

## 4G LTE Network Performance Analysis Provider 3 In Pamekasan Using The G-Nettrack Application

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### ABSTRACT

This research evaluates the performance of 4G LTE Provider 3 network services in Pamekasan City using the drive test method using the G-NetTrack application. The goal is to understand network performance in providing high-quality internet access in the ever-evolving digital era. This research is important because people's needs for fast and reliable internet access are increasing, especially in cities with high population density such as Pamekasan. Field measurement results show that Provider 3's 4G LTE network has good service quality with stable download and upload speeds and adequate signal strength. Drive tests were conducted by driving along predetermined routes while recording data on signal strength, internet speed, latency, and other relevant parameters. The data collected from each location was analyzed to compare the performance of various service providers. This analysis provides a comprehensive picture of network performance and can be used to provide recommendations to both consumers and other concerned parties. The conclusion of this study includes an evaluation of the performance of each provider based on the drive test results, as well as providing recommendations for future service improvements. The results of this study provide useful insights to understand and improve user experience in telecommunication connectivity in Pamekasan City, and can be used to improve user experience.

### INTRODUCTION

In the ever-evolving digital era, reliable and fast connectivity is a key prerequisite to support various aspects of modern life, whether in business, education, or daily life. In the midst of the shift towards more advanced mobile technology, 4G LTE (Long-Term Evolution) networks have become the backbone of telecommunications infrastructure that facilitates high-quality internet access in various locations (Diajukan Sebagai & Satu, n.d.).

The rapid development of the internet is closely related to advances in information and communication technology. people's need for access to fast, reliable, and high-quality internet networks, which has an impact on the quality of service offered by a number of service providers ('Drive Test Indoor Jaringan 4G LTE Operator XL di Rumah Sakit Pusat Otak Nasional', n.d.). In addition to demanding expensive network infrastructure upgrades, this increase in service quality highlights the importance of using funds wisely and according to the needs of each region. This ensures that service consumers in that region or area will actually benefit greatly from the advancement of network services (Disusun Sebagai et al., n.d.).

One of the cities on the island of Madura is Pamekasan. The population density in the city of Pamekasan greatly affects the need for infrastructure related to technology and communication, a fast and reliable internet network is one of the most important communication needs, in this situation Pamekasan has available 4G (LTE) networks that operate and provide services. mobile network subscribers (Samani Siewe, Article Samani Siewe Darix, & Siewe Darix, 2023). Given this, it is important to assess the level of service quality offered by telecommunications service providers to clients using 4G (LTE) technology (Perdana Sari & Eka Tassia, 2024).

In planning and improving the efficiency of LTE networks, telecommunications service providers often carry out measurements in the coverage area with the aim of improving the efficiency of LTE networks. Drive test method (Budiman, Hairah, Studi Informatika Fakultas Teknik Universitas Mulawarman, -Kalimantan Timur, & Kuaro Kampus Gunung Kelua Unmul, n.d.). To ensure accurate measurements, they use appropriate software and equipment. One of the commonly used tools is the G-NetTrack application. This research aims to generate drive test data that can be accessed directly through a cell phone, with the process involving port analysis from the cell phone and GPS to retrieve signal strength data and other parameters, as well as position data.

The focus of the research is the analysis of 4G network quality in pamekasan City, by applying the drive test method, drive tests are carried out using the G-NetTrack application to compare network quality between



operators(Hardiyanto, Ersya Yayang Saputra, & Timur Wahyuningsi, n.d.) . This step is part of an effort to maximize network quality by conducting tests to evaluate the speed and level of network quality in Pamekasan City.

**LITERATURE REVIEW**

A literature review is a critical, analytical summary and synthesis of the current knowledge of a topic. It should compare and relate different theories/research, findings, and so on, rather than just summarize them individually. It should also have a particular focus or theme to organize the review. In this section, the researcher can describe some of the related previous studies. Researchers can review the gaps in the research, then it can be used as a basis for research to be carried out

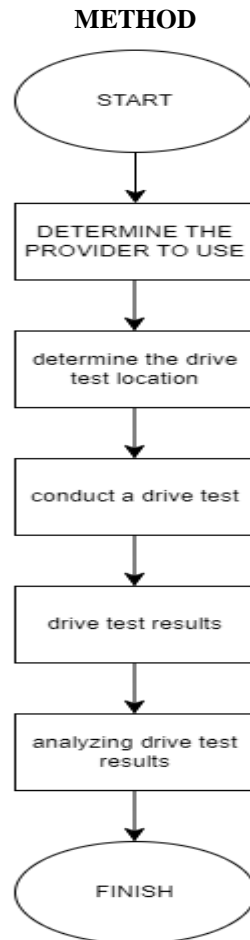


Figure 1. Research Stages

Figure 1 describes the research stages that will be carried out in this study. First of all, to start the research, the main focus is to identify the telecommunication service providers to be studied. The determination of the service is based on consideration of network coverage, internet speed, and the price of the package offered (Yuhanef et al., 2023). Once the service providers were selected, the next step was to determine the research locations.

The research locations were carefully selected to ensure a good representation of various geographical conditions, including urban and rural areas, as well as areas that may have differences in signal and network quality. After determining the research locations, measurements were taken using the drive test method(Yulianto, Haryanti, & Mt, n.d.). Measurements were taken by driving a vehicle along a predetermined route, while recording data on signal strength, internet speed, latency, and other relevant parameters. During the drive test, various measurements were taken at various points in each research location to get a comprehensive picture of the network performance.

After completing the drive test, the measurement results were collected and analyzed . The data collected from each location was evaluated to compare the performance of different service providers. The results of this analysis were then used to make the conclusions of this study(Muhammad, Rusfa, & Tonny, 2023).

The conclusion of this research includes an evaluation of the performance of each provider based on the drive test results. Recommendations can also be provided based on the findings of this research, both to consumers and other interested parties . The final report of this research is prepared to be published or shared with relevant parties, such as

consumers, regulators, or the telecommunications service providers themselves (Ayubianto & Mulyono, 2023).

**Research Limitations**

Before running the drive test, the parameters to be used will be determined first, as shown in Figure 2.

PARAMETER	DESCRIPTION
DRIVE TEST APPLICATION	G-NETTRACK LITE
NETWORK	4G LTE
SERVICE PROVIDER	3
CITY	PAMEKASAN
MEASUREMENT ROUTE	JL. JALMAK JL. TALANG SIRING JL. PANGLEGUR

Figure 2. Predetermined parameters

**Drive test method**

Field testing, often referred to as drive testing, is one of the main methods used in radio network optimization. The process involves collecting field data to monitor the quality of service in the area covered by the telecommunications infrastructure. The aim is to monitor and improve network quality at various locations by collecting data directly from the field. The data includes an evaluation of the conditions at each eNodeB. The eNodeB is the radio access component to the 4G (LTE) network, which includes radio transmitters, receivers, resource management, control, and power supply (Indra Ully Widhi Nugraha et al., n.d.).

The main purpose of using drive tests is to evaluate service quality, troubleshoot network performance issues, optimize the network, and measure end-user experience. By collecting data on signal strength, data speed, call reliability, and other factors, drive tests help network operators to improve service quality and user experience (Rosyada, Teknik Elektro Politeknik Negeri Padang, & Chandra, n.d.). The measurement method in this study was carried out by utilizing a drive test traversing map-based navigation, as shown in Figure 3.

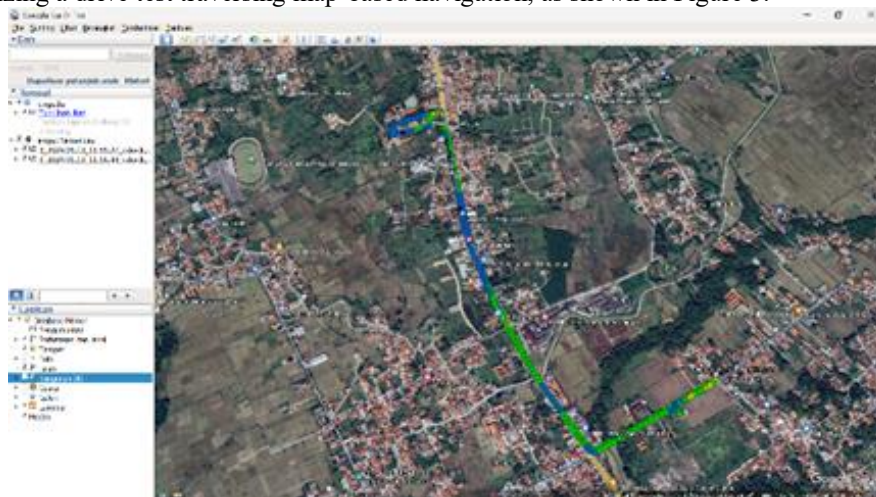


Figure 3. Drive test path in pameksan city

**G-NetTrack**

G-NetTrack is an application specifically designed for Android devices, making it easy for users to conduct mobile network testing in the field with high efficiency. This application is equipped with various important features, including signal measurements such as signal strength (RSSI) and signal quality (SINR) for various types of mobile networks ranging from 2G to 5G. Users can also utilize the network mapping feature by using GPS on their devices, which helps in knowing the location and coverage of the network better. In addition, G-NetTrack allows users to perform call and data testing and provides statistical analysis that helps in identifying and resolving network performance issues. Once extracted from the app, the measurement results can be saved in a raw file format, as seen in figure 6. Thus, the app becomes a very useful tool for network engineers, mobile operators, and researchers to understand and improve the overall service quality of mobile networks (Muhammad Harun Ashar & Dinda, 2023).

In the test using G-NetTrack, we can get the quality of the RSRP (Reference Signal Received Power) signal advantage when we use G-NetTrack to make measurements. Figure 4 shows that the RSRP number received by the user will decrease as the distance between the site and the user increases (Akram, Melvandino, Bragaswara, & Ramza,

2023).

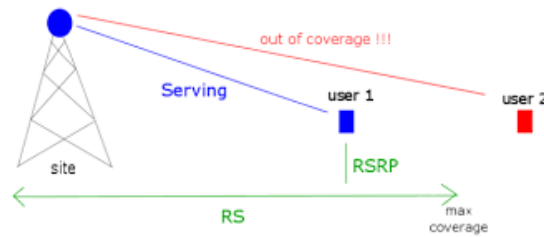


Figure 4. User receives signal from site

RSRP serves to provide the UE (User Equipment) with information about the cell signal strength based on path-loss calculations. It also functions in the cell handover and reselection process. RSRP parameters can be partially analogous to RxLevel in 2G technology, and RSRP can be compared to analog parameters in 3G technology (Haidar Hari, Prasetyo Eka Putra, Hasanah, & Ririn Sutarsih, n.d.). The range of RSRP parameter values can be found in Table 2.

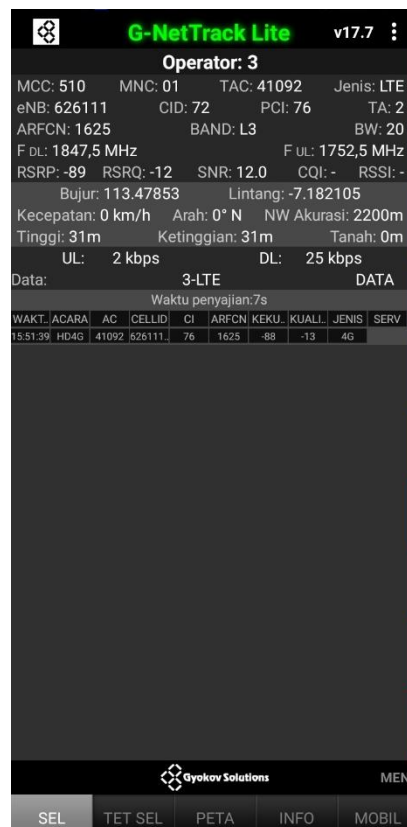


Figure 5. G-NetTrack application

RSRP VALUE	NUMBER OF SAMPLE
(-110 -101)	0
(-100 -91)	147
(-90 -81)	122
(-80 -71)	11
(-70 -61)	0
(-60;)	14

Figure 6. Drive test results data from G-NetTrack

G-Net Track application can also display additional data, such as network quality, cell, upload speed, and download speed. According to the color indications in Table 1, the fastest to slowest signals will be displayed on the map using red to dark blue dot markers during the drive test (Yungka & Widiyanto, 2023).

Table 1: Color Indicator and RSRP Parameter Range of G-Net Track Application

NO	Timestamp	Longitude	Latitude	Operatorname	NetworkTech	Level	keterangan	Speed	Altitude
1	2024.05.13_11.56.44	11.347.658	-7.179.333	3	4G	-95	sedang	0	16
2	2024.05.13_11.56.45	11.347.664	-7.179.356	3	4G	-84	bagus	0	16
3	2024.05.13_11.57.39	11.347.660	-7.179.441	3	4G	-91	sedang	4	20
4	2024.05.13_11.57.45	11.347.671	-7.179.511	3	4G	-95	sedang	9	20
5	2024.05.13_11.57.47	11.347.682	-7.179.545	3	4G	-92	sedang	12	20
6	2024.05.13_11.57.49	11.347.693	-7.179.584	3	4G	-85	bagus	15	21
7	2024.05.13_11.57.51	11.347.706	-7.179.618	3	4G	-87	bagus	19	21
8	2024.05.13_11.57.53	11.347.722	-7.179.659	3	4G	-86	bagus	26	21
9	2024.05.13_11.57.55	11.347.738	-7.179.706	3	4G	-83	bagus	28	21
10	2024.05.13_11.57.57	11.347.754	-7.179.749	3	4G	-83	bagus	31	21
11	2024.05.13_11.57.59	11.347.772	-7.179.790	3	4G	-87	bagus	34	21
12	2024.05.13_11.58.00	11.347.781	-7.179.813	3	4G	-87	bagus	36	21
13	2024.05.13_11.58.01	11.347.790	-7.179.836	3	4G	-87	bagus	36	21
14	2024.05.13_11.58.02	11.347.800	-7.179.856	3	4G	-87	bagus	37	22
15	2024.05.13_11.58.03	11.347.810	-7.179.878	3	4G	-88	bagus	39	22
16	2024.05.13_11.58.04	11.347.820	-7.179.901	3	4G	-88	bagus	38	22
17	2024.05.13_11.58.05	11.347.830	-7.179.923	3	4G	-86	bagus	36	22
18	2024.05.13_11.58.06	11.347.839	-7.179.945	3	4G	-86	bagus	35	22
19	2024.05.13_11.58.08	11.347.856	-7.179.984	3	4G	-88	bagus	32	23
20	2024.05.13_11.58.10	11.347.856	-7.179.984	3	4G	-87	bagus	32	23
21	2024.05.13_11.58.10	11.347.871	-7.180.025	3	4G	-87	bagus	27	24
22	2024.05.13_11.58.12	11.347.871	-7.180.025	3	4G	-88	bagus	27	24
23	2024.05.13_11.58.12	11.347.883	-7.180.053	3	4G	-88	bagus	21	25
24	2024.05.13_11.58.15	11.347.895	-7.180.076	3	4G	-87	bagus	12	27
25	2024.05.13_11.58.19	11.347.905	-7.180.095	3	4G	-84	bagus	10	28
26	2024.05.13_11.58.23	11.347.915	-7.180.141	3	4G	-87	bagus	14	30
27	2024.05.13_11.58.26	11.347.915	-7.180.141	3	4G	-91	bagus	14	30
28	2024.05.13_11.58.26	11.347.921	-7.180.245	3	4G	-91	bagus	17	32
29	2024.05.13_11.58.28	11.347.921	-7.180.358	3	4G	-91	bagus	24	32
30	2024.05.13_11.58.29	11.347.921	-7.180.358	3	4G	-83	bagus	24	32
31	2024.05.13_11.58.30	11.347.919	-7.180.510	3	4G	-83	bagus	30	33
32	2024.05.13_11.58.31	11.347.918	-7.180.605	3	4G	-83	bagus	35	34
33	2024.05.13_11.58.32	11.347.917	-7.180.703	3	4G	-87	bagus	36	34
34	2024.05.13_11.58.33	11.347.916	-7.180.806	3	4G	-87	bagus	38	34
35	2024.05.13_11.58.34	11.347.915	-7.180.916	3	4G	-87	bagus	42	34
36	2024.05.13_11.58.35	11.347.913	-7.181.036	3	4G	-86	bagus	45	34
37	2024.05.13_11.58.36	11.347.911	-7.181.163	3	4G	-86	bagus	49	35
38	2024.05.13_11.58.37	11.347.909	-7.181.295	3	4G	-85	bagus	50	35
39	2024.05.13_11.58.38	11.347.907	-7.181.430	3	4G	-85	bagus	52	36
40	2024.05.13_11.58.39	11.347.905	-7.181.573	3	4G	-85	bagus	53	36
41	2024.05.13_11.58.40	11.347.903	-7.181.713	3	4G	-84	bagus	52	36
42	2024.05.13_11.58.41	11.347.901	-7.181.846	3	4G	-84	bagus	51	36
43	2024.05.13_11.58.42	11.347.899	-7.181.986	3	4G	-84	bagus	52	36
44	2024.05.13_11.58.43	11.347.897	-7.182.130	3	4G	-90	bagus	52	36
45	2024.05.13_11.58.44	11.347.895	-7.182.271	3	4G	-90	bagus	54	36
46	2024.05.13_11.58.45	11.347.893	-7.182.413	3	4G	-91	sedang	53	36
47	2024.05.13_11.58.46	11.347.890	-7.182.556	3	4G	-91	sedang	54	35
48	2024.05.13_11.58.47	11.347.887	-7.182.698	3	4G	-91	sedang	54	35
49	2024.05.13_11.58.48	11.347.885	-7.182.841	3	4G	-90	bagus	55	35
50	2024.05.13_11.58.49	11.347.882	-7.182.986	3	4G	-90	bagus	55	34

**RESULTS**

The results of real-time observations made using the G-Net Track application to analyze the 4G network service of Pamekasan city show that there are 293 signal measurement points of operator 3 during the drive test process on the route traveled. These results show that the 4G network is good in Pamekasan city(Prasetyo Eka Putra, Nazir Arifin, Zulfana Imam, & Saputra, n.d.). Green indicates good network quality. From the analysis, the average value of 293 data levels is -90.0648 dBm, ranging between -72 dBm and -90 dBm. Table 1 shows the RSRP value which is a good indicator(Prasetyo, Putra, Baidawi, & Mubarak, n.d.).

**DISCUSSION**

During the drive test, the strongest to weakest signal strengths are represented on a map with colored dots starting in red and ending in dark blue, according to the color scale listed in Table 1. You can see a visualization of the measurement results on the map in Figure 5. The quality of the measurement results can also be evaluated based on the average values of the parameters shown in Figure 7(Zulfikri et al., 2023).



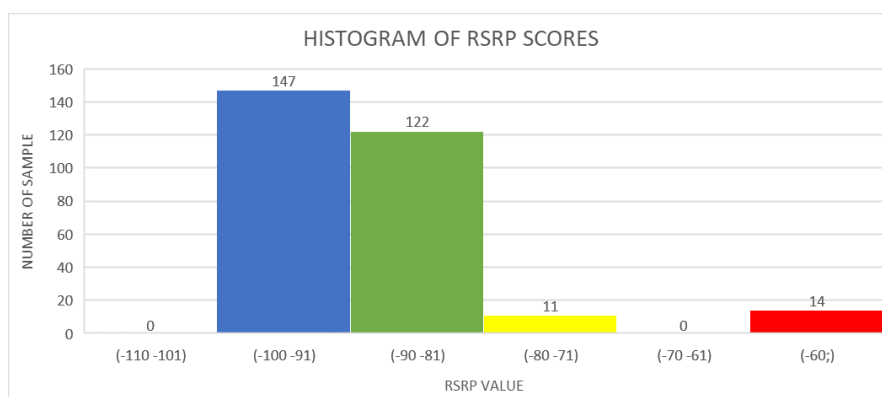


Figure 7. Histogram of RSRP values.

### CONCLUSIONS

The conclusion of the 4G LTE network performance analysis of Provider 3 in Pamekasan City using G-NetTrack will provide a deep understanding of the quality of service provided by the provider in the region. Data collected through G-NetTrack will provide insight into download speed, upload speed, latency, connection stability, and network coverage. From this analysis, recommendations will emerge to improve network performance, both through infrastructure upgrades and service optimization. This is important to ensure adequate user experience and continuously improve the quality of telecommunication services in Pamekasan City (Prasetyo, Putra, Arman, et al., n.d.).

### REFERENCES

- Akram, A., Melvandino, F. H., Bragaswara, W. Y., & Ramza, H. (2023). ANALISIS KINERJA JARINGAN 4G LTE MENGGUNAKAN METODE DRIVE TEST DI KELURAHAN KAMPUNG RAMBUTAN, JAKARTA TIMUR. *Jurnal Informatika Dan Teknik Elektro Terapan*, 11(3). Retrieved from <https://doi.org/10.23960/jitet.v11i3.3140>
- Ayubianto, R., & Mulyono, M. (2023). Analisis Kualitas Jaringan 4G LTE Studi Kasus PT.Ramayana Sudirman Pekanbaru. *Remik*, 7(1), 246–258. Retrieved from <https://doi.org/10.33395/remik.v7i1.12040>
- Budiman, E., Hairah, U., Studi Informatika Fakultas Teknik Universitas Mulawarman, P., -Kalimantan Timur, S., & Kuaro Kampus Gunung Kelua Unmul, J. (n.d.). Kinerja Jaringan 4G LTE Operator Mobile di Ibukota Kalimantan Timur dimasa Pandemi Covid19 Mobile Operator 4G Network Performance in Capital of East Kalimantan during the Covid19 Pandemic. Retrieved from <https://doi.org/10.30818/jpkm.2021>
- Drive Test Indoor Jaringan 4G LTE Operator XL di Rumah Sakit Pusat Otak Nasional. (n.d.).
- Haidar Hari, N., Prasetyo Eka Putra, F., Hasanah, U., & Ririn Sutarsih, S. (n.d.). Transformasi Jaringan Telekomunikasi dengan Teknologi 5G: Tantangan, Potensi, dan Implikasi. Retrieved from <https://doi.org/10.37034/jidt.v5i1.357>
- Hardiyanto, A., Ersya Yayang Saputra, M., & Timur Wahyuningsi, R. (n.d.). ANALISIS QUALITY OF SERVICE LAYANAN JARINGAN 4G PADA AREA URBAN DAN RURAL. Retrieved from <https://ejournal.warunayama.org/koehesi>
- Indra Uly Widhi Nugraha, I. P., Gunantara, N., Diafari Djuni Hartawan, I., Bukit, K., Raya Kampus Unud Jimbaran, J., Kuta Sel, K., & Badung, K. (n.d.). ANALISIS PENGUKURAN KUALITAS LAYANAN PADA JARINGAN 4G (Vol. 8).
- Muhammad, A., Rusfa, R., & Tonny, S. (2023). Analysis of the Quality of 4G Networks on the Island of Mantang with Drive Test Method. In *BIO Web of Conferences* (Vol. 70). EDP Sciences. Retrieved from <https://doi.org/10.1051/bioconf/20237002006>
- Muhammad Harun Ashar, & Dinda. (2023). Analisis Performansi Jaringan 4G Telkomsel Menggunakan Metode Drive Test. *Bulletin of Computer Science Research*, 3(5), 364–371. Retrieved from <https://doi.org/10.47065/bulletincsr.v3i5.273>
- Perdana Sari, Y., & Eka Tassia, S. (2024). Analisa Perbandingan Kinerja Jaringan 4G LTE Pada Provider Telkomsel Dan Indosat Menggunakan Metode Drive Test. *Jurnal Ilmu Komputer Dan Pendidikan*, 2(2). Retrieved from <https://journal.mediapublikasi.id/index.php/logic>
- Prasetyo Eka Putra, F., Nazir Arifin, M., Zulfana Imam, K., & Saputra, E. (n.d.). Pengembangan Sistem Informasi Laboratorium Terintegrasi Sistem Akademik Menggunakan Agile Scrum. Retrieved from <https://doi.org/10.37034/jidt.v5i1.367>
- Prasetyo, F., Putra, E., Arman, D., Putra, M., Firdaus, A., & Hamzah, A. (n.d.). Analisis Kecepatan Dan Kinerja Jaringan 5G (Generasi ke 5) Pada Wilayah Perkotaan. *Informatics for Educators And Professionals: Journal of Informatics*, 8(1), 47–51.

- Prasetyo, F., Putra, E., Baidawi, A., & Mubarak, A. A. (n.d.). Merancang Jaringan Sensor Nirkabel dan IoT untuk Kota Pintar Pamekasan. Retrieved from <https://doi.org/10.37034/jidt.v5i1.331>
- Rosyada, A., Teknik Elektro Politeknik Negeri Padang, J., & Chandra, D. (n.d.). *ANALISIS KUALITAS HANDOVER 4G LTE BERDASARKAN PARAMETER DRIVE TEST DI JALUR KERETA API PADANG-PARIAMAN*.
- Samani Siewe, D., Article Samani Siewe Darix, R., & Siewe Darix, S. (2023). A New Mobile RF Drive Test Application. *J Sen Net Data Comm*, 3(1), 2023. Retrieved from <https://doi.org/10.36227/techrxiv.24040917.v7>
- Sebagai, Diajukan, & Satu, S. (n.d.). *Analisis Perbandingan Kualitas Sinyal 4G LTE Pada Beberapa Provider TUGAS AKHIR*.
- Sebagai, Disusun, Satu, S., Untuk, S., Gelar, M., Teknik, S., Jurusan, P., ... Fahrizal, O. M. (n.d.). *ANALISIS PERBANDINGAN KUALITAS JARINGAN INTERNET 4G DI KAMPUS UIN SUSKA RIAU MENGGUNAKAN METODE QUALITY OF SERVICE TUGAS AKHIR*.
- Yuhanef, A., Yusnita, S., Riandaisan, G., Studi Telekomunikasi, P., Teknik Elektro, J., & Negeri Padang, P. (2023). Analisis Kualitas Throughput Jaringan 4G LTE Indosat pada Site 01JKS504 Di Kebayoran Lama, Jakarta Barat, 4(1), 276–282. Retrieved from <https://doi.org/10.24036/jtein.v4i1.396>
- Yulianto, H., Haryanti, M., & Mt, S. T. (n.d.). *Perbaikan Dan Peningkatan Coverage Jaringan 4G LTE*.
- Yungka, Y. R., & Widiyanto, D. C. (2023). 4G LTE NETWORK WALK TEST ANALYSIS USING ANDROID APPLICATION G-NET TRACK ON SWCU FTI BUILDING. *Jurnal Teknik Informatika (Jutif)*, 4(2), 441–448. Retrieved from <https://doi.org/10.52436/1.jutif.2023.4.2.727>
- Zulfikri, A., Putra, F. P. E., Huda, M. A., Hasbullah, H., Mahendra, M., & Surur, M. (2023). Analisis Keamanan Jaringan Dari Serangan Malware Menggunakan Filtering Firewall Dengan Port Blocking. *Digital Transformation Technology*, 3(2), 857–863. Retrieved from <https://doi.org/10.47709/digitech.v3i2.3379>