

AN ANALYSIS FOR VERIFYING THE BEST TELECOMMUNICATION SERVICE PROVIDER FOR GSM AND 3G TECHNOLOGY

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ABSTRACT

Telecommunication plays one of the most prominent role in all aspects of Information Technology (IT) and IT has become inseparable in all the industries in the world today. As the stability of network service is not ensured in Sri Lanka, there is a big demand for finding the best service provider from area to area. In that aspect, we have done a research study for finding the best network provider only for a selected area, due to limited time, the Gampaha city area. All the data could be readable through software as all telecommunication data were virtual, they are not tangible. In this research, I considered both the currently popular technologies; GSM (2G) and WCDMA (3G). In order to obtain the data or values of parameters in each and every points, it is necessary to conduct a Drive Test (DT) that has to be done by driving all over the area considered. Analysis was done as the final part after Gathering all the data collected Via DT which observed them with the use of the software called Actix. Finally, we could be able to come up with the conclusion about the best network service provider even with a graphical illustration. With the use of the software based analysis, for the more applicable operator/Range (-70 to 0 dbm), we could select one of the leading government affiliated company acquires 69.70 dbm the maximum value.

Keywords: Drive Test (DT), mobile Communication, network provider, GSM, WCDMA

1. INTRODUCTION

Nowadays most of the industries are highly depend on telecommunication. There are lot of network providers in the world. In Sri Lanka, there are five network providers, namely Dialog,

Mobitel, Airtel, Etisalat and Hutch. As the telecommunication plays a unique role in today's industry as it was explained, it is very important to find the more convenient network provider. Also as there are high network fluctuation from place to place in Sri Lanka, it is necessary to find the network strength or quality at all living areas. The scope was narrowed to one city; Gampaha city area. This research is only conducted for GSM (2G) and WCDMA (3G) technologies, because not the all five network providers come up with LTE (4G) technology island wide at present.

2. EXPERIMENTAL

2.1. Tools used for DT

The required tools are mentioned below in detail.

2.1.1. GPS (Global Positioning System)

GPS or Global Positioning System is a network of orbiting satellites that send precise details of their position in space back to earth. The signals are obtained by GPS receivers, such as navigation devices and are used to calculate the exact position, speed and time at the vehicles location².

GPS is needed to fix the place, where the data had been collected. It could be connected to the computer through USB port and being detected and supported by the required software.

2.1.2. A laptop with relevant software.

Two laptops were used, one for GSM (2G) and the other one for WCDMA (3G). And this laptop was installed a software called TEMS which is essential for this analysis.

Ascom Network Testing offers the TEMS Portfolio, a complete set of trusted solutions for drive testing, benchmarking, monitoring, and analysing network performance. These state-of-the-art offerings facilitate the deployment, optimization, and maintenance of mobile networks². It is the industry-leading tool for troubleshooting, verification, optimization, and maintenance of wireless networks. Offering data collection, real-time analysis, and post-processing all in one, TEMS Investigation is a complete solution for all of a network operator's daily network optimization tasks³.

This software need a hard licence key, which is expensive.

2.1.3. Phones

There should be ten mobile phones as there are five network providers and there are two technologies, used here namely GSM (2G) and WCDMA (3G). So five network providers into two technologies, altogether it is ten. Five should support 2G and the rest should support 3G.

2.1.4. Power hubs

As in our laptops there are limited USB ports, it is impossible connect all the phones and hard licence key in a single laptop. So hubs were used.

2.2. Methodology

First of all the tools were connected properly. The following diagram illustrates, the way to connect the investigation system properly.

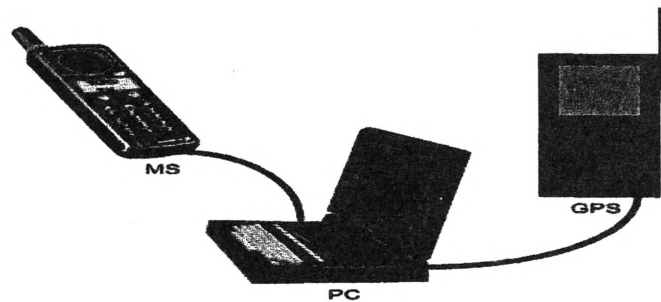


Figure 1: Connection of Tools for our investigated System

After connecting the tools physically, all five phones and GPS were connected to the TEMS software, and ensure was it detected the tools.

If the data were shown properly, it is the high time conduct Drive Test (DT).

The Drive Test is a test performed in cellular networks regardless of technology (GSM, CDMA, UMTS, LTE, etc. ...).by Means of collecting data on vehicle movement⁴.

At the end of the DT, all the data will be saved in a file, which was in a format, only could readable in TEMS.

3. RESULTS AND DISCUSSION

The data, which was obtained from DT have several parameters. Rx level, RSCP, BCCH, Band (900/1800), CPICH Ec/No, PSC are some of the parameters. But Rx level and RSCP values are more than enough to measure the strength of the networks of GSM and WCDMA respectively.

- Rx level means Received level. The power level corresponding to the average received signal level of the downlink as measured by the mobile station. Normal Range is from -30 to -70 dbm. Level lower than -70 dbm shows low signal levels⁵.
- RSCP means Received Signal Code Power. It is also like Rx level, but as the 3G is more power than 2G, its measurement is slightly different from Rx level. In 2G value of Rx level is from -10 to -110 dbm and in 3G value of RSCP is from -10 to -140 dbm⁵.
- So, Rx level was used to analyse GSM (2G) and RSCP was used to analyse WCDMA (3G).

This Rx level and RSCP values had been seen via a software called Actix. The files obtained through Drive Test were loaded to Actix and the data were seen in values.

3.1 Rx level for GSM

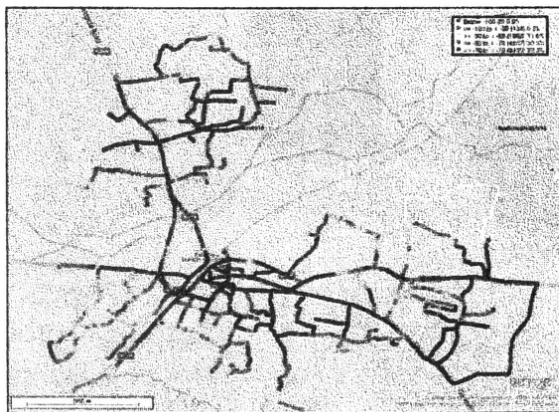


Figure 2: Rx Levels in Route Map

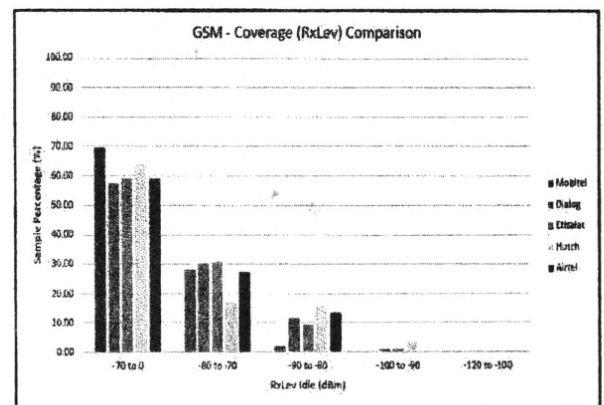


Figure 3: Rx level values in Graph

Figure 2 shows the all the route in Gampaha City and the Rx level or signal strength of Dialog. Here the dark green shows the maximum strength and the red shows the minimum strength greater than -70 and below -100 respectively. This is for Dialog only, likewise all the five were obtained.

Figure 3 shows the graphical expression of Rx level for all five network providers. X axis depicts the Rx level, -70 to 0, -80 to -70, -90 to -80, likewise. Y axis depicts the percentage, 0 to 100 %.

If Rx level lies between 0 to -70, it is maximum strength, below -100 is worse. According to the graph above dark blue is on the top in between 0 to -70 with around 70%. It is Mobitel. So, Mobitel is the best network provider in Gampaha city in GSM (2G) technology. This result can be tabulated as shown below.

Table 1: Values of Rx level in percentage in decreasing order

Operator\Range	-70 to 0	-80 to -70	-90 to -80	-100 to -90	-120 to -100
Mobitel	69.70	28.33	1.97	0.00	0.00
Dialog	57.28	30.25	11.64	0.83	0.00
Etisalat	59.03	30.89	9.27	0.81	0.00
Hutch	63.91	16.87	15.82	3.40	0.00
Airtel	59.04	27.29	13.34	0.34	0.00

3.2 RSCP level for WCDMA ; 3G network

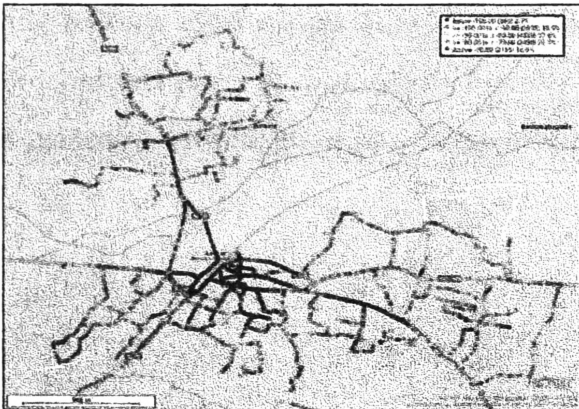


Figure 4: RSCP in Route Map

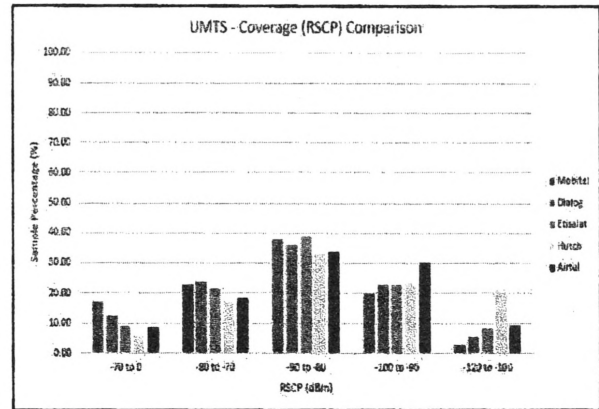


Figure 5: RSCP values in Graph

These figures were explained earlier for GSM network. Here also blue is on the top in the range of 0 to -70. So, it can be concluded that the Mobitel is the best network provider in WCDMA (3G) technology in Gampaha City area. The result can be tabulated as below.

Table 2: Value of RSCP in percentage in decreasing order

Operator\Range	-70 to 0	-80 to -70	-90 to -80	-100 to -90	-120 to -100
Mobitel	16.89	22.71	37.84	19.87	2.69
Dialog	12.53	23.86	35.75	22.59	5.28
Etisalat	8.83	21.47	38.82	22.58	8.31
Hutch	5.83	17.17	33.05	23.26	20.69
Airtel	8.62	18.30	33.54	30.13	9.40

4. CONCLUSION

Although the aim of this project is to find the best network provider country wide, it will be a valuable information for a particular network provider to enhance their service throughout the country. The difficulties exist for this research is keeping the tools connected continuously, because the TEMS software disconnect the tools very frequently, especially the GPS. If it is being failed to identify that a tool is being disconnected from the TEMS, it is needed to redo the whole missed part again, sometime it would be a long journey. As this analysis is being done in a period of time by the network providers, they have to bear a large amount of money to spend. So we proposed a machine that could contain all the tools in a one machine, it could be a dedicated machine (computer). Then the disconnecting of tools and the expenses for the employees could be avoided.

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