RADINKA JOURNAL OF SCIENCE AND SYSTEMATIC LITERATURE REVIEW

ISSN 2988-5825

https://www.rjupublisher.com/ojs/index.php/RJSLR

Analysis and Optimization of Telkomsel Coverage Signals for the London SumatraPlantation Company

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Abstract

With the advancement of plantations in South Sumatra in particular and Indonesia in general. So, there is a lot of opening up of new plantation land, be it oil palm, rubber, and other plantations. Therefore, Telkomsel is always at the forefront of adding new BTS (Base Transceiver Station). Telkomsel always provides comfort to its users to continue trying to maintain signal stability so that customers continue to experience satisfactory results. One of them is the London Sumatra Plantation Company, an oil palmplantation company located in Musi Banyuasin Regency. The research aims to optimize and improve Telkomsel signals at this location. The checks in this research used the Drive test method using TEMS Investigation 11.0.1. At the beginning of checking the location, the BTS thatcovered the London Sumatra Group Plantation Company building was BinaKahuripan, a distance of ±10KM, while apart from this BTS there was a BTS that was closer, namely SungaiKubu, ± 6KM. After analysis, the reason why the Sungai-Kubu BTS is not dominant is because the antenna direction is not pointing towards the London Sumatra Group location, which causes the dominant BTS to be Bina Kahuripan. So, from the results of this analysis, a solution was produced, namely Reorienting the Sungai Kubu BTS antenna from Directional. Previously 330º was changed to 355º as well as mechanical & electrical from 2 & 3, were changed to all 1. From the results of the antenna reorientation, the Sungai Kubu BTS has become more dominant. Checks were carried out in 2 positions, namely Position 1 and Position 2. The results of the checks produced an average Rx Level value for Position 1 before the antenna reorientation was -94.4 dBm while after the antenna reorientation was -81 dBm. The average Rx Quality value before the antenna reorientation was 3.8 while after the antenna reorientation was 2. The results of checking the average Rx Level for Position 2 before the antenna reorientation was -89 dBm while after the antenna reorientation was -81 dBm. The average Rx Quality value before antenna reorientation was 4.9 while after antenna reorientation was 2.

Keywords: Repeater, Drive Test, Rx Level, Rx Qual, Reorientasi Antena

Acknowledgments: Thanks to all parties who have supported the implementation of this research. I hope this research can be useful.

For citation:
Sayuti, A., DAVIZAN, S., & Irwansyah. (2023). Analysis and Optimization of Telkomsel Coverage Signals for the London SumatraPlantation Company. *Radinka Journal of Science and Systematic Literature Review, 1*(3), 144-151.

Introduction

With the continued development of plantations in South Sumatra in particular and Indonesia in general. So, there is a lot of opening up of new plantation land, be it oil palm, rubber, and other plantations. Therefore, Telkomsel is always at the forefront of adding new BTS (Base Transceiver Station) to maintain signal availability in the new plantation areas. Telkomsel openly receives complaints from plantation companies regarding the availability of oil in the company's plantation, residential, and office areas. In this way, plantation companies will no longer have difficulty communicating to create progress in plantations in Indonesia. One of the options given by Telkomsel to maintain good signal condition are to continue adding BTS (Base Transceiver Station). However, long before that, Telkomsel first analyzed customer complaints. Based on the signal problems in the field, several solution options will be provided for the company. For Blank Spot signal problems/No signal, weak signal, difficulty making calls,and others, a compliance check will usually be carried out at the location by carrying out a DriveTest. From these results, problems and solutions can be identified. The specific problem that occurs at the Makin Group Plantation Company is Blank Spot/No signal, even if there is a signalit is unstable so communication does not run smoothly.

Based on the background above, the problem can be identified, namely the unavailability of Telkomsel signal at the location of the London Sumatra Plantation Company, so it is necessary to analyze the signal performance at that location so that Telkomsel will provide a solution for the availability of Telkomsel signal at the location of the London Sumatra Plantation Company.

A driving test is a measurement carried out by standing still in the car with the car continuously running to determine the condition of the signal that has been passed by the car to observe and carry out optimization to produce network performance criteria. What is observed is usually the strength of the transmit and receive power, the level of quality of voice performance, or the speedof data access.

In the Drive Test, several equipment is required, including:

1. TEMS Investigation 11.0.1 Software and License Dongle.
2. The laptop is used to install TEMS Investigation 11.0.1 software.
3. Sony Ericsson W995 cellphone
4. Drive Test Map or Route Map in MapInfo format.
5. Nemo Analyze is used to create optimization results reports.

Rx Level is the strength of the receiver level on the MS/Handphone (minus db/decibel units). The smaller the value, the weaker the signal.

Table 1. Information on Colour Symbols for Rx Level parameters.

Color	Range (dBm)	Description
Blue	>= -85	Good
Light brown	>=-95 and <-85	Currently
Dark brown	<-95	Bad

Rx Quality, usually abbreviated as Rx Qual, is the quality level of the receiver level on theMS/Handphone (range 0-7). The greater the value, the worse the signal quality.

Table 2. Color Symbol Information on Rx Qual parameters.

Color	Range (dBm)	Description
Blue	< 5	Good
Light brown	= 5	Currently
Dark brown	> 5	Bad

An antenna is an electrical device that can convert electrical signals into electromagnetic waves and then transmit them into free space or vice versa, namely capturing electromagnetic waves from free space and converting them into electrical signals. The antenna is a transmitter to transmit signals.

Methodology

The author uses a framework structure to make it easier to carry out this research. This framework is the storyline of the research that will be carried out by the author. So that when conducting research, the author already knows the research path as a reference to make writing easier.

The following is the research framework as follows.

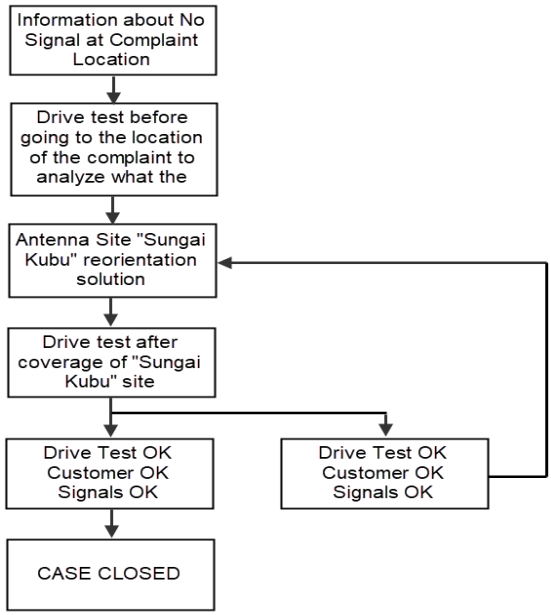

Figure 1. Research Stages

The research location was taken at the London Sumatra Plantation Company. This location is determined based on information that there is no signal in that area, if there is but it is not yet optimal and stable. Therefore, Telkomsel responded to customer complaints by sending a team ofdrive testers to carry out drive test checks in the area. The purpose of this check is to find out thenearest BTS (Base Transceiver Station) that covers the plantation area.

Next, to find out the problems that occur so that we can analyze what solutions will be taken to improve the signal conditions in the area.

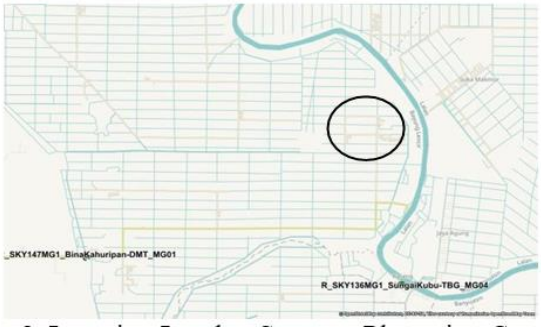

Figure 2. Location London Sumatra Plantation Company

Results

Initial Checking

This initial stage of checking is in response to customer complaints. Usually, the customer conveys information about customer complaints to the operator officially. After receiving information about the customer's complaint, Telkomsel arranged a schedule for an initial check at the company location that was experiencing signal problems. The check is carried out by the drive tester team. This check is carried out to determine the signalcondition in the problem area. The goal is to find out the location of the BTS that covers the problematic location and to find out the received power transmitted by the BTS to that location. Next, the drive tester analyzes and provides several solutions that will later be taken to make the signal in the building area much better than before. Finally, the drive tester provided an incident report to the Service Quality Assurance division.

The following are the results of the initial check

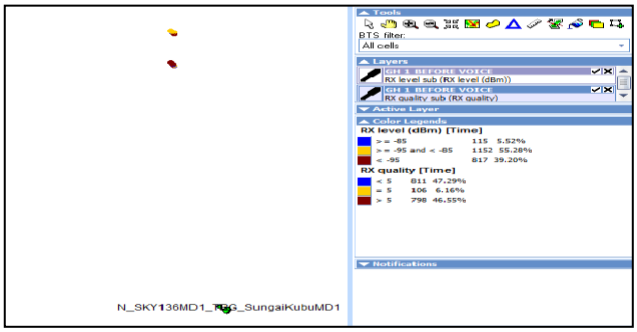

Figure 3. Rx Level & Rx Qual Position 1 Before

From the picture above the Rx Level in good conditions is only 5.52%, medium 55.28%, and bad39.20%. Meanwhile, Rx Qual in good condition was 47.29%, moderate at 6.16%, and poor at 46.55%.

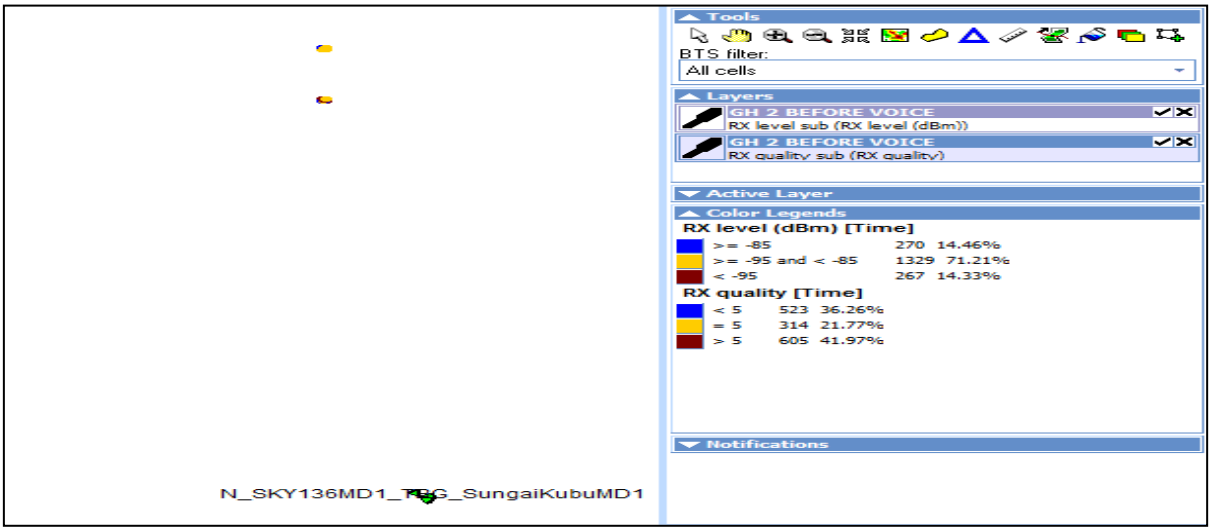

Figure 4. Rx Level & Rx Qual Position 2 Before

Similarly, when collecting drive test data in position 1, for position 2 in the picture above. From the picture above, the Rx Level in good condition is only 14.46%, medium is 71.21%, and bad is 14.33%. Meanwhile, Rx Qual in good condition was 36.26%, moderate at 21.11%, and poor at 41.97%. The dominant BTS covering the London Sumatra plantation company location is BTS SKY147MG1_DMT_BinaKahuripanMG1. The distance from the BTS to the London Sumatra Plantation Company location is ± 10 KM. So, it is very difficult to produce a good signal to the customer's location. Meanwhile, the closest distance from another BTS is BTS SKY136MG1_TBG_SungaiKubuMG1. The BTS distance to the London Sumatra Plantation Company customer location is ± 6 KM. The solution to overcome this problem is to reorient the antenna. Installing the Antenna Reorientation Repeater means checking the condition of the antenna direction, antenna type, mechanical and electrical.

Table 3. Distance of the closest BTS to the location of the London Sumatra

Site Coverage	Distance
SKY136MG1_TBG_SungaiKubu	± 6 KM
SKY147MD1_DMT_BinaKahuripan	± 10 KM

In terms of distance, the closest BTS should be BTS SKY136MG1_TBG_SungaiKubuMG1 but in reality, the dominant BTS covering the London Sumatra Plantation Company is BTS SKY147MG1_DMT_BinaKahuripanMG1 with a distance of ±10 KM. However, after analyzing the BTS SKY136MG1_TBG_SungaiKubuMG1 with a distance of ±6 KM, none of the antennasare directed towards the London Sumatra Plantation Company, so even though the BTS is close, the problem is the direction of the antenna. So, to fix the signal problem at the London Sumatra Plantation Company location, you can move/direct the BTS SKY136MG1_TBG_SungaiKubuMG1 antenna.

Table 4. Antenna Reorientation Changes SKY136MG1_TBG_SungaiKubuMG

Summary	SITE COVERAGE	Distance
Azimut	330º	350º
Mechanical	2	1

Electrical	3	1

Conclusion

The textile industry is one of the fastest-growing sectors in the world today, contributing to environmental pollution. To eliminate pollution from the textile industries, countries must conform to international standards. Additionally, each nation should trade techniques for removing pollution-causing chemicals.

Final Stage Checking

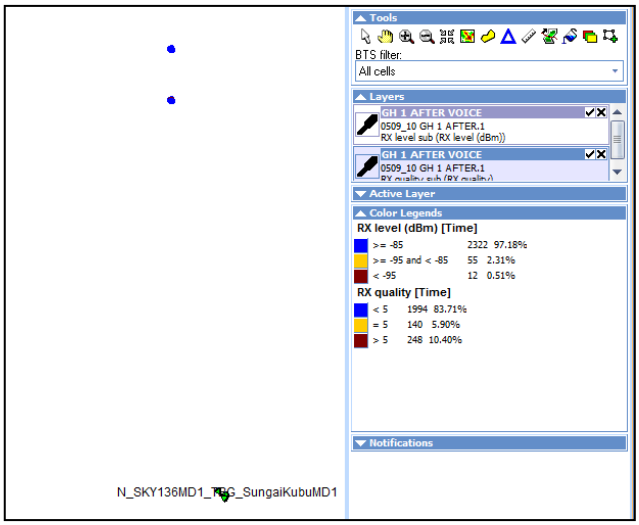

Figure 5. Rx Level & Rx Qual Position 1 After

Antenna reorientation is the physical job of climbing the tower manually. The work is done on theantenna tower. The antenna is shifted/rotated in the direction according to the drive tester's directions referring to the results of the drive test carried out. After all the work has been completed, a drive test is first carried out to find out the comparison results between before and after reorienting the antenna. From the picture above the Rx Level in good condition is only 97.18%, medium 2.31%, and bad 0.51%. Meanwhile for Rx Qual in good condition 83.71%, medium 5.90%, and bad 10.40%.

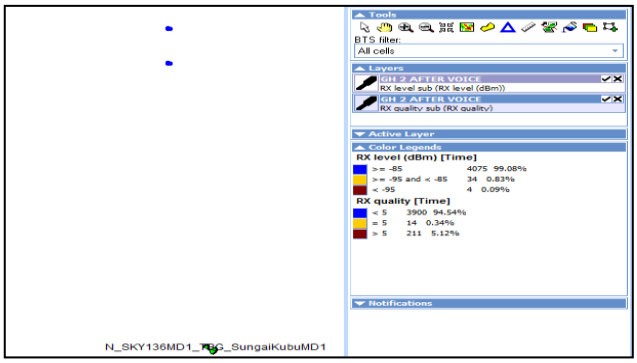

Figure 6. Rx Level & Rx Qual Position 2 After

From the picture above the Rx Level in good condition is only 99.08%, medium 0.83%, and bad 0.09%. Meanwhile, Rx Qual in good condition was 94.54%, moderate at

0.34%, and poor at 5.12%. In this study, the author analyzed the comparison of analysis results before and after antenna reorientation, including Rx Level and Rx Quality values.

Table 5. Comparison of Analysis Results Before and After Antenna Reorientation

				London Sumatra Plantation Company
Location 1				BEFORE
Voice	Average	Max	Min	Site Coverage
Rx Level	-94.4	-38	-134	SKY147MD1_DMT_BinaKahuripan
Rx Qual	3.8	7	0	SKY136MG1_TBG_SungaiKubu
Location 1				AFTER
Voice	Average	Max	Min	Site Coverage
Rx Level	-81.0	-76	-109	SKY136MG1_TBG_SungaiKubu
Rx Qual	2	7	0	
Location 2				BEFORE
Voice	Average	Max	Min	Site Coverage
Rx Level	-89	-20	-124	SKY147MD1_DMT_BinaKahuripan
Rx Qual	3.8	7	0	SKY136MG1_TBG_SungaiKubu
Location 2				AFTER
Voice	Average	Max	Min	Site Coverage
Rx Level	-81	-76	-109	SKY136MG1_TBG_SungaiKubu

Overall, the BTS that covers the London Sumatra Plantation Company was previously covered by the Bina Kahuripan BTS, but after reorienting the antenna, the BTS that covers it is the Sungai Kubu BTS.

Discussion

The checking points are carried out at 2 points, namely Position 1 and Position 2. These two positions are chosen based on the position in the middle. If you look at the checking results, you can feel the signal that was at position 1 Rx Level.The average value before was -94.4 dBm, while the results from the check after were -81, as wellas the RX quality results before antenna reorientation, the average value was 3.8 while after 2. In position 2, the average Rx Level before is -89 dBm, while the results from checking after are -81, as well as the RX quality results before antenna reorientation, the average value is 4.9, whileafter 2.

Conclusion

From the results of the research conducted by the author, it can be concluded that Antenna Reorientation is one solution to the problem of weak signal coverage so that after antenna reorientation, customers in the London Sumatra Plantation area no longer experience signal difficulties. The BTS that covers the London Sumatra plantation area is Sungai Kubu. The Rx Level value before antenna reorientation is -94.4 dBm after antenna reorientation -81 dBm for position 1 while for position 2 the Rx Level before antenna reorientation is -89 dBm after antenna reorientation -81 dBm. The RxLevel value is much better after antenna reorientation. The Rx Quality value before antenna reorientation was 3.8 after antenna 2 reorientation for position 1 while for position 2 the Rx Level before antenna reorientation was 4.9 after antenna 2 reorientation. The Rx Quality value was much better after antenna

reorientation.

Conflict of Interest

No conflict of interest

References

A. Sugiharto and I. Alfi. (2019). Komparasi Performa Jaringan Antara Penyedia Layanan Seluler 4G LTE Di Area Kota Yogyakarta, Angkasa: *Jurnal Ilmiah Bidang Teknologi*, 11(1), 73-80.

Blomeier, Stefan. (2006). HSDPA Design Detail & System Engineering, Germany: Incom GmbH.

Bostelmann, Gerr & Rudolf Zarits. (2005). UMTS Design Detail & System Engineering, Germany: Incom GmbH.

D. Y. Haq. (2017). Optimalisasi dan Simulasi Jaringan 4G LTE di Area Universitas Muhammadiyah Yogyakarta, Yogyakarta.

Firman Adi. (2017). Analisa Quality Drive Test Benchmarking Menggunakan Software Nemo Analyze. *Jurnal Informatika*, AINET, 3(2) 67-76.

I. P. D. K. Pramulia, P. K. Sudiarta, and G. Sukadarmika, (2015). Analisis Pengaruh Jarak Antara User Equipment Dengan eNodeB Terhadap Nilai RSRP (Reference Signal Received Power) Pada Teknologi LTE 900 MHz. *Jurnal SPEKTRUM*, 2(3). 24-30.

Nurhasanah. (2017). Measurement of SINR (Signal Noise Interference Noise to Ratio) and RSRP (Reference Signal Received Power) on 4G LTE Area Surakarta, *Jurnal ICT Akademi Telkom Jakarta*, 8(15), 9-17.

Praharasty, Anggit. (2009). Analisis Kualitas Panggilan Pada Jaringan GSM Menggunakan Tems Investigation, Universitas Diponegoro, Semarang.

R. Efriyendro, Y. Rahayu. (2017). Analisa Perbandingan Kuat Sinyal 4G LTE Antara Operator Telkomsel dan XL AXIATA Berdasarkan Paramater Drive Test Menggunakan Software G-NetTrack Pro Di Area Jalan Protokol Panam. *Jom FTEKNIK*, 4(2). 1-9

R. Yanuari P.K. Sudiarta N. Gunantara. (2015). ANALISA KUALITAS SINYAL JARINGAN GSM PADA MENARA ROOFTOP DENGAN MEMBANDINGKAN APLIKASI METODE DRIVE TEST ANTARA TEMS INVESTIGATION 8.0.3 DENGAN G-NETTRACK PRO.*Jurnal SPEKTRUM*, Unud, 2(4),39-45.

Riyanto, (2010). Sistem Informasi Geografis Berbasis Mobile, Gava Media, Yogyajarta.

Sayuti, Akhmad. (2018). Analisis Kinerja Jaringan 4G Pada Cluster Palembang Inner Menggunakan Metode Drive Test Nemo Handy dan Nemo Analyze. *Jurnal Sistem Informasi*, UIN Raden Fatah Palembang, 4(1), 1–10.

Shoji, Shigeki dan Suhana, (2014) Buku Pegangan Teknik Telekomunikasi, PT. Pradnya Paramita, Jakarta.

Sunomo, (2014). Pengantar Sistem Komunikasi Nirkabel, Grasindo, Jakarta.

Kiswanto, (2012). Analisa Kerja Jaringan Operator 3G (WCDMA – UMTS) Menggunakan Metode Drive Test, Politeknik Negeri Surabaya, Surabaya.