-83	-84
680	1358	-79	-83	-81
681	1360	-78	-85	-81.5
682	1362	-80	-87	-83.5
683	1364	-83	-84	-83.5
684	1366	-83	-84	-83.5
685	1368	-85	-85	-85
686	1370	-87	-85	-86
687	1372	-84	-89	-86.5
688	1374	-84	-83	-83.5
689	1376	-85	-86	-85.5
690	1378	-85	-85	-85
691	1380	-89	-84	-86.5
692	1382	-83	-82	-82.5
693	1384	-86	-83	-84.5
694	1386	-85	-85	-85
695	1388	-84	-84	-84
696	1390	-82	-85	-83.5
697	1392	-83	-86	-84.5
698	1394	-85	-83	-84
699	1396	-84	-84	-84
700	1398	-85	-81	-83
701	1400	-86	-83	-84.5
702	1402	-83	-82	-82.5
703	1404	-84	-83	-83.5

704	1406	-81	-84	-82.5
705	1408	-83	-82	-82.5
706	1410	-82	-84	-83
707	1412	-83	-82	-82.5
708	1414	-85	-83	-84
709	1416	-83	-84	-83.5
710	1418	-85	-81	-83
711	1420	-83	-85	-84
712	1422	-82	-86	-84
713	1424	-87	-87	-87
714	1426	-89	-85	-87
715	1428	-86	-85	-85.5
716	1430	-85	-88	-86.5
717	1432	-84	-76	-80
718	1434	-85	-74	-79.5
719	1436	-86	-73	-79.5
720	1438	-75	-72	-73.5
721	1440	-76	-70	-73
722	1442	-79	-75	-77
723	1444	-80	-74	-77
724	1446	-79	-76	-77.5
725	1448	-80	-71	-75.5
726	1450	-79	-75	-77
727	1452	-80	-74	-77
728	1454	-79	-78	-78.5
729	1456	-80	-83	-81.5
730	1458	-82	-84	-83
731	1460	-81	-82	-81.5
732	1462	-81	-84	-82.5
733	1464	-85	-82	-83.5
734	1466	-87	-83	-85
735	1468	-82	-84	-83
736	1470	-83	-81	-82
737	1472	-84	-85	-84.5

738	1474	-82	-86	-84
739	1476	-84	-87	-85.5
740	1478	-82	-85	-83.5
741	1480	-83	-85	-84
742	1482	-84	-88	-86
743	1484	-81	-85	-83
744	1486	-85	-89	-87
745	1488	-86	-86	-86
746	1490	-87	-86	-86.5
747	1492	-85	-87	-86
748	1494	-85	-79	-82
749	1496	-88	-87	-87.5
750	1498	-85	-90	-87.5
751	1500	-89	-84	-86.5
752	1502	-86	-88	-87
753	1504	-86	-89	-87.5
754	1506	-87	-81	-84
755	1508	-79	-82	-80.5
756	1510	-87	-84	-85.5
757	1512	-90	-85	-87.5
758	1514	-84	-86	-85
759	1516	-87	-81	-84
760	1518	-85	-82	-83.5
761	1520	-81	-86	-83.5
762	1522	-79	-83	-81
763	1524	-84	-82	-83
764	1526	-85	-81	-83
765	1528	-89	-89	-89
766	1530	-87	-83	-85
767	1532	-87	-82	-84.5
768	1534	-85	-87	-86
769	1536	-86	-83	-84.5
770	1538	-84	-82	-83
771	1540	-87	-84	-85.5

772	1542	-88	-86	-87
773	1544	-87	-85	-86
774	1546	-84	-82	-83
775	1548	-88	-84	-86
776	1550	-87	-85	-86
777	1552	-81	-79	-80
778	1554	-79	-80	-79.5
779	1556	-81	-82	-81.5
780	1558	-78	-83	-80.5
781	1560	-78	-80	-79
782	1562	-79	-82	-80.5
783	1564	-82	-87	-84.5
784	1566	-78	-82	-80
785	1568	-80	-84	-82
786	1570	-79	-85	-82
787	1572	-79	-83	-81
788	1574	-80	-89	-84.5
789	1576	-79	-83	-81
790	1578	-80	-86	-83
791	1580	-79	-85	-82
792	1582	-80	-84	-82
793	1584	-79	-82	-80.5
794	1586	-80	-83	-81.5
795	1588	-82	-81	-81.5
796	1590	-81	-82	-81.5
797	1592	-81	-86	-83.5
798	1594	-85	-83	-84
799	1596	-87	-82	-84.5
800	1598	-82	-81	-81.5
801	1600	-83	-89	-86
802	1602	-84	-83	-83.5
803	1604	-82	-82	-82
804	1606	-84	-87	-85.5
805	1608	-82	-83	-82.5

806	1610	-83	-82	-82.5
807	1612	-84	-84	-84
808	1614	-81	-86	-83.5
809	1616	-85	-85	-85
810	1618	-86	-82	-84
811	1620	-87	-84	-85.5
812	1622	-85	-85	-85
813	1624	-85	-79	-82
814	1626	-88	-78	-83
815	1628	-85	-80	-82.5
816	1630	-89	-83	-86
817	1632	-86	-83	-84.5
818	1634	-86	-85	-85.5
819	1636	-87	-87	-87
820	1638	-79	-84	-81.5
821	1640	-87	-84	-85.5
822	1642	-90	-85	-87.5
823	1644	-84	-85	-84.5
824	1646	-88	-89	-88.5
825	1648	-89	-83	-86
826	1650	-81	-86	-83.5
827	1652	-82	-85	-83.5
828	1654	-84	-84	-84
829	1656	-85	-82	-83.5
830	1658	-84	-83	-83.5
831	1660	-85	-81	-83
832	1662	-84	-82	-83
833	1664	-84	-86	-85
834	1666	-84	-83	-83.5
835	1668	-81	-82	-81.5
836	1670	-82	-81	-81.5
837	1672	-86	-89	-87.5
838	1674	-83	-83	-83
839	1676	-82	-82	-82

840	1678	-81	-87	-84
841	1680	-89	-83	-86
842	1682	-83	-82	-82.5
843	1684	-82	-84	-83
844	1686	-87	-86	-86.5
845	1688	-83	-85	-84
846	1690	-82	-82	-82
847	1692	-84	-84	-84
848	1694	-86	-85	-85.5
849	1696	-85	-79	-82
850	1698	-82	-78	-80
851	1700	-84	-84	-84
852	1702	-85	-85	-85
853	1704	-89	-89	-89
854	1706	-88	-88	-88
855	1708	-85	-85	-85
856	1710	-83	-83	-83
857	1712	-83	-83	-83
858	1714	-85	-85	-85
859	1716	-87	-87	-87
860	1718	-84	-84	-84
861	1720	-84	-84	-84
862	1722	-85	-85	-85
863	1724	-85	-85	-85
864	1726	-89	-89	-89
865	1728	-87	-87	-87
866	1730	-86	-86	-86
867	1732	-85	-85	-85
868	1734	-84	-84	-84
869	1736	-86	-86	-86
870	1738	-84	-86	-85
871	1740	-87	-87	-87
872	1742	-91	-91	-91
873	1744	-90	-90	-90

874	1746	-91	-91	-91
875	1748	-92	-92	-92
876	1750	-93	-84	-88.5
877	1752	-91	-85	-88
878	1754	-92	-89	-90.5
879	1756	-93	-88	-90.5
880	1758	-95	-85	-90
881	1760	-97	-83	-90
882	1762	-96	-83	-89.5
883	1764	-92	-85	-88.5
884	1766	-95	-87	-91
885	1768	-98	-84	-91
886	1770	-97	-84	-90.5
887	1772	-94	-85	-89.5
888	1774	-91	-85	-88
889	1776	-91	-89	-90
890	1778	-95	-87	-91
891	1780	-93	-86	-89.5
892	1782	-93	-85	-89
893	1784	-94	-84	-89
894	1786	-97	-86	-91.5
895	1788	-95	-84	-89.5
896	1790	-94	-87	-90.5
897	1792	-96	-91	-93.5
898	1794	-94	-90	-92
899	1796	-95	-91	-93
900	1798	-98	-92	-95
901	1800	-93	-89	-91
902	1802	-89	-91	-90
903	1804	-99	-89	-94
904	1806	-90	-91	-90.5
905	1808	-95	-89	-92
906	1810	-89	-92	-90.5
907	1812	-92	-87	-89.5

908	1814	-95	-91	-93
909	1816	-96	-92	-94
910	1818	-94	-95	-94.5
911	1820	-89	-96	-92.5
912	1822	-91	-93	-92
913	1824	-90	-88	-89
914	1826	-91	-93	-92
915	1828	-92	-91	-91.5
916	1830	-93	-90	-91.5
917	1832	-91	-95	-93
918	1834	-92	-90	-91
919	1836	-93	-89	-91
920	1838	-95	-91	-93
921	1840	-97	-87	-92
922	1842	-96	-91	-93.5
923	1844	-92	-90	-91
924	1846	-95	-95	-95
925	1848	-98	-97	-97.5
926	1850	-96	-97	-96.5
927	1852	-102	-98	-100
928	1854	-91	-99	-95
929	1856	-92	-98	-95
930	1858	-93	-99	-96
931	1860	-93	-101	-97
932	1862	-95	-98	-96.5
933	1864	-96	-102	-99
934	1866	-93	-96	-94.5
935	1868	-95	-97	-96
936	1870	-96	-98	-97
937	1872	-97	-96	-96.5
938	1874	-94	-101	-97.5
939	1876	-95	-105	-100
940	1878	-97	-101	-99
941	1880	-96	-96	-96

942	1882	-97	-96	-96.5
943	1884	-98	-95	-96.5
944	1886	-99	-96	-97.5
945	1888	-98	-95	-96.5
946	1890	-99	-93	-96
947	1892	-101	-93	-97
948	1894	-98	-95	-96.5
949	1896	-102	-96	-99
950	1898	-96	-93	-94.5
951	1900	-97	-95	-96
952	1902	-98	-96	-97
953	1904	-96	-97	-96.5
954	1906	-101	-94	-97.5
955	1908	-105	-95	-100
956	1910	-101	-97	-99
957	1912	-96	-96	-96
958	1914	-96	-97	-96.5
959	1916	-95	-98	-96.5
960	1918	-91	-99	-95
961	1920	-92	-98	-95
962	1922	-93	-99	-96
963	1924	-93	-97	-95
964	1926	-95	-98	-96.5
965	1928	-96	-99	-97.5
966	1930	-93	-101	-97
967	1932	-95	-99	-97
968	1934	-96	-101	-98.5
969	1936	-97	-98	-97.5
970	1938	-94	-102	-98
971	1940	-95	-96	-95.5
972	1942	-97	-97	-97
973	1944	-96	-98	-97
974	1946	-97	-96	-96.5
975	1948	-98	-103	-100.5

976	1950	-99	-105	-102
977	1952	-98	-101	-99.5
978	1954	-99	-96	-97.5
979	1956	-101	-96	-98.5
980	1958	-98	-95	-96.5
981	1960	-102	-91	-96.5
982	1962	-96	-102	-99
983	1964	-97	-93	-95
984	1966	-98	-93	-95.5
985	1968	-96	-95	-95.5
986	1970	-101	-96	-98.5
987	1972	-105	-93	-99
988	1974	-101	-95	-98
989	1976	-98	-96	-97
990	1978	-96	-106	-101
991	1980	-95	-97	-96
992	1982	-94	-95	-94.5
993	1984	-102	-97	-99.5
994	1986	-95	-96	-95.5
995	1988	-93	-97	-95
996	1990	-102	-98	-100
997	1992	-96	-99	-97.5
998	1994	-93	-98	-95.5
999	1996	-95	-99	-97
1000	1998	-99	-101	-100
1001	2000	-105	-102	-103.5

1.4 RSSI FOR AIRTEL 2G

CELL ID: 51386

S/N	DISTANCE (m)	RSSI 2G (Dbm) signal strength	RSSI 2G (Dbm) net monitor	MEAN(dbm)
1	0	-49	-49	-49
2	2	-52	-51	-51.5
3	4	-52	-49	-50.5
4	6	-51	-57	-54
5	8	-50	-53	-51.5
6	10	-55	-55	-55
7	12	-51	-55	-53
8	14	-51	-49	-50
9	16	-51	-51	-51
10	18	-53	-51	-52
11	20	-57	-49	-53
12	22	-55	-52	-53.5
13	24	-55	-49	-52
14	26	-53	-50	-51.5
15	28	-54	-51	-52.5
16	30	-53	-55	-54
17	32	-51	-59	-55
18	34	-53	-54	-53.5
19	36	-55	-56	-55.5
20	38	-54	-51	-52.5
21	40	-56	-52	-54
22	42	-53	-53	-53
23	44	-52	-57	-54.5
24	46	-53	-54	-53.5
25	48	-54	-56	-55
26	50	-52	-58	-55
27	52	-53	-54	-53.5
28	54	-55	-53	-54
29	56	-56	-57	-56.5
30	58	-57	-55	-56

31	60	-59	-53	-56
32	62	-57	-54	-55.5
33	64	-56	-57	-56.5
34	66	-54	-58	-56
35	68	-62	-54	-58
36	70	-59	-56	-57.5
37	72	-57	-54	-55.5
38	74	-56	-53	-54.5
39	76	-55	-56	-55.5
40	78	-54	-57	-55.5
41	80	-56	-54	-55
42	82	-56	-55	-55.5
43	84	-56	-58	-57
44	86	-57	-54	-55.5
45	88	-52	-58	-55
46	90	-53	-54	-53.5
47	92	-55	-53	-54
48	94	-56	-57	-56.5
49	96	-57	-55	-56
50	98	-59	-53	-56
51	100	-57	-54	-55.5
52	102	-56	-57	-56.5
53	104	-54	-58	-56
54	106	-62	-54	-58
55	108	-59	-56	-57.5
56	110	-57	-54	-55.5
57	112	-56	-53	-54.5
58	114	-55	-56	-55.5
59	116	-54	-57	-55.5
60	118	-56	-54	-55
61	120	-56	-55	-55.5
62	122	-56	-58	-57
63	124	-57	-54	-55.5
64	126	-52	-58	-55

65	128	-53	-54	-53.5
66	130	-55	-53	-54
67	132	-56	-57	-56.5
68	134	-57	-55	-56
69	136	-59	-53	-56
70	138	-57	-54	-55.5
71	140	-56	-57	-56.5
72	142	-54	-58	-56
73	144	-62	-54	-58
74	146	-59	-56	-57.5
75	148	-57	-54	-55.5
76	150	-56	-53	-54.5
77	152	-55	-56	-55.5
78	154	-54	-57	-55.5
79	156	-56	-54	-55
80	158	-56	-55	-55.5
81	160	-56	-58	-57
82	162	-57	-54	-55.5
83	164	-52	-58	-55
84	166	-53	-54	-53.5
85	168	-55	-53	-54
86	170	-56	-57	-56.5
87	172	-57	-55	-56
88	174	-59	-53	-56
89	176	-57	-54	-55.5
90	178	-56	-57	-56.5
91	180	-54	-58	-56
92	182	-62	-54	-58
93	184	-59	-56	-57.5
94	186	-57	-54	-55.5
95	188	-56	-53	-54.5
96	190	-55	-56	-55.5
97	192	-54	-57	-55.5
98	194	-56	-54	-55

99	196	-56	-55	-55.5
100	198	-56	-58	-57
101	200	-57	-54	-55.5
102	202	-52	-58	-55
103	204	-53	-54	-53.5
104	206	-55	-53	-54
105	208	-56	-57	-56.5
106	210	-57	-55	-56
107	212	-59	-53	-56
108	214	-57	-54	-55.5
109	216	-56	-57	-56.5
110	218	-54	-58	-56
111	220	-62	-54	-58
112	222	-59	-56	-57.5
113	224	-57	-54	-55.5
114	226	-56	-53	-54.5
115	228	-55	-56	-55.5
116	230	-54	-57	-55.5
117	232	-56	-54	-55
118	234	-56	-55	-55.5
119	236	-56	-58	-57
120	238	-57	-54	-55.5
121	240	-52	-58	-55
122	242	-53	-54	-53.5
123	244	-55	-53	-54
124	246	-56	-57	-56.5
125	248	-57	-55	-56
126	250	-59	-53	-56
127	252	-57	-54	-55.5
128	254	-56	-57	-56.5
129	256	-54	-58	-56
130	258	-56	-54	-55
131	260	-59	-56	-57.5
132	262	-57	-54	-55.5

133	264	-56	-53	-54.5
134	266	-55	-56	-55.5
135	268	-54	-57	-55.5
136	270	-56	-54	-55
137	272	-56	-55	-55.5
138	274	-56	-58	-57
139	276	-57	-54	-55.5
140	278	-52	-58	-55
141	280	-53	-54	-53.5
142	282	-55	-53	-54
143	284	-56	-57	-56.5
144	286	-57	-55	-56
145	288	-59	-53	-56
146	290	-57	-54	-55.5
147	292	-56	-57	-56.5
148	294	-54	-58	-56
149	296	-62	-54	-58
150	298	-59	-56	-57.5
151	300	-57	-54	-55.5
152	302	-56	-53	-54.5
153	304	-55	-56	-55.5
154	306	-54	-57	-55.5
155	308	-56	-54	-55
156	310	-56	-55	-55.5
157	312	-56	-58	-57
158	314	-57	-54	-55.5
159	316	-52	-58	-55
160	318	-53	-54	-53.5
161	320	-55	-53	-54
162	322	-56	-57	-56.5
163	324	-57	-55	-56
164	326	-59	-53	-56
165	328	-57	-54	-55.5
166	330	-56	-57	-56.5

167	332	-54	-58	-56
168	334	-62	-54	-58
169	336	-59	-56	-57.5
170	338	-57	-54	-55.5
171	340	-56	-53	-54.5
172	342	-55	-56	-55.5
173	344	-54	-57	-55.5
174	346	-56	-54	-55
175	348	-56	-55	-55.5
176	350	-56	-58	-57
177	352	-57	-54	-55.5
178	354	-52	-58	-55
179	356	-53	-54	-53.5
180	358	-55	-53	-54
181	360	-56	-57	-56.5
182	362	-57	-55	-56
183	364	-59	-53	-56
184	366	-57	-54	-55.5
185	368	-56	-57	-56.5
186	370	-54	-58	-56
187	372	-62	-54	-58
188	374	-59	-56	-57.5
189	376	-57	-54	-55.5
190	378	-56	-53	-54.5
191	380	-55	-56	-55.5
192	382	-54	-57	-55.5
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266	530	-68	-67	-67.5
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433	864	-76	-72	-74
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436	870	-75	-69	-72
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438	874	-76	-79	-77.5

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446	890	-75	-73	-74
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713	1424	-75	-70	-72.5
714	1426	-76	-72	-74
715	1428	-77	-75	-76
716	1430	-75	-74	-74.5
717	1432	-78	-72	-75
718	1434	-75	-73	-74
719	1436	-76	-77	-76.5
720	1438	-75	-72	-73.5
721	1440	-79	-72	-75.5
722	1442	-79	-71	-75
723	1444	-78	-76	-77
724	1446	-78	-74	-76
725	1448	-78	-73	-75.5
726	1450	-68	-68	-68
727	1452	-69	-69	-69
728	1454	-70	-74	-72
729	1456	-70	-71	-70.5
730	1458	-69	-73	-71
731	1460	-73	-71	-72
732	1462	-72	-75	-73.5
733	1464	-70	-74	-72
734	1466	-72	-74	-73
735	1468	-75	-73	-74
736	1470	-74	-71	-72.5
737	1472	-72	-74	-73
738	1474	-73	-76	-74.5
739	1476	-77	-72	-74.5
740	1478	-72	-73	-72.5
741	1480	-72	-71	-71.5
742	1482	-71	-69	-70
743	1484	-72	-77	-74.5
744	1486	-74	-79	-76.5

745	1488	-73	-74	-73.5
746	1490	-72	-72	-72
747	1492	-70	-71	-70.5
748	1494	-75	-72	-73.5
749	1496	-74	-75	-74.5
750	1498	-76	-74	-75
751	1500	-71	-72	-71.5
752	1502	-75	-78	-76.5
753	1504	-74	-77	-75.5
754	1506	-78	-75	-76.5
755	1508	-77	-79	-78
756	1510	-73	-77	-75
757	1512	-73	-75	-74
758	1514	-78	-78	-78
759	1516	-75	-75	-75
760	1518	-76	-74	-75
761	1520	-78	-76	-77
762	1522	-77	-72	-74.5
763	1524	-75	-75	-75
764	1526	-79	-74	-76.5
765	1528	-77	-78	-77.5
766	1530	-75	-77	-76
767	1532	-78	-73	-75.5
768	1534	-73	-73	-73
769	1536	-75	-76	-75.5
770	1538	-76	-74	-75
771	1540	-79	-73	-76
772	1542	-80	-72	-76
773	1544	-79	-70	-74.5
774	1546	-80	-75	-77.5
775	1548	-79	-74	-76.5
776	1550	-74	-71	-72.5
777	1552	-72	-74	-73
778	1554	-73	-76	-74.5

779	1556	-77	-72	-74.5
780	1558	-72	-73	-72.5
781	1560	-72	-71	-71.5
782	1562	-71	-69	-70
783	1564	-72	-77	-74.5
784	1566	-74	-79	-76.5
785	1568	-73	-74	-73.5
786	1570	-72	-72	-72
787	1572	-70	-71	-70.5
788	1574	-75	-72	-73.5
789	1576	-74	-75	-74.5
790	1578	-76	-74	-75
791	1580	-71	-72	-71.5
792	1582	-75	-78	-76.5
793	1584	-74	-77	-75.5
794	1586	-78	-75	-76.5
795	1588	-77	-79	-78
796	1590	-74	-71	-72.5
797	1592	-72	-74	-73
798	1594	-73	-76	-74.5
799	1596	-77	-72	-74.5
800	1598	-72	-73	-72.5
801	1600	-72	-71	-71.5
802	1602	-71	-69	-70
803	1604	-72	-77	-74.5
804	1606	-74	-79	-76.5
805	1608	-73	-74	-73.5
806	1610	-74	-71	-72.5
807	1612	-72	-74	-73
808	1614	-73	-76	-74.5
809	1616	-77	-72	-74.5
810	1618	-72	-73	-72.5
811	1620	-72	-71	-71.5
812	1622	-71	-69	-70

813	1624	-72	-77	-74.5
814	1626	-74	-79	-76.5
815	1628	-73	-74	-73.5
816	1630	-72	-72	-72
817	1632	-70	-71	-70.5
818	1634	-75	-72	-73.5
819	1636	-74	-75	-74.5
820	1638	-76	-74	-75
821	1640	-71	-72	-71.5
822	1642	-75	-78	-76.5
823	1644	-74	-77	-75.5
824	1646	-78	-75	-76.5
825	1648	-77	-79	-78
826	1650	-73	-77	-75
827	1652	-73	-75	-74
828	1654	-78	-78	-78
829	1656	-75	-75	-75
830	1658	-76	-74	-75
831	1660	-78	-76	-77
832	1662	-77	-72	-74.5
833	1664	-75	-75	-75
834	1666	-79	-74	-76.5
835	1668	-77	-78	-77.5
836	1670	-75	-77	-76
837	1672	-78	-73	-75.5
838	1674	-73	-73	-73
839	1676	-75	-76	-75.5
840	1678	-76	-74	-75
841	1680	-79	-73	-76
842	1682	-74	-71	-72.5
843	1684	-72	-74	-73
844	1686	-73	-76	-74.5
845	1688	-77	-72	-74.5
846	1690	-72	-73	-72.5

847	1692	-72	-71	-71.5
848	1694	-71	-69	-70
849	1696	-72	-77	-74.5
850	1698	-74	-79	-76.5
851	1700	-73	-74	-73.5
852	1702	-72	-72	-72
853	1704	-70	-71	-70.5
854	1706	-75	-72	-73.5
855	1708	-74	-75	-74.5
856	1710	-76	-74	-75
857	1712	-71	-72	-71.5
858	1714	-75	-78	-76.5
859	1716	-74	-77	-75.5
860	1718	-78	-75	-76.5
861	1720	-77	-79	-78
862	1722	-74	-71	-72.5
863	1724	-72	-74	-73
864	1726	-73	-76	-74.5
865	1728	-77	-72	-74.5
866	1730	-74	-71	-72.5
867	1732	-72	-74	-73
868	1734	-73	-76	-74.5
869	1736	-77	-72	-74.5
870	1738	-72	-73	-72.5
871	1740	-72	-71	-71.5
872	1742	-71	-69	-70
873	1744	-72	-77	-74.5
874	1746	-74	-79	-76.5
875	1748	-73	-74	-73.5
876	1750	-74	-71	-72.5
877	1752	-72	-74	-73
878	1754	-73	-76	-74.5
879	1756	-77	-72	-74.5
880	1758	-72	-73	-72.5

881	1760	-72	-71	-71.5
882	1762	-71	-69	-70
883	1764	-72	-77	-74.5
884	1766	-74	-79	-76.5
885	1768	-73	-74	-73.5
886	1770	-72	-72	-72
887	1772	-70	-71	-70.5
888	1774	-75	-72	-73.5
889	1776	-74	-75	-74.5
890	1778	-76	-74	-75
891	1780	-71	-72	-71.5
892	1782	-75	-78	-76.5
893	1784	-74	-77	-75.5
894	1786	-78	-75	-76.5
895	1788	-77	-79	-78
896	1790	-73	-77	-75
897	1792	-73	-75	-74
898	1794	-78	-78	-78
899	1796	-75	-75	-75
900	1798	-76	-74	-75
901	1800	-78	-76	-77
902	1802	-77	-72	-74.5
903	1804	-75	-75	-75
904	1806	-80	-76	-78
905	1808	-79	-71	-75
906	1810	-80	-75	-77.5
907	1812	-82	-74	-78
908	1814	-81	-78	-79.5
909	1816	-81	-83	-82
910	1818	-85	-84	-84.5
911	1820	-87	-82	-84.5
912	1822	-82	-84	-83
913	1824	-83	-82	-82.5
914	1826	-84	-83	-83.5

915	1828	-82	-84	-83
916	1830	-84	-81	-82.5
917	1832	-82	-85	-83.5
918	1834	-83	-86	-84.5
919	1836	-84	-87	-85.5
920	1838	-81	-85	-83
921	1840	-85	-85	-85
922	1842	-86	-88	-87
923	1844	-87	-85	-86
924	1846	-85	-89	-87
925	1848	-85	-86	-85.5
926	1850	-88	-86	-87
927	1852	-85	-87	-86
928	1854	-89	-79	-84
929	1856	-86	-87	-86.5
930	1858	-86	-90	-88
931	1860	-87	-84	-85.5
932	1862	-79	-88	-83.5
933	1864	-87	-89	-88
934	1866	-90	-81	-85.5
935	1868	-84	-82	-83
936	1870	-88	-84	-86
937	1872	-89	-85	-87
938	1874	-81	-86	-83.5
939	1876	-82	-85	-83.5
940	1878	-84	-84	-84
941	1880	-85	-84	-84.5
942	1882	-86	-84	-85
943	1884	-85	-81	-83
944	1886	-84	-82	-83
945	1888	-84	-86	-85
946	1890	-84	-83	-83.5
947	1892	-81	-82	-81.5
948	1894	-82	-81	-81.5

949	1896	-86	-89	-87.5
950	1898	-83	-83	-83
951	1900	-82	-82	-82
952	1902	-81	-87	-84
953	1904	-89	-83	-86
954	1906	-83	-82	-82.5
955	1908	-82	-83	-82.5
956	1910	-87	-84	-85.5
957	1912	-83	-85	-84
958	1914	-82	-82	-82
959	1916	-83	-84	-83.5
960	1918	-84	-85	-84.5
961	1920	-85	-79	-82
962	1922	-82	-78	-80
963	1924	-84	-80	-82
964	1926	-85	-83	-84
965	1928	-79	-83	-81
966	1930	-78	-85	-81.5
967	1932	-80	-87	-83.5
968	1934	-83	-84	-83.5
969	1936	-83	-84	-83.5
970	1938	-85	-85	-85
971	1940	-87	-85	-86
972	1942	-84	-89	-86.5
973	1944	-84	-83	-83.5
974	1946	-85	-86	-85.5
975	1948	-85	-85	-85
976	1950	-89	-84	-86.5
977	1952	-83	-82	-82.5
978	1954	-86	-83	-84.5
979	1956	-85	-85	-85
980	1958	-84	-84	-84
981	1960	-82	-85	-83.5
982	1962	-83	-86	-84.5

983	1964	-85	-83	-84
984	1966	-84	-84	-84
985	1968	-85	-81	-83
986	1970	-86	-83	-84.5
987	1972	-83	-82	-82.5
988	1974	-84	-83	-83.5
989	1976	-81	-84	-82.5
990	1978	-83	-82	-82.5
991	1980	-82	-84	-83
992	1982	-83	-82	-82.5
993	1984	-85	-83	-84
994	1986	-80	-76	-78
995	1988	-79	-71	-75
996	1990	-80	-75	-77.5
997	1992	-82	-74	-78
998	1994	-81	-78	-79.5
999	1996	-81	-83	-82
1000	1998	-85	-84	-84.5
1001	2000	-87	-82	-84.5