P-ISSN : 2715-2448 | E-ISSSN : 2715-7199
Vol.3 No.2 July 2022
Buana Information Tchnology and Computer Sciences (BIT and CS)

Analysis of Signal Quality, Voice Service, and Data Access on Telkomsel and Indosat Providers in Pakisjaya District

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Abstract*—Kualitas dalam komunikasi sangat berpengaruh dalam kegiatan di zaman modern ini. kesenjangan padakualitas jaringan yang diharapkan terhadap kualitas jaringan sebenarnya tak jarang ditemui. Pengukuranterhadap performa jaringan penting untuk mereferensikan kepada pengguna untuk memilih operator yang tepat sekaligus bagi penyedia layanan untuk memperbaiki kualitas pelayanannya Metode Drive Test merupakan metode yang digunakan untuk mengukur performa jaringan seluler. Tujuan penelitian ini yaitu untuk mengetahui hasil perbandingan performa antar provider penyedia layanan. Parameter yang digunakan dalam analisa ini adalah Receive Signal Code Power (RSCP), Cell ID, Signal Noise Ratio (SNR), Upload Rate, dan Download Rate. Parameter ini digunakan untuk proses pengukuran metode Drive Test. Sedangakan alat bantu yang digunakan untuk pengumpulan nilai dari masing-masing parameter Drive Test dengan menggunakan aplikasi berbasis Android, GNet Track Pro. Hasil pengukuran dengan GNet Track Pro ini kemudian diolah dengan aplikasi Google Earth sebagai pemetaan area pengukuran.. Data penelitian yang dikumpulkan dalam analisa ini sebanyak 60 kasus, dengan setiap desa berjumlah 20 data untuk selanjutnya diolah dengan metode Drive Test. Dalam penelitian ini, Telkomsel cenderung unggul dalam layanan voice dengan 150 jumlah panggilan berhasil dari 150 percobaan panggilan. Sementara Indosat unggul dalam penyediaan layanan akses data dan sinyal terutama di desa Tanjungbungin.

Kata Kunci: Drive Test, GNet Track Pro, Telkomsel, Indosat

Abstract*—Quality in communication is very important in activities in this modern era. It is expected that the expected network quality against network quality is actually not expected. Measurement of network performance is important to refer for users to choose the right operator for service providers to improve the quality of their service Drive Test Method is a method used to measure cellular network performance. The purpose of this study is to study the results of research between service providers. The parameters used in this analysis are Receive Signal Code Power (RSCP), Cell ID, Signal Noise Ratio (SNR), Upload Rate, and Download Rate. This parameter is used for the measurement process of the Drive Test method. While the tool used to collect the value of each Drive Test parameter by using an Android-based application, GNet Track Pro. The measurement results with GNet Track Pro are then processed with the Google Earth application as a measurement area. Research data collected in this analysis were 60 cases, with each village 20 data collected to continue processing with the Drive Test method. In this study, Telkomsel chose to excel in voice services with 150 successful numbers of 150 attempted calls. While Indosat excels in providing data access services and special signals in the village of Tanjungbungin.

Keywords: Drive Test, GNet Track Pro, Telkomsel, Indosat

I. INTRODUCTION

Communication is an integral part of our social life. Communication is very closely related to support socialization. Without communication, civilization and socialization would not run as it is today. In today's era, the ease of communication is one of the advantages of technological advances. Unlike in the past where to communicate over long distances, humans still rely on postal mail, which takes days to be received by the recipient of the letter, technology makes communication easier, more practical, and can even be done in real-time.

Usually, operator services in densely populated areas such as urban areas tend to be better than areas with low population density, such as in rural areas. This is actually influenced by many factors, including the amount of network infrastructure and optimal operational capacity placed in an area, to the number of network users in that area. This certainly affects the user experience in communicating, poor signal conditions will have an impact on dropped calls, unstable data connections, and ultimately affect the user's decision to choose a network operator that suits their needs.

In theory, the density and range of the signal will affect the speed of the data access connection itself. Lack of coverage area has the potential to reduce the average data access speed in an area and vice versa. However, this could be due to two factors. The first is the result of data collection methods that rely on the quantity of user samples in an area to cause a lack of data in an area, to the quality of the sample itself, which may represent the actual measurement results in that area.

It is hoped that this research can provide real aspects of the Telkomsel and Indosat provider networks so as to provide an answer to the actual situation of the network where in the initial research conducted by the author the data produced is quite contradictory, becomes a guideline and preference for the community in determining the use of the right operator.

II. STUDY OF LITERATURE

2.1 Mobile network development

Mobile wireless communication or wireless telecommunications has evolved in a short span of time, and as it should be, the impact of these innovations is felt by all walks of life significantly. As humans, we are designed to seek wider and deeper connections, and mobile technology has opened up possibilities for us to communicate better and more easily. The development of cellular technology started with 1G and was followed by 2G, 3G, 4G and 5G technology is currently being developed.

2.2 Quality of Service (QoS)

According to [1], Quality of Service (QoS) is a method of measuring how good the network is and is an attempt to define the characteristics and properties of a service. QoS is used to measure a set of performance attributes that have been specified and associated with a service [6]. In general, Quality of Service (QoS) is a measurement method used to determine the capabilities of a network such as; network applications, hosts or routers with the aim of providing better and planned network services so that they can meet the needs of a service. Through QoS a network administrator can give priority to certain traffic. QoS offers the ability to define the attributes of the services provided, both qualitatively and quantitatively. The purpose of QoS is to provide different quality of service based on service needs in the network.

According to [2] Quality of Service (QoS) is a method of measuring how good the network is and is an attempt to define the characteristics and properties of a service. QoS is used to measure a set of performance attributes that have been specified and associated with a service. In general, Quality of Service (QoS) is a measurement method used to determine the capabilities of a network such as; application network, host or router with the aim of providing a better and planned network service so that it can meet the needs of a service. There are several parameters in QoS, namely; bandwidth, throughput, jitter, packet loss, and latency.2.1 Mobile network development.

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2.3 Mobile KPI Standard

The mobile KPI standard consists of 3 aspects. Accessibility is the user's ability to obtain services in accordance with the services provided by the network provider. Retainability is the ability of users and network systems to maintain services after the service has been obtained until the time limit for the service is stopped by the user. While Integrity is the degree of measurement when the service is successfully obtained by the user.[3]

2.4 Drive Test

One method of measuring network data is the Drive test. [4] argues that: The drive test is one of the steps for cell planning for a cellular phone network. The test drive retrieves the information needed for cell development planning or cell optimization to create quality communications. The special devices used in the test drive are generally large, separate (Laptop, GPS, and handphone) and are fewer simple devices.

2.5 GNet Track Pro

According to [5] G-Net Track Pro is an android-based application to perform netmonitoring of UMTS/GSM/LTE/ CDMA/EVDO networks. This application monitors services from CELLID, LEVEL, QUAL, MCC, MNC,LAC, adjacent cell service cell time and level. In addition, this application can also be used to determine the quality of voice services with voice sequences, data services with sequence data and test data, and SMS services with SMS sequences.

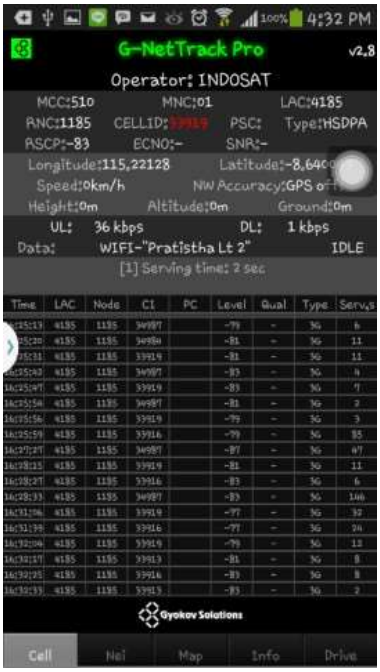

Figure 1. GNet Track Pro interface display

This G-Net Track Pro application can be used to carry out indoor and outdoor test drives and retrieve and visualize data from cells that will be taken on a map or map, the visualization will be presented in the form of a route that has been traversed.

The map is marked with an indicator in the form of color and cell breathing and the user will appear on the map. The results of the test drive will be saved in .kml format and a text file that can be extracted on a google map. Mechanism in doing this test drive that is by first installing the G-Net Track Pro software on the smartphone that will be used to do a test drive.

III. RESULTS AND DISCUSSION

3.1 Drive Test Analysis

Using an Android smartphone and GNet Track Pro software, a simultaneous drive test was carried out in 3 villages that were the object of research (Tanjungbungin, Solokan, and Teluk Buyung).

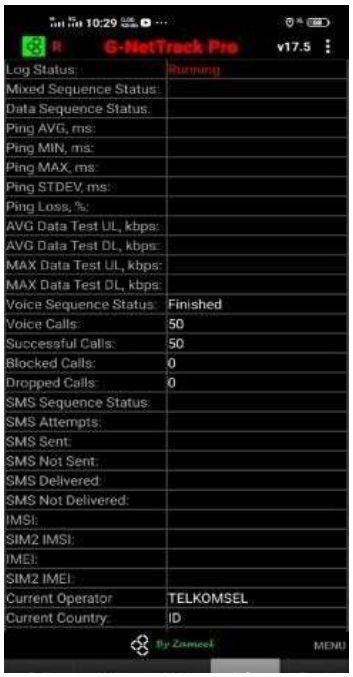

Figure 2. Drive Test Process on GNet Track Pro

After that, the data from the test drive is processed in the form of mapping (Google Earth) and cumulative data in tabular format. In the mapping image, what appears in colored dots is the area traversed during the drive test process.

Figure 3. Drive Test Process Map on GNet Track Pro

Table 1. Results of cumulative drive test data processing

Location			Tanjungbungin		Solokan		Telukbuyung		
Operator			Telkomsel	Indosat	Telkomsel	Indosat	Telkomsel	Indosat	
Parameter	Signal	RSCP	-77	-79	-88	-90	-126	-85	Db
	DATA	Upload Rate	354	544	252	226	324	298	Kb/s
		Download Rate	20	20	21	14	37	10	Kb/s
		Ping Rate	407	180	913	238	82	2002	Ms
	Voice	**Call Setup**			**50**				**times**
		Successful Call	50	50	50	49	50	42	times
		Dropped Calls	0		(0	1	0	8	times

The data that is processed from the results of the drive test for signal parameters is RSCP. For internet data, the parameters measured are upload rate, download rate, and ping rate. Meanwhile for the voice stage, the parameters measured are call setup, successful call, and dropped calls. Then to determine the performance of each parameter, measurements were made with QoS standards and KPI standards.

Tabel 2. Standardization of RSCP signal sequence parameter performance based on KPI Standard

Location			Tanjungbungin		Solokan		Telukbuyung		
Operator			Telkomsel	Indosat	Telkomsel	Indosat	Telkomsel	Indosat	
Parameter	Signal	RSCP	-77	-79	-88	-90	-126	-85	Decibel
Result			Very Good	Very Good	Good	Not Good	Bad	Good	

Tabel 3. Standardization of upload rate parameter data sequence performance based on KPI Standard

Location			Tanjungbungin		Solokan		Telukbuyung		
Operator			Telkomsel	Indosat	Telkomsel	Indosat	Telkomsel	Indosat	
Parameter	Data	Upload Rate	354	544	252	226	324	298	Kbps
Result			Not Good	Not Good	Bad	Bad	Bad	Bad	

Tabel 4. Standardization of data sequence parameter download rate performance based on KPI Standard

Location			Tanjungbungin		Solokan		Telukbuyung		
Operator			Telkomsel	Indosat	Telkomsel	Indosat	Telkomsel	Indosat	
Parameter	Data	Download Rate	20	20	21	14	37	10	Kbps
	Result		Very Bad	Very Bad	Very Bad	Very Bad	Very Bad	Very Bad	

Tabel 5. Standardization of ping rate parameter data sequence performance based on KPI Standard

Location			Tanjungbungin		Solokan		Telukbuyung		
Operator			Telkomsel	Indosat	Telkomsel	Indosat	Telkomsel	Indosat	
Parameter	Data	Ping Rate	407	180	913	238	82	2002	ms
Result			Bad	Enough	Bad	Bad	Good	Bad	

Tabel 6. Standardization of voice sequence parameter ping rate performance based on KPI Standard

Location			Tanjungbungin		Solokan		Telukbuyung		
Operator			Telkomsel	Indosat	Telkomsel	Indosat	Telkomsel	Indosat	
Parameter	Voice	Call Attempt				50			times
		Successful Call	50	50	50	49	50	42	times
		Dropped Calls	0	0	0	1	0	8	times
Result		CSSR	100%	100%	100%	98%	100%	84%	

3.2 Discussion of Signal Sequence

In the signal sequence, the parameter being tested is RSCP. Signal strength performance with the RSCP KPI standard of Telkomsel has a very good predicate in Tanjungbungin village, while in Solokan village, Telkomsel and Indosat have good and bad marks, respectively. In Telukbuyung village, Telkomsel and Indosat have bad and good predicate respectively.

3.3 Discussion of Sequence Data

In the data sequence, the parameters tested are download rate, upload rate, ping rate. For download rate performance with standard KPI Throughput, TIPHON and GNet Track Pro, Telkomsel and Indosat each have a very bad rating in Tanjungbungin village, while in Solokan village,

Telkomsel and Indosat each have a very bad rating. In Telukbuyung village, Telkomsel and Indosat each have a very bad predicate. In terms of upload rate performance with standard KPI throughput, TIPHON and GNet Track Pro, Telkomsel and Indosat each have a bad reputation in Tanjungbungin village, while in Solokan village, Telkomsel and Indosat are bad, respectively. In Telukbuyung village, Telkomsel and Indosat each have a bad reputation. For ping rate performance with KPI Jitter standards, Telkomsel and Indosat each have a bad and sufficient predicate in Tanjungbungin village, while in Tanjungbungin village,Solokan villages Telkomsel and Indosat each have a bad reputation. In Telukbuyung village, Telkomsel and Indosat have good and bad predicate respectively.

3.4 Discussion of Voice Sequence

In the voice sequence, the parameters tested are Accessibility which includes call attempts, successful calls, and dropped calls. The result is that with the KPI Accessibility standard, Telkomsel and Indosat's voice call performances each have a ratio of 100% in Tanjungbungin village, while in Solokan village, Telkomsel and Indosat have a ratio of 100% and 98%, respectively. For Telukbuyung village, Telkomsel and Indosat have ratios of 100% and 84%, respectively.

IV. CONCLUSION

The results of the comparison of performance between service providers can be analyzed from the conclusions obtained. Indosat tends to be superior based on signal quality even though it gets a bad predicate, but Telkomsel has poor results in Telukbuyung village. In terms of data access performance, Indosat is superior in Tanjungbungin village, in the other two villages. Telkomsel is slightly superior in terms of Upload and Download Rate. However, for ping quality, Indosat is superior in Tanjungbungin and Solokan while Telkomsel is superior in Telukbuyung village. For voice call quality, Telkomsel is superior with a call success ratio of 100%. Meanwhile, Indosat only obtained a 100% ratio in Tanjungbungin.

For cellular operators, which in this case become the object of the author's research, to be able to improve the quality of their services. In this case the signal quality and the placement of the Base Transceiver Station (BTS) location, in order to adjust to the natural topology and the surrounding environment. If possible, BTS placement can be done in areas with high topology in order to reduce obstacles from surrounding objects and are in areas with high population density. This can be applied to the village which is a weakness in this study, both Telkomsel and Indosat operators.

For operator service users who are the object of this research, namely Telkomsel and Indosat. In order to be able to make this research as a reference material to determine the operator in accordance with the quality of service in each region.

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