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ANALYSIS OF TELECOMMUNICATION MAST USING GIS AND GPS TECHNIQUES: A CASE STUDY OF IBADAN NORTH EAST LOCAL GOVERNMENT, OYO STATE NIGERIA

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ABSTRACT

GIS technologies are essential tools that are useful in various services and it plays an important role in telecommunication system. GIS together with GPS with high resolution imagery play an important role for better site selection in the city for telecommunication system such as Mast. This study examines the analysis of telecommunication system of the local government area. Primary and Secondary data were acquired from 6 areas of Ibadan North East Local Government Area, Ibadan. The primary data involve the use of GPS PROMARK 3 to acquire x, y, z coordinates of each Mast under investigation while the secondary data were the interview from the residents living within the study area based on signal capability/strength. Various analyses of spatial and non-spatial techniques were carried out on telecommunication Mast such as telecommunication mast height, signal strength with the use of android telephone, layers of area for creation of geometric network along with land base features for telecommunication Mast mapping, Location of tower, provider name, and along with tower type and ward boundaries. From the results, it was ascertained that the use of GIS and GPS for spatial analysis of telecommunication Mast will go a long way for planning and management of telecommunication use within the local government.

KEYWORDS: GIS and GPS, Telecommunication Mast, Spatial and Non-Spatial.

INTRODUCTION

Telecommunication was defined as a technology whose domain is communicating from a distance by (Tarmo, 2003). This shows one possible view of the different sections of telecommunications. Telecommunications networks make up the most complicated network in the world. Let us think only of the telephone network, which includes more than 2 billion fixed and cellular telephones with universal access. When any of these telephones requests a call, the telephone network is able to establish a connection to any other telephone in the world. In addition, many other networks are interconnected with the telephone network. This gives us a view of the complexity of the global telecommunications network and no other system in the world exceeds the complexity of telecommunications networks.

A telecommunication mast tower however, consists of a body structure of steel beams and materials with a concrete base of an approximate height of between 25 and 55meters, whereas antennae, transmitters and receivers are mounted on the body of the structures. These antennae receive high frequency radio waves from cell phones. The ranges of these antennas vary 21from distances as short as 1.5km to 2.4km to distances as long as 48km to 56km. A power source is provided with other accessories, all fenced either by block wall or steel poles and wire depending on the preference of the service providers. The land area covered by each mast location is approximately 144m^2 (12m x 12m) (Akin and Margaret 2014). It was estimated that, over 1.4 million base stations exist worldwide, and this number is increasing significantly with the introduction of third generation technology (Nakwawessi, 2010).

It was estimated that, more than 120 masts are built monthly on the average by the service providers (Punch, 2009). The service providers as at 2009 have about 3,000 masts each across the country, most concentrating on urban areas (Punch, 2009). As at the year, each provider has more than 14,000 live masts in Nigeria. Today, the number of live masts can only be imagined. If 120 masts per month is anything to go by, then each operator would have added about 4, 800 masts (Nwokoro, 2000).

Telecommunications services have an essential impact on the development of a community. If we look at the telephone density of a country, we can estimate its level of technical and economical development. In the developing countries, prior to the introduction of Global System for Mobile (GSM), the fixed telephone density (tele – density) is fewer than 10 telephones per 1,000 inhabitants; while in developed countries North America and Europe for instance,, there are around 500 to 600 fixed telephones per 1,000 inhabitants (Tarmo, 2003). The operations of a modern community are highly dependent on telecommunications. We can hardly imagine our working environment without telecommunications services. Telecommunications plays an essential role on many

areas of everyday living. Everyday life is dependent on telecommunications. Each of us uses telecommunications services and services that rely on telecommunications daily.

In the telecommunication world, GIS is used for network planning and development. The ability to layer information onto the earth's surface, complete with attribute data, allows engineers the unique ability to model and assess a network from the office. This saves valuable time and reduces the number of trips Wang (2007). Furthermore, the powerful automation capabilities offered by a GIS increase the speed and accuracy of the network design process and can help reduce, and even eliminate, the downstream impacts of design-phase errors on cost and schedule during the network deployment phase.

Geographical information system (GIS) has ability to resolve various problems and calculate amount of radiation in affected areas. The GPS field surveys are versatile extension of traditional information and capable in providing accurate and efficient GIS data that is useful for planning of cumbersome data for future reference. GIS technologies have the capabilities to provide cost effective solutions in the maintenance, display, recording and analysis of the scenario with telecommunication tower helps to identify and locate the appropriate locations of site geographically. GIS is an integrated system that performs manipulation and analysis of spatial data. The GIS technology efficiently maintains databases of urban areas for use in telecommunication industry (Franz et al, 1998).

GIS is an essential tool in the telecommunication industry. Most wireless network engineers are familiar with the GIS as the backbone of many wireless design tools already in use. By incorporating digital elevation models (DEMs), land clutter (LC) data, and building elevation models, wireless engineers are able to assess radio coverage before the network is built, identify areas that require enhanced capacity or coverage, and plan for trends in network and application performance. A GIS can further be used in business development efforts at both the strategic and operational scales to determine where coverage expansion should be directed and how the ensuing network should be deployed. Demographic data can be leveraged to identify population centres and areas of high income. A demographic approach removes the need for strategic planners to ―throw darts at the map. Income estimates further allow engineers to target geographic areas with high disposable income that will be most likely to subscribe to new services. The benefits of this approach are obvious and are further validated by its increasing use in diverse business lines. Simply by picking up a business atlas or doing Internet research, planners can identify underserved markets and provide opportunities for revenue generation.

Using a GIS allows the engineer to add existing and competitive coverage to the map to improve the context of the data provided (Demers, 1997; Jones, 2005; and Galati, 2006). Therefore, the purpose of using Remote Sensing and GIS in this study is due to the powerful solutions that the technology brings to the computer desktop in the present day to aid in the database creation, querying, update, and administration of the mentioned facilities.

Furthermore, the powerful automation capabilities offered by a GIS increase the speed and accuracy of the network design process and can help reduce, and even eliminate, the downstream impacts of design-phase errors on cost and schedule during the network deployment phase. Rule-based features found in a GIS can also offer network designers the ability to produce better products, optimized for cost, shortest routing distances, or other user-defined metrics.

THE STUDY AREA

Ibadan North-East Local Government is one of the local government areas of Oyo State, Southwest of Nigeria. It was created in 1991 with the Administrative Headquarters situated at Iwo Road. It is geographically defined within latitude 7° 36′ 28N and 7° 39′ 4" N and longitude 3° 93′ 69" E and 3° 94′ 7" E of the Greenwich Meridian, and has a land mass of about 17.8843 Km^2. It has a small land cover, but one of the largest populated Local Government in Ibadan of eleven (11) LGA. The total population of Ibadan North East Local Government Area is 330,399 at National Population Census, 2006 (NPC, 2007*)*. Ibadan North East local government area is subdivided into 12 wards. Below are the six (6) location within the local government where mast is been located.

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Fig. 1: Google earth imagery showing Study location

MATERIALS/METHODS

Equipment Used

The equipment used are categorize into hardware and software.

Hardware

i. Global positioning system (GPS handheld Garmin-78)
ii. Plotter (HP)
iii. 2.16GHz, Windows 8, 64-bit operating system, x64-based processor,
iv. Cutlass
v. Flash drive (scandisk 8 gigabite)
vi. Existing map
vii. Android telephone for signal strength
viii. Hewlett Packard Colour Laserjet 5550dn Printer
ix. Lenovo Laptop

Software

i. ArcGIS 10.2
ii. Google Earth Plus 5.0
iii. Surfer 11.
iv. Notepad
v. Microsoft word
vi. AutoCAD 2012
vii. Windows 8 Operating System
viii. Franson Coordinate Converter

Method of Data Collection

The main focus here centered on the various methods, operation and procedures that were adopted for this study. GIS software utilized for this study was ArcGIS 10.2 which provides data visualization, image Enhancement,

Geometric Network Analysis, Spatial and non-spatial queries and analysis capability with powerful data creation and editing environment. GPS PROMARK 3 receiver was used in generating the coordinate (x, y, z) information for each telecommunication towers of the entire study area and including telecommunication mast height. Also signal strength data were acquired with the use of android telephone. The Google earth imagery was used to extract different kind of layers of area for creation of geometric network along with land base features for telecommunication Mast mapping. Location of tower, provider name, and along with tower type and ward boundaries were also collected across the local government area. The data collected were verified during the field visit.

Table 1: Attribute table showing various telecommunications Provider and their spatial analysis

MAST_POINT

FID	Shape *	FID_	GPS_HEIGHT	SIGNAL_STR	NETWORK	LOCATION	MAST_HEIGH	NORTHINGS	EASTINGS	REMARK
0	Point ZM	0	242	-55dBm24asu	GLO	KOSOLOTO	45m	819881	603513	WORKING
1	Point ZM	0	243	-69dBm22asu	GLO	BALOGUN STR	50m	819805	603542	WORKING
2	Point ZM	0	243	-69dBm22asu	ETISALAT	BALOGUN STR	50m	819805	603542	WORKING
3	Point ZM	0	243	-24dBm65asu	MTN	BALOGUN STR	50m	819805	603542	WORKING
4	Point ZM	0	232	-84dBm16asu	MTN	AKEKE	50m	819277	603629	NOT WORKIN
5	Point ZM	0	232	NULL	VISAFONE	ABAYOMI STR	40m	818617	604013	NOT WORKIN
6	Point ZM	0	230	-53dBm30asu	MTN	BODE STR	40m	818178	603428	WORKING
7	Point ZM	0	233	-67dBm23asu	GLO	IDI-APE	40m	818236	603552	WORKING
8	Point ZM	0								
9	Point ZM	0	255	-51dBm31asu	MTN	TESTING GRD	45m	818435	602708	WORKING
10	Point ZM	0								
11	Point ZM	0	239	-59dBm27asu	GLO	METHODIST SCH	50m	817116	601482	WORKING
12	Point ZM	0	239	-55dBm22asu	ETISALAT	METHODIST SCH	50m	817116	601482	WORKING
13	Point ZM	0	239	-65dBm25asu	MTN	METHODIST SCH	50m	817116	601482	WORKING
14	Point ZM	0	223	-51dBM31asu	GLO	OKE ADU	40m	816623	601373	WORKING
15	Point ZM	0	224	-61dBM25asu	GLO	ODE AJE	50m	815857	601345	NOT WORKIN
16	Point ZM	0								
17	Point ZM	0	222	-67dbm23asu	ETISALAT	BINUKONU AREMO	55m	815513	601323	WORKING
18	Point ZM	0								
19	Point ZM	0	219	NULL	MULTILINKS	AREMO	55m	815447	601051	NOT WORKIN
20	Point ZM	0	206	-55dBm31asu	GLO	AREMO	45m	815609	600730	WORKING
21	Point ZM	0	191	-55dBm29asu	MTN	AJEGEDE	50m	815873	600453	WORKING
22	Point ZM	0	194	NULL	VISAFONE	OBISESAN SCH	50m	814774	601193	NOT WORKIN
23	Point ZM	0	210	-97dBm08asu	GLO	ODINJO	45m	813730	600484	WORKING
24	Point ZM	0	249	-51dBm31asu	GLO	LOYOLO	40m	817069	602449	WORKING
25	Point ZM	0	235	-67dBm24asu	MTN	SAWMILL	45m	816936	603089	WORKING
26	Point ZM	0	235	NULL	VISAFONE	SAWMILL	45m	816936	603089	WORKING
27	Point ZM	0	233	-61dBm26asu	ETISALAT	ABAYOMI EST	40m	817063	603045	WORKING
28	Point ZM	0	236	-61dBm24asu	ETISALAT	ALH LATEEF CL	45m	818215	603939	WORKING
29	Point ZM	0	249	NULL	SMILE	JOSEPH STR	45m	818501	602502	WORKING
30	Point ZM	0	195	-51dBm31asu	ETISALAT	ILE ALUGBIN	55m	815094	601656	WORKING
31	Point ZM	0	211	-91dBm11asu	GLO	GBELEKALE	45m	815181	601866	WORKING
32	Point ZM	0	199	-75dBm19asu	GLO	OBISESAN SCH	50m	814918	601292	WORKING

Source: *Author field survey, 2017*

RESULTS AND DISCUSSION

Results

The study area has telecommunication Mast of different network within the study area in which over thirty (30) telecommunication network Mast were determined both in working and non-working condition. According to the resident living in/within the environment, they really commend that they enjoy the entire networks in terms of communication. Most of the network telecommunication mast are working and in good conditions. Even some are requesting for more mast just for them to collect money then it is noticed that most of them are not even aware of the effect of this telecommunication mast. Also when they were asked if there is any complain? Most of the

resident cannot identified a particular problem they are facing as far the telecommunication network is concerns but they said the network is okay with them but only lamenting on the tariff which is not our subject matter. Also during the study, we were able to determine the signal strength which was good.

Spatial Search and Query Analysis

The following query analysis were carried out for better appreciation of the facts on ground, this helps with the understanding and in turn provides solutions to problems.

Query Analysis

This is where information is been queried. The query carried out for this study was done to determine the result analysis of all the Mast, their working condition, highest signal strength, lowest signal strength etc. the needed information was been typed in the query builder.

The following query analysis were carried out for better appreciation of the facts on ground, this helps with the understanding and in turn provides solution to problems.

Various queries are listed below

i. Selection showing all the Existing GLO Mobile masts
ii. Selection showing all the Existing MTN Mobile masts
iii. Selection showing all the Existing ETISALAT Mobile masts
iv. Selection showing all the Existing AIRTEL Mobile masts

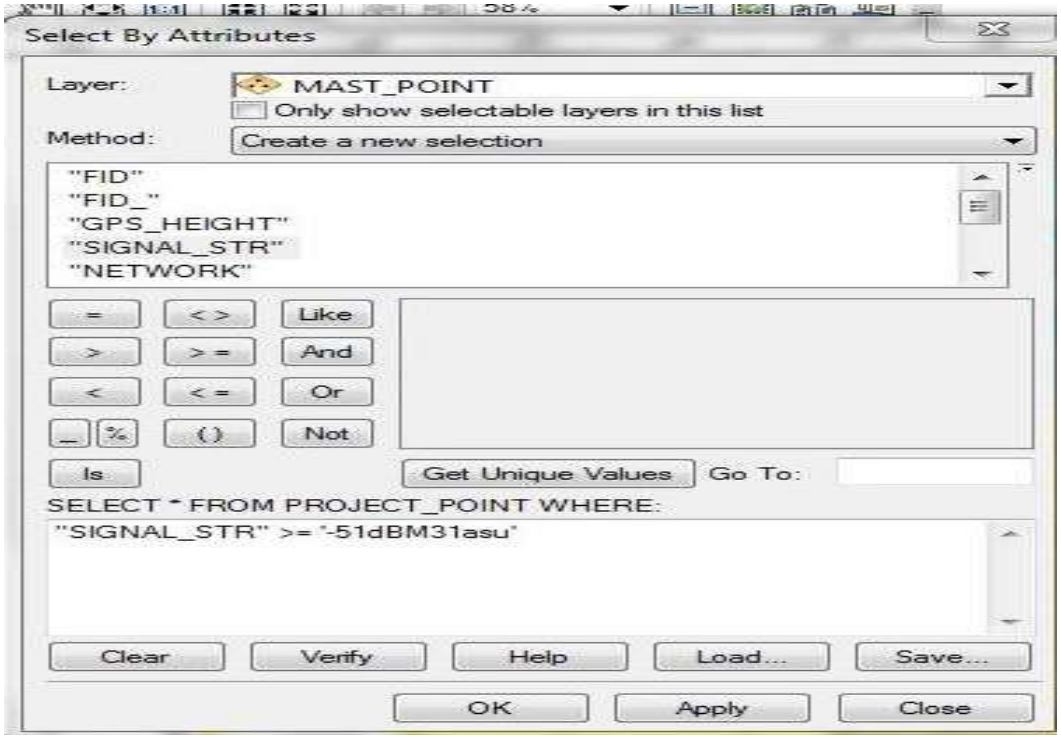

Fig. 2: Querying Process

From the figure above, signal strength query were carried out and it shows that it is greater than or equal to > -51dBm31asu and only ten (10) network Mast were lesser than it and twenty (20) is above or equal to -51dBm31asu as it is shown Analysis of figure 2 below:

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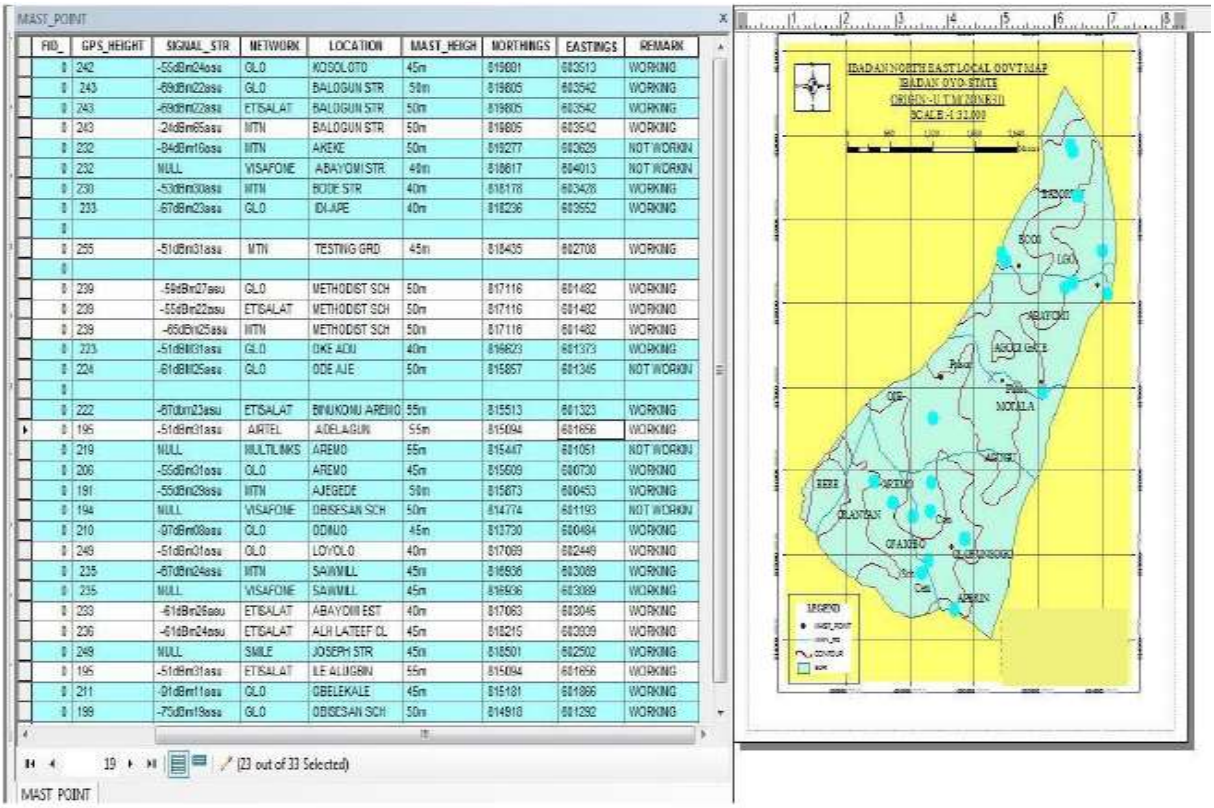


MAST_POINT

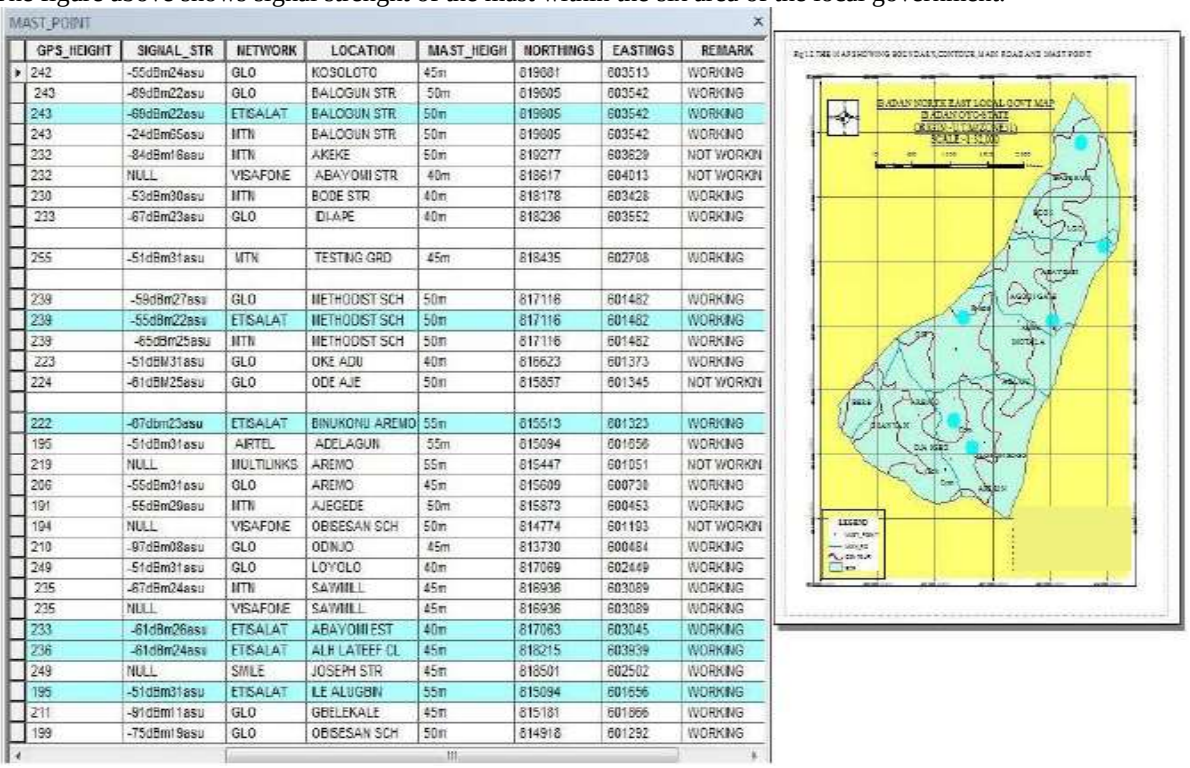
FID_	GPS_HEIGHT	SIGNAL_STR	NETWORK	LOCATION	MAST_HEIGH	NORTHINGS	EASTINGS	REMARK
0	242	-55dBm24asu	GLO	KOSOLOTO	45m	819881	603513	WORKING
0	243	-69dBm22asu	GLO	BALOGUN STR	50m	819805	603542	WORKING
0	243	-69dBm22asu	ETISALAT	BALOGUN STR	50m	819805	603542	WORKING
0	243	-24dBm65asu	MTN	BALOGUN STR	50m	819805	603542	WORKING
0	232	-84dBm16asu	MTN	AKEKE	50m	819277	603629	NOT WORKIN
0	232	NULL	VISAFONE	ABAYOMI STR	40m	818617	604013	NOT WORKIN
0	230	-53dBm30asu	MTN	BODE STR	40m	818178	603428	WORKING
0	233	-67dBm23asu	GLO	IDI-APE	40m	818236	603552	WORKING
0								
0	255	-51dBm31asu	MTN	TESTING GRD	45m	818435	602708	WORKING
0								
0	239	-59dBm27asu	GLO	METHODIST SCH	50m	817116	601482	WORKING
0	239	-55dBm22asu	ETISALAT	METHODIST SCH	50m	817116	601482	WORKING
0	239	-65dBm25asu	MTN	METHODIST SCH	50m	817116	601482	WORKING
0	223	-51dBM31asu	GLO	OKE ADU	40m	816623	601373	WORKING
0	224	-61dBM25asu	GLO	ODE AJE	50m	815857	601345	NOT WORKIN
0								
0	222	-67dbm23asu	ETISALAT	BINUKONU AREMO	55m	815513	601323	WORKING
0	195	-51dBm31asu	AIRTEL	ADELAGUN	55m	815094	601656	WORKING
0	219	NULL	MULTILINKS	AREMO	55m	815447	601051	NOT WORKIN
0	206	-55dBm31asu	GLO	AREMO	45m	815609	600730	WORKING
0	191	-55dBm29asu	MTN	AJEGEDE	50m	815873	600453	WORKING
0	194	NULL	VISAFONE	OBISESAN SCH	50m	814774	601193	NOT WORKIN
0	210	-97dBm08asu	GLO	ODINJO	45m	813730	600484	WORKING
0	249	-51dBm31asu	GLO	LOYOLO	40m	817069	602449	WORKING
0	235	-67dBm24asu	MTN	SAWMILL	45m	816936	603089	WORKING
0	235	NULL	VISAFONE	SAWMILL	45m	816936	603089	WORKING
0	233	-61dBm26asu	ETISALAT	ABAYOMI EST	40m	817063	603045	WORKING
0	236	-61dBm24asu	ETISALAT	ALH LATEEF CL	45m	818215	603939	WORKING
0	249	NULL	SMILE	JOSEPH STR	45m	818501	602502	WORKING
0	195	-51dBm31asu	ETISALAT	ILE ALUGBIN	55m	815094	601656	WORKING
0	211	-91dBm11asu	GLO	GBELEKALE	45m	815181	601866	WORKING
0	199	-75dBm19asu	GLO	OBISESAN SCH	50m	814918	601292	WORKING

19 (23 out of 33 Selected)

MAST POINT

Fig. 3: Analysis of signal strength

The figure above shows signal strenght of the mast within the six area of the local government.



MAST_POINT

GPS_HEIGHT	SIGNAL_STR	NETWORK	LOCATION	MAST_HEIGH	NORTHINGS	EASTINGS	REMARK
242	-55dBm24asu	GLO	KOSOLOTO	45m	819881	603513	WORKING
243	-69dBm22asu	GLO	BALOGUN STR	50m	819805	603542	WORKING
243	-69dBm22asu	ETISALAT	BALOGUN STR	50m	819805	603542	WORKING
243	-24dBm65asu	MTN	BALOGUN STR	50m	819805	603542	WORKING
232	-84dBm16asu	MTN	AKEKE	50m	819277	603629	NOT WORKIN
232	NULL	VISAFONE	ABAYOMI STR	40m	818617	604013	NOT WORKIN
230	-53dBm30asu	MTN	BODE STR	40m	818178	603428	WORKING
233	-67dBm23asu	GLO	IDI-APE	40m	818236	603552	WORKING
255	-51dBm31asu	MTN	TESTING GRD	45m	818435	602708	WORKING
239	-59dBm27asu	GLO	METHODIST SCH	50m	817116	601482	WORKING
239	-55dBm22asu	ETISALAT	METHODIST SCH	50m	817116	601482	WORKING
239	-65dBm25asu	MTN	METHODIST SCH	50m	817116	601482	WORKING
223	-51dBM31asu	GLO	OKE ADU	40m	816623	601373	WORKING
224	-61dBM25asu	GLO	ODE AJE	50m	815857	601345	NOT WORKIN
222	-67dbm23asu	ETISALAT	BINUKONU AREMO	55m	815513	601323	WORKING
195	-51dBm31asu	AIRTEL	ADELAGUN	55m	815094	601656	WORKING
219	NULL	MULTILINKS	AREMO	55m	815447	601051	NOT WORKIN
206	-55dBm31asu	GLO	AREMO	45m	815609	600730	WORKING
191	-55dBm29asu	MTN	AJEGEDE	50m	815873	600453	WORKING
194	NULL	VISAFONE	OBISESAN SCH	50m	814774	601193	NOT WORKIN
210	-97dBm08asu	GLO	ODINJO	45m	813730	600484	WORKING
249	-51dBm31asu	GLO	LOYOLO	40m	817069	602449	WORKING
235	-67dBm24asu	MTN	SAWMILL	45m	816936	603089	WORKING
235	NULL	VISAFONE	SAWMILL	45m	816936	603089	WORKING
233	-61dBm26asu	ETISALAT	ABAYOMI EST	40m	817063	603045	WORKING
236	-61dBm24asu	ETISALAT	ALH LATEEF CL	45m	818215	603939	WORKING
249	NULL	SMILE	JOSEPH STR	45m	818501	602502	WORKING
195	-51dBm31asu	ETISALAT	ILE ALUGBIN	55m	815094	601656	WORKING
211	-91dBm11asu	GLO	GBELEKALE	45m	815181	601866	WORKING
199	-75dBm19asu	GLO	OBISESAN SCH	50m	814918	601292	WORKING

Fig. 4: Analysis of Etisalat Mast

Figure 3 above shows the query for the total number of Etisalat Mast that is working in the local government and we found out the total number of six (6) Etisalat Mast were within the local government area and all are working (good condition). And the interview from residents shows that the signal strength of Etisalat was okay within the area than any other networks.

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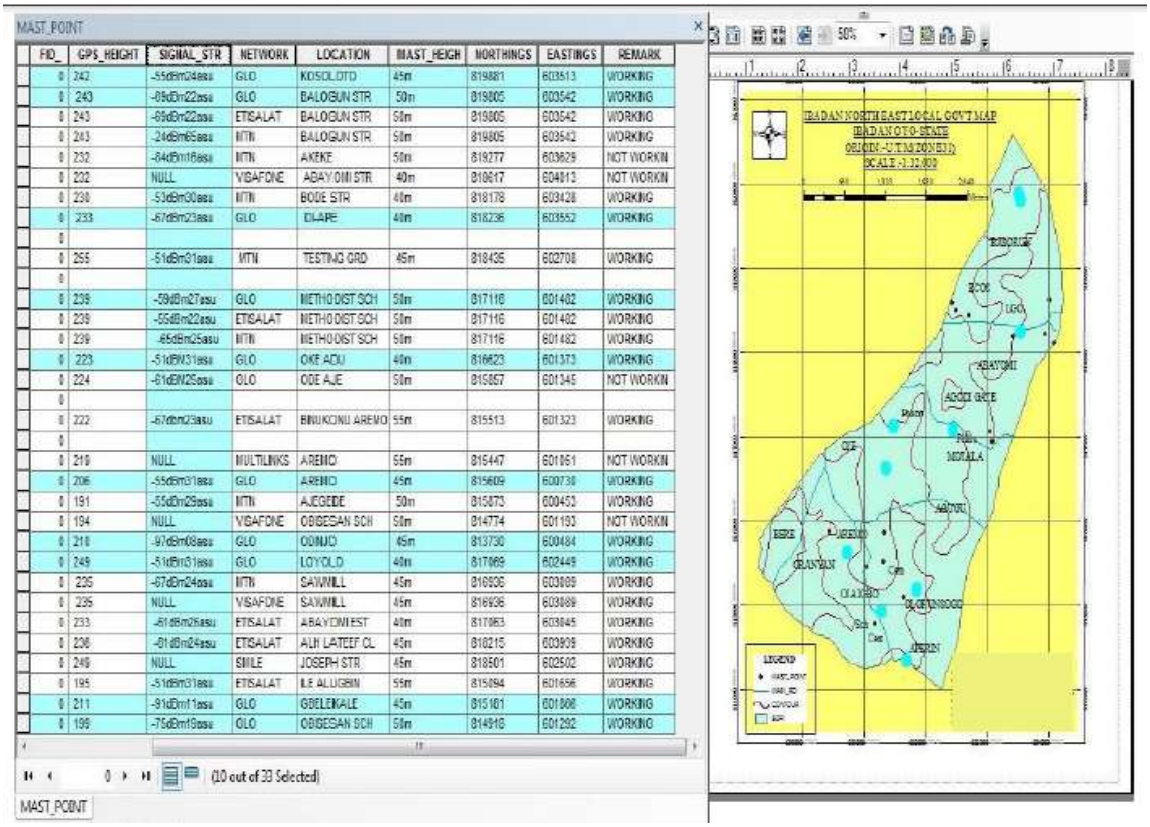


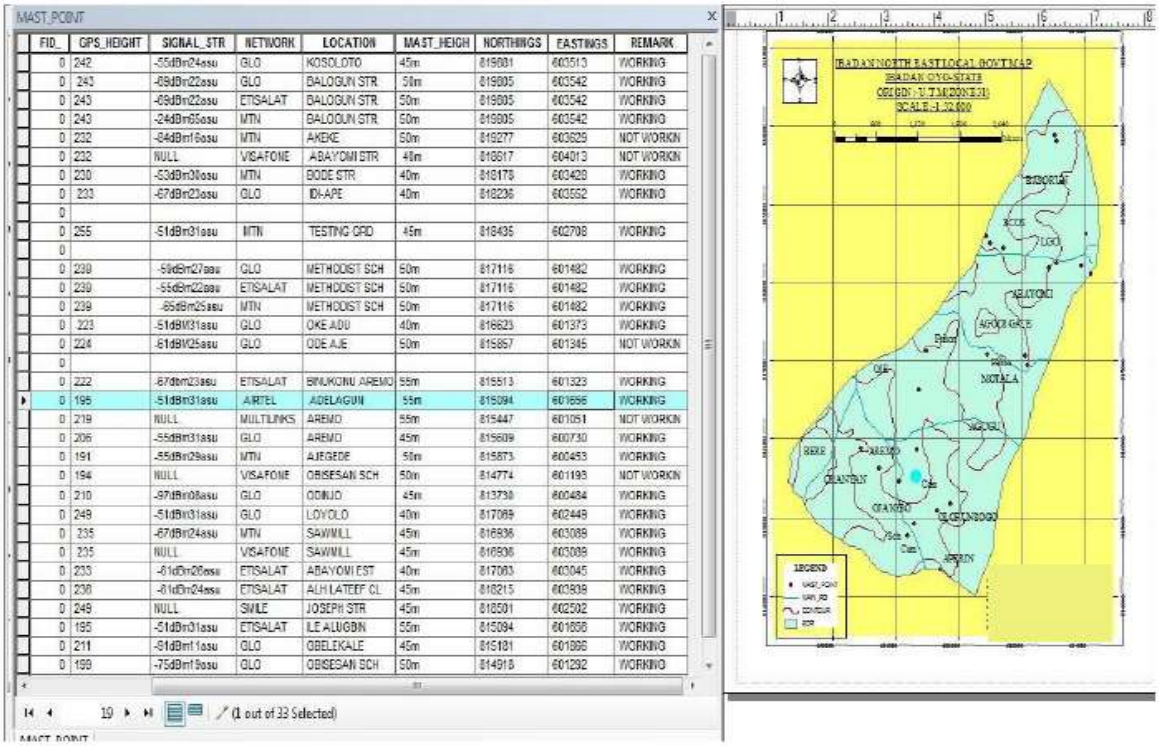
MAST_POINT

FID_	GPS_HEIGHT	SIGNAL_STR	NETWORK	LOCATION	MAST_HEIGH	NORTHINGS	EASTINGS	REMARK
0	242	-55dBm24asu	GLO	KOSOLOTO	45m	819881	603513	WORKING
0	243	-69dBm22asu	GLO	BALOGUN STR	50m	819805	603542	WORKING
0	243	-69dBm22asu	ETISALAT	BALOGUN STR	50m	819805	603542	WORKING
0	243	-24dBm65asu	MTN	BALOGUN STR	50m	819805	603542	WORKING
0	232	-84dBm16asu	MTN	AKEKE	50m	819277	603629	NOT WORKIN
0	202	NULL	VISAFONE	ABAYOMI STR	40m	816617	604013	NOT WORKIN
0	230	-53dBm30asu	MTN	BODE STR	40m	818178	603429	WORKING
0	233	-67dBm23asu	GLO	IDI-APE	40m	818236	603552	WORKING
0								
0	255	-51dBm31asu	MTN	TESTING GRD	45m	818435	602708	WORKING
0								
0	239	-59dBm27asu	GLO	METHO DIST SCH	50m	817116	601482	WORKING
0	239	-55dBm22asu	ETISALAT	METHO DIST SCH	50m	817116	601482	WORKING
0	239	-65dBm25asu	MTN	METHO DIST SCH	50m	817116	601482	WORKING
0	223	-51dBM31asu	GLO	OKE ADU	40m	816623	601373	WORKING
0	224	-61dBM25asu	GLO	ODE AJE	50m	815857	601345	NOT WORKIN
0								
0	222	-67dbm23asu	ETISALAT	BINUKONU AREMO	55m	815513	601323	WORKING
0								
0	219	NULL	MULTILINKS	AREMO	55m	815447	601051	NOT WORKIN
0	206	-55dBm31asu	GLO	AREMO	45m	815609	600730	WORKING
0	191	-55dBm29asu	MTN	AJEGEDE	50m	815873	600453	WORKING
0	194	NULL	VISAFONE	OBISESAN SCH	50m	814774	601193	NOT WORKIN
0	210	-97dBm08asu	GLO	ODINJO	45m	813738	600484	WORKING
0	249	-51dBm31asu	GLO	LOYOLO	40m	817069	602449	WORKING
0	235	-67dBm24asu	MTN	SAWMILL	45m	816936	603089	WORKING
0	235	NULL	VISAFONE	SAWMILL	45m	816936	603089	WORKING
0	233	-61dBm26asu	ETISALAT	ABAYOMI EST	40m	817063	603045	WORKING
0	230	-61dBm24asu	ETISALAT	ALH LATEEF CL	45m	818215	603939	WORKING
0	249	NULL	SMILE	JOSEPH STR	45m	818501	602502	WORKING
0	195	-51dBm31asu	ETISALAT	ILE ALUGBIN	55m	815094	601656	WORKING
0	211	-91dBm11asu	GLO	GBELEKALE	45m	815181	601866	WORKING
0	199	-75dBm19asu	GLO	OBISESAN SCH	50m	814918	601292	WORKING

(10 out of 33 Selected)

Fig.5: Analysis of GLO mast

Figure 4 above shows the query for the total number of GLO Mast that is working in the local government and we found out the total number of eleven (11) GLO Mast were within the local government area and only ten (10) are working (good condition) and one (1) located at Ode-Aje was not working. And the interview from residents shows that the signal strength of GLO was okay except for the people living Ode-Aje.



MAST_POINT

FID_	GPS_HEIGHT	SIGNAL_STR	NETWORK	LOCATION	MAST_HEIGH	NORTHINGS	EASTINGS	REMARK
0	242	-55dBm24asu	GLO	KOSOLOTO	45m	819881	603513	WORKING
0	243	-69dBm22asu	GLO	BALOGUN STR	50m	819805	603542	WORKING
0	243	-69dBm22asu	ETISALAT	BALOGUN STR	50m	819805	603542	WORKING
0	243	-24dBm65asu	MTN	BALOGUN STR	50m	819805	603542	WORKING
0	232	-84dBm16asu	MTN	AKEKE	50m	819277	603629	NOT WORKIN
0	232	NULL	VISAFONE	ABAYOMI STR	40m	816617	604013	NOT WORKIN
0	230	-53dBm30asu	MTN	BODE STR	40m	818178	603429	WORKING
0	233	-67dBm23asu	GLO	IDI-APE	40m	818236	603552	WORKING
0								
0	255	-51dBm31asu	MTN	TESTING GRD	45m	818435	602708	WORKING
0								
0	239	-59dBm27asu	GLO	METHODIST SCH	50m	817116	601482	WORKING
0	239	-55dBm22asu	ETISALAT	METHODIST SCH	50m	817116	601482	WORKING
0	239	-65dBm25asu	MTN	METHODIST SCH	50m	817116	601482	WORKING
0	223	-51dBM31asu	GLO	OKE ADU	40m	816623	601373	WORKING
0	224	-61dBM25asu	GLO	ODE AJE	50m	815857	601345	NOT WORKIN
0								
0	222	-67dbm23asu	ETISALAT	BINUKONU AREMO	55m	815513	601323	WORKING
0	195	-51dBm31asu	AIRTEL	ADELAGUN	55m	815094	601656	WORKING
0	219	NULL	MULTILINKS	AREMO	55m	815447	601051	NOT WORKIN
0	206	-55dBm31asu	GLO	AREMO	45m	815609	600730	WORKING
0	191	-55dBm29asu	MTN	AJEGEDE	50m	815873	600453	WORKING
0	194	NULL	VISAFONE	OBISESAN SCH	50m	814774	601193	NOT WORKIN
0	210	-97dBm08asu	GLO	ODINJO	45m	813738	600484	WORKING
0	249	-51dBm31asu	GLO	LOYOLO	40m	817069	602449	WORKING
0	235	-67dBm24asu	MTN	SAWMILL	45m	816936	603089	WORKING
0	235	NULL	VISAFONE	SAWMILL	45m	816936	603089	WORKING
0	233	-61dBm26asu	ETISALAT	ABAYOMI EST	40m	817063	603045	WORKING
0	230	-61dBm24asu	ETISALAT	ALH LATEEF CL	45m	818215	603939	WORKING
0	249	NULL	SMILE	JOSEPH STR	45m	818501	602502	WORKING
0	195	-51dBm31asu	ETISALAT	ILE ALUGBIN	55m	815094	601656	WORKING
0	211	-91dBm11asu	GLO	GBELEKALE	45m	815181	601866	WORKING
0	199	-75dBm19asu	GLO	OBISESAN SCH	50m	814918	601292	WORKING

(1 out of 33 Selected)

Fig. 6: Analysis of Airtel Mast

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Figure 5 above shows the query for the total number of Airtel Mast that is working in the local government and we found out the total number of two (2) Airtel Mast were within the local government area and only one (1) at Adelagun was working (good condition) and the other one (1) located at Abayomi was not working. And the interview from residents shows that the signal strength of Airtel were not satisfied.

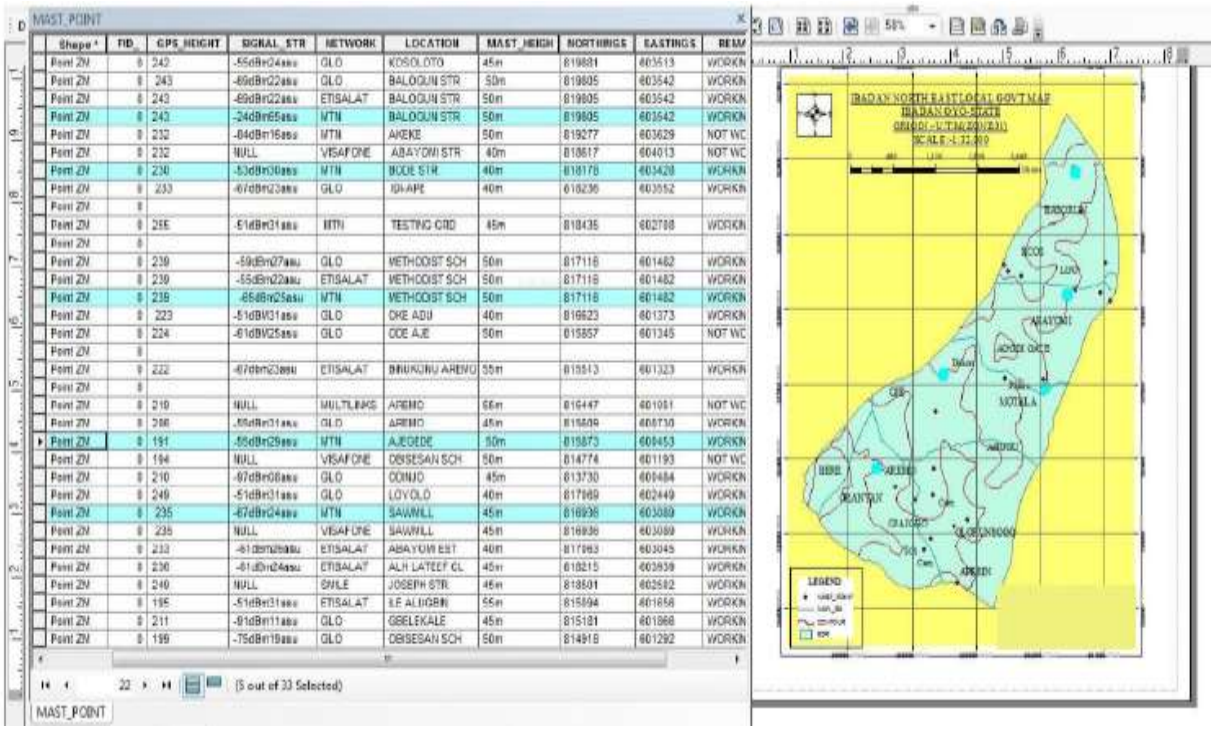

Fig. 7: Analysis of MTN Mast

Figure 6 above shows the query for the total number of MTN Mast that is working in the local government and we found out the total number of two (7) MTN Mast were within the local government area and six (6) was working (good condition) and the other one (1) located at Akeke was not working. And the interview from residents shows that the signal strength of MTN were still satisfied.

DISCUSSION OF RESULT

With the graphical display generated by queries, it can be analysed that the GIS application can be used to solve a lot of things in everyday life either on government, public, and private organization. All the Network Telecommunication Mast in this Local Government were working perfectly accept five (5) which was stated above. From the result, it shows that a total number of Etisalat telecommunication Mast working in the local government was six (6) which implies that all Etisalat Mast in the local government is working (in good condition). Total number of Glo mast working within the local government is ten (10) while only one (1) located at Ode-Aje area within the local government is not working again which implies that a total number 11 Glo telecommunication mast is within the local government. Only two (2) Airtel Mast are within the local government in which 1 is working while the other one at Ode-Aje was not working. A total number of five (5) MTN mast was working while two (2) of the MTN Mast located at Akeke and Testing ground of the local government is not working again which implies that a total number of seven (7) MTN telecommunication Mast was in the local government.

CONCLUSION

This paper investigates the environmental analysis on telecommunication mast within Ibadan North-East Local Government using GIS and GPS. Different kind of data were incorporated together to facilitate planning and management of telecommunication Mast. GIS as a tool has the capability to determine the spatial analysis and project the signal strength of the affected areas of this study. In this study, the analyses of area covered were carried out with the help of GIS software (ArcGIS 10.2). Telecommunication Mast coverage with high standard signal strength will enable more subscribers to use such telecommunication networks.

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RECOMMENDATION

It is now recommended that, there is need for greater awareness of GIS technology for creating spatial analysis in telecommunication industry. Various analyses for specific purpose can be developed to improve the quality of life of the common citizens. This module should have capability to solve user's queries on selected areas and it should also have capability to generate reports. Charts and graphs for various statistical analysis purpose. These all applications should be linked and published in cloud for decision makers. The information of all telecommunication mast in Oyo-State should be acquired and process for proper analysis and documentation for each network provider so that they can improve on them. The information presented should be worked on for example the area that are lacking low signals in network and those Mast that are not working should be worked on. GIS work should be given more priority in the state (environment).

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