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Wireless Network Quality Analysis at the Tanah Abang Sub district Office, Pali Regency Using the *Quality of Service* (QOS) Method

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ABSTRACT
In the era of rapid globalization and information technology development, government institutions are required to adopt reliable and efficient technological systems to support public services. The Tanah Abang District Office, Penukal Abab Lematang Ilir Regency, South Sumatra Province, is responsible for various administrative services such as issuing birth certificates, identity cards, and other official correspondence, all of which rely heavily on stable network performance. However, current conditions indicate frequent internet slowdowns caused by unmanaged bandwidth usage and an unknown number of active wireless users, resulting in decreased service efficiency, especially during large data transfers. This study aims to analyze the implementation of the Hierarchical Token Bucket (HTB) method as a bandwidth management solution to improve network performance. Network quality is evaluated using Quality of Service (QoS) parameters, including throughput, delay, jitter, and packet loss. Data collection and traffic monitoring were conducted using the Wireshark application to capture and analyze network performance in real time. The results of this study are expected to provide insights into improving network stability and service effectiveness within government offices.

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1. Introduction

With the rapid development of technology today, we realize that it has developed rapidly so that it affects all aspects of human life, both in the government, political, economic, cultural, and even in the field of education. Something that we cannot avoid is the development of technology which every era is a revolution of very fast turnover, even in modern times like today, because the greater the science, the more technological development that we are experiencing today. The creation of technological advances has allowed an environment filled with digital technology one of which is related to a network that puts all digital users without finding it difficult to access anything, therefore surrounded by various sources and good quality services of electronics. In addition to accepting the good things from technological developments to make it easier in any way, we also have to accept the positive and negative consequences[1].

The government of the Tanah Abang District Office, Penukal Abab Lematang Ilir Regency, South Sumatra Province is a government agency tasked with carrying out government authority in carrying out its

duties, this sub-district office is involved in a lot of correspondence. One of them is the making of Birth Certificates, ID cards, and many others. This really involves technology that is very powerful to help the work process that is carried out, one of which is good network and electronic technology, uprage, and advanced to be used so that the process is maximized and on time[2].

In the era of rapidly developing information technology globalization, people are increasingly accustomed to technology that continues to innovate and is practical to do to facilitate various activities in daily life. Thus, this development is natural for many agencies, both government agencies and private agencies, to have participated in upgrading the supporting devices of this information technology. The development that has emerged and is very useful to make things easier with the current very rapid development is wireless network information technology or wireless and commonly also called wifi, because this wireless technology has reached a range of 50-100 meters, therefore many wireless or access points are needed. The development of internet technology today means that the need for internet access is very high, almost all information technology activities based on the internet network without using cables that can be accessed by all electronic devices, one of which is the wireless network[3],[4].

Wireless network is a technology in the form of a computer network by using wave media as a path to cross data and also this network allows devices such as computers, smartphones, and tablets to share data and resources easily. One of the institutions that uses this wireless network technology is the Tanah Abang sub-district office[5].

The Tanah Abang District Office is one of the agencies engaged in the government sector. The District Office also follows the times, namely participating in using the internet network. The Sub-district Office uses an ISP (Internet Service Provider) from PT. Infotama Indonesia for internet services and bandwidth of 50 Mbps. The Sub-district Office provides a host network as a means for staff and employees who use the internet network. Therefore, measurements are needed to find out how good the quality of service or Quality Of Service (QOS) has been provided[6].

The problem that occurs in the field at this time is that wireless network users still often experience slow internet connections because the bandwidth factor is not limited and is not known for the number of active users for large and small services, therefore because there are too many wifi devices operating in one area, therefore if the network usage is very slow, the signal when downloading files and downloading large files. So in this study, the aim of this study is to examine how the Hierarchical Token Bucket has been given[7].

In the research that will be carried out, you will find out the Qualty Of Service (QOS) and the parameters used by troughput, delay, jitter, and packetloss. In this study, to determine the network quality of each connection and monitor the running network, the author uses the Wireshack application[8].

2. Research Methods

This research is in the form of quantitative research with an approach used to analyze the quality of wireless networks using the Hierarchical Token Bicket method with Quality of Service (QoS) at the Tanah Abang Sub-district Office, PALI Regency. This method is used to optimize network performance by prioritizing data traffic, managing bandwidth, and reducing latency and packet loss. Using QoS allows the allocation of network resources according to needs, thereby improving the efficiency and stability of the wireless network[9].

2.1 Literature Studies

This method is carried out with references that match the title to add a review of the literature and supporters in analyzing the quality of the Wireless network with the HTB (Hierarchical Token Bucket) method at the Sub-district Office from journals and materials from browsing from the internet[10].

2.2 Network Observation

In the second stage, direct observation was carried out to the location to review the wireless network infrastructure at the Tanah Abang Sub-district Office. This observation was carried out by analyzing the application in network management, especially in the arrangement of service classes applied to wireless networks at the sub-district office. The results of the study show that there are differences in service quality based on the classes of bandwidth that have been implemented. Some services have a higher priority than others, which affects the speed and stability of the connection perceived by users. In addition, through a discussion with one of the sub-district office staff, it was known that there were still complaints related to slow connections in some parts of the network. This shows that even though QoS has been implemented, there is still a need to optimize the distribution of bandwidth so that network services are more evenly distributed and in accordance with the needs of each user[11].

2.3 Research Time and Place

The implementation of the final pre-project project research was carried out for 2 days on December 3-5, 2024. The location of the research is the Sub-district Office, Tanah Abang District, PALI Regency, South Sumatra Province.

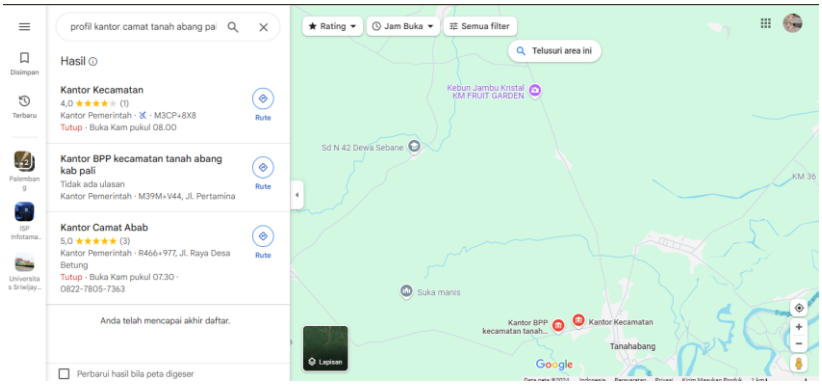

Figure 1. Research Place

3. Results and Discussion

In this study, the results of network quality testing at the Tanah Abang Sub-district Office, PALI Regency will be discussed. The test was conducted to analyze the quality and performance of the network applying *the Hierarchical Token Bucket* (HTB) method. The testing process uses *Wireshark software,* which analyzes network traffic, detects outages, and evaluates network performance in depth[12].

3.1 Test Results

The test was done by playing the video on YouTube for a few minutes. Wireless network data is then collected using the Wireshark app.

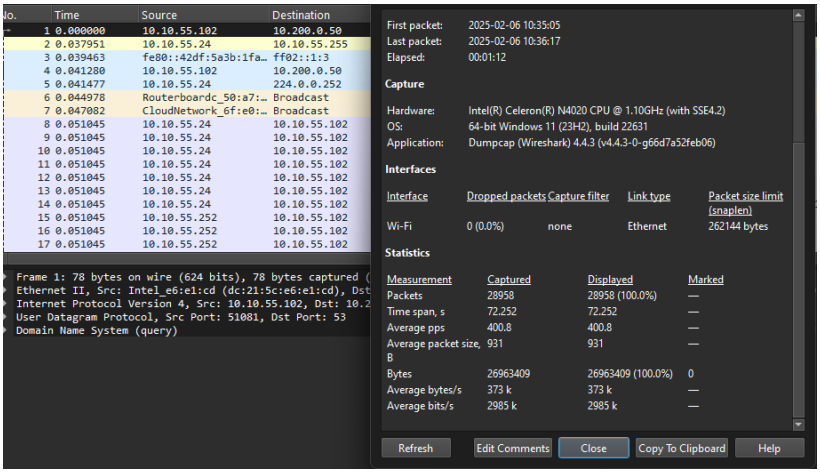

Figure 2. Morning Data Capture

The image above illustrates the results of wireless network traffic data collection conducted at the Tanah Abang Sub-district Office during morning working hours using the Wireshark application while performing YouTube video streaming activities. This measurement scenario was chosen to represent real network usage conditions, as video streaming is one of the most bandwidth-intensive activities commonly performed by users. Through this activity, Wireshark was able to capture and display detailed information related to network performance, including the number of packets sent and received, total bytes transferred, packet rate, and protocol distribution.

The captured data provide an overview of how the wireless network handles high data traffic during peak usage periods. The number of packets and bytes transmitted indicates the network load and the capacity of the existing bandwidth to support multimedia services. In addition, packet transmission patterns observed during streaming activity can be used to identify potential issues such as packet loss, transmission delays, and

network congestion. These indicators are essential in evaluating the Quality of Service (QoS) of the network, particularly in terms of throughput, delay, jitter, and packet loss[13].

Furthermore, the analysis of morning network conditions is important because this period reflects the beginning of daily operational activities when many users simultaneously access the network. The results obtained from this measurement serve as a baseline for comparing network performance before and after the implementation of bandwidth management using the Hierarchical Token Bucket (HTB) method. Therefore, this data plays a crucial role in assessing the effectiveness of network optimization strategies applied in this study.

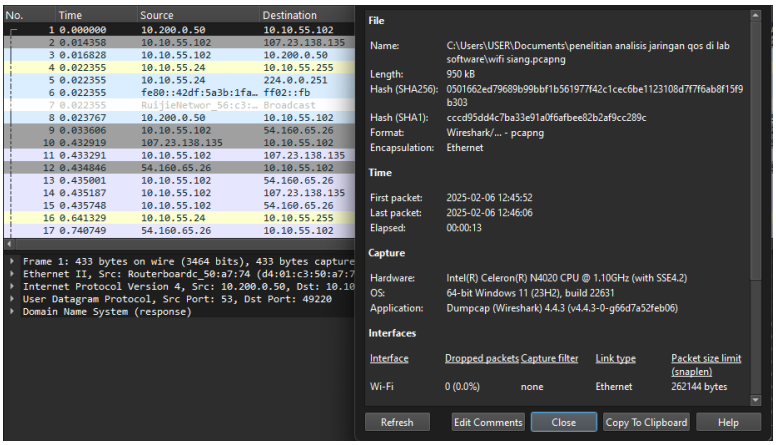

Figure 3. Daytime Data Capture

The image above shows the results of wireless network data collection at the Tanah Abang Sub-district Office during the day using *the wireshark* application while streaming *YouTube.* In this image, information is obtained in the form of the number of packets sent and received, *bytes, packets,* and others[14].

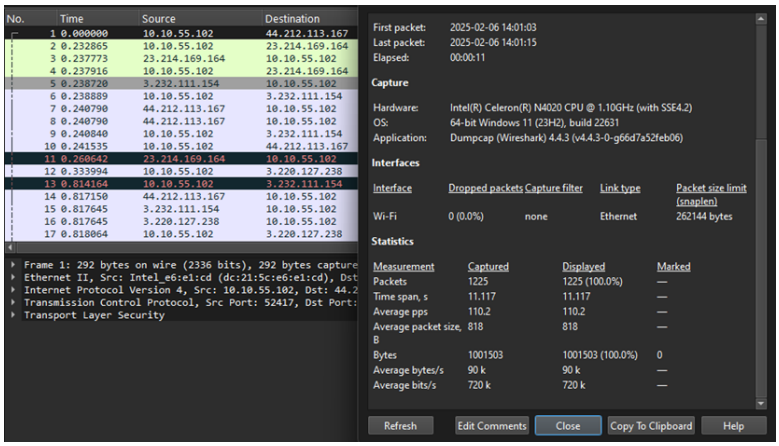

Figure 4. Afternoon Data Capture

The image above presents the results of wireless network data collection carried out at the Tanah Abang Sub-district Office during the afternoon working hours using the Wireshark application while conducting YouTube streaming activities. This measurement was intentionally performed in the afternoon to capture network performance under conditions that typically represent peak usage, as many employees are actively accessing the internet simultaneously for administrative tasks, data transfer, and multimedia services. Streaming YouTube was selected as the testing activity because it requires stable bandwidth and continuous data transmission, making it suitable for evaluating the reliability and performance of the wireless network.

From the captured data, various network parameters can be observed, including the number of packets sent and received, the total amount of data in bytes, packet rates, and other traffic statistics. These indicators reflect how effectively the wireless network manages data transmission during high-load conditions. A large number of packets and bytes suggests significant network utilization, while fluctuations

in packet flow may indicate congestion, delay, or instability. Such conditions can directly affect user experience, especially for services that require real-time data delivery.

Furthermore, Figures 5 to Figure 7 illustrate the results of wireless network performance measurements processed using the Quality of Service (QoS) calculation method, with Notepad software utilized as a supporting tool for recording and organizing the captured data [15]. The QoS analysis focuses on key parameters such as throughput, delay, jitter, and packet loss, which are essential for assessing overall network quality. By comparing the afternoon measurement results with those obtained during other time periods, this study can identify performance variations and potential bottlenecks in the wireless network. The findings from these measurements provide valuable input for evaluating the effectiveness of bandwidth management strategies and serve as a basis for improving network performance and service reliability at the Tanah Abang Sub-district Office.

Figure 5. Morning Data Measurement

This image shows the results of QoS services on morning data, namely *troughput parameters, packet loss parameters,* delay *parameters*, network jitter *parameters* that were tested to have good *throughput*, no *packet loss*, and low *jitter*, which indicates that the connection is quite stable[16].

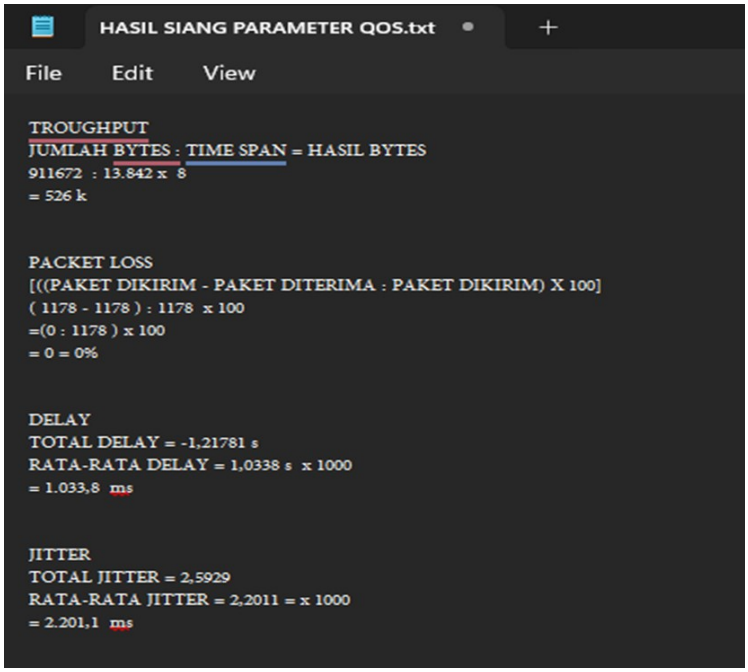

Figure 6. Daytime Data Measurement

This image shows the results of QoS services on Noon data, namely *troughput parameters, packet loss parameters,* delay *parameters*, network jitter *parameters* that are tested to have good *throughput*, no *packet loss*, and low *jitter*, which indicates that the connection is quite stable[17].

Figure 7 Afternoon Data Measurement

This image shows the results of QoS services on Afternoon data, namely troughput parameters, packet loss parameters, delay parameters, network jitter parameters that are tested to have good throughput, no packet loss, and low jitter, which indicates that the connection is quite stable.

1. Throughput Parameter Measurement Results

Table 4.1 Throughput Measurement Results

Yes	Time	Average Throughput	Index	Category
1	Morning	2985 k	4	Very Good
2	Noon	526 k	4	Very Good
3	Afternoon	720 k	4	Very Good

Based on the table above, *throughput* is measured over three time periods: morning, noon, and evening. The measurement results show that *the highest throughput* occurs in the morning (2985k), while the lowest occurs during the day (526k). Despite the difference in values, the network performance at all three times remained in the **"Excellent" category.**

2. Measurement Results of *Packet Loss Parameters*
3.

Table 1. Packet Loss Measurement Results

Yes	Time	Average Packet Loss	Index	Category
1	Morning	0 %	4	Very Good
2	Noon	0 %	4	Very Good
3	Afternoon	0 %	4	Very Good

Based on the table above, *Packet Loss* is measured over three time periods: morning, noon, and evening. The measurement results are in accordance with *the TIPHON version* as standardized, Packet Loss Category with a percentage of 0% for measurement results in three time periods morning, noon, and evening with the category "**Excellent**"

4. Delay Parameter Measurement Results

Table 2. Delay Measurement Results

Yes	Time	Average Delay	Index	Category
1	Morning	2,4	4	Very Good
2	Noon	1,0	4	Very Good
3	Afternoon	1,5	4	Very Good

Based on the table above, *Delay* is measured over three time periods: morning, noon, and evening. The results of *the Delay* measurement show an excellent value according to the *TIPHON* version which states that a maximum below 50 ms is still in the acceptable category. *Delay* is affected by distance, physical media, congestion or also the long process of data transfer and it can be seen in the table above that *the highest delay* value is in the morning[18].

5. Jitter *Parameter Measurement Results*

Table 3 Jitter Measurement Results

Yes	Time	Average Jitter	Index	Category
1	Morning	1,0	4	Very Good
2	Noon	1,2	4	Very Good
3	Afternoon	3,1	4	Very Good

Based on the table above, *Jitter* is measured over three time periods: morning, noon, and afternoon. The results of *Jitter* measurements with three times showed excellent category results. Although the *increase in Jitter* in the afternoon is greatly increased from the morning time. These three times are still in the acceptable category[19].

6. Quality of Service (QoS) Value Recapitulation

Table 4. QoS Parameter Recapitulation

Yes	Qos Parameters	Morning	Noon	Afternoon
1	Troughput	2985 k	526 k	720 k
2	Delay	2,4	1,0	1,5
3	Jitter	1,0	1,2	3,1
4	Packet Loss	0 %	0 %	0 %

The table above results from the network's quality of service (QoS) at three different time periods morning, noon, and evening. The parameters measured include *throughput, delay, jitter, and packet loss*. From the data displayed, it can be seen that there is a variation in network performance at all times, with significant changes, especially in *throughput and jitter. Delays* also fluctuate, although not too drastic, while *packet loss* remains stable at all times. This analysis shows that network performance tends to change throughout the day, which can be affected by user traffic factors or network conditions when

4. Conclusion

The results of the study using *the Hierarchical Token Bucket* (HTB) method showed that this method succeeded in dividing the total bandwidth of 50 Mbps into three different classes of services. The first class is intended for video conferencing, which has the highest priority, with a minimum bandwidth allocation of 75 ms and a maximum of 150 ms. The second class for browsing, with medium priority, has a minimum bandwidth allocation of 50 ms and a maximum of 75 ms. The third class, which is file downloads, has the lowest priority with a minimum bandwidth allocation of 25 ms and a maximum of 50 ms.

In terms of network performance by service class, the first class (video conferencing) shows *a throughput* of 4550 k, a delay of 3.45 ms, a packet loss of 1%, and a jitter of 0.25 ms. The second class (browsing) has a throughput of 2361 k, a delay of 5.32 ms, *a packet loss* of 2%, and a jitter of 2.36 ms. The third class (file downloads) shows a throughput of 1225 k, a delay of 7.55 ms, *a packet loss* of 2%. and *jitter* of 5.50 ms. This shows that HTB is effective in managing and regulating bandwidth based on service priority.

Meanwhile, the results of the study using *the Quality of Service* (QoS) method showed that the measured parameters, such as *throughput, packet loss, delay, and jitter*, gave consistently good results. For throughput, measurements in the morning reached 2985 k, 526 k in the afternoon, and 720 k in the afternoon, all in the "Very Good" category. No *packet loss* was detected at all times of measurement, and *the delay* also

showed excellent values, with morning measurements of 2.4 ms, afternoon 1.0 ms, and afternoon measurements of 1.5 ms. *Jitter* was also in a good category, with morning measurements of 1.0 ms, afternoon 1.2 ms, and afternoon 3.1 ms. Overall, the HTB method showed good ability to manage and regulate bandwidth based on service priority, with network performance for excellent video conferencing services. On the other hand, the QoS method provides a comprehensive picture of network quality based on a variety of parameters, with consistent results across all measurements. Both show positive results, but HTB is more effective in situations with many types of services that require different bandwidth settings, while QoS provides a more comprehensive evaluation of overall network performance.

4.1 Suggestion

From the results of the research, the author provides suggestions for network management using *the Hierarchical Token Bucket* (HTB) and *Quality of Service* (QoS) methods as follows:

First, it is recommended to implement the HTB method on a network that has different types of services with different bandwidth needs. With clear priority settings, HTB can help optimize bandwidth usage and improve the user experience, especially in situations where services are sensitive to *delays*, such as video conferencing.

Second, it is important to conduct regular QoS evaluations. Measurements of parameters such as *throughput, delay, jitter, and packet loss* must be performed regularly to ensure that the network remains up to the expected quality standards. It will also help in identifying and addressing issues that may arise over time.

Finally, it is advisable to keep an eye on the development of network technologies and new methods that can be applied. By keeping up with the latest trends, organizations can ensure that they use best practices in network management and can adapt to changing user needs.

Reference

[1] Febima, M. (2025). Sentiment Analysis of MSME Rice Application with Algorithm Performance Improvement Knn. Journal of Digit Vol. 15, No.2, 70-82.

[2] Ningsih, S. A. (2023). Wireless LAN network performance analysis using Qos and RMA methods. Audiobooks: Journal of Information and Computer Technology, Vol. 1, No. 1, Https://Doi.Org/10.33772/Anoatik.V1i1.5.

[3] Syafrudin, T. (2025). Analysis of the performance of Support Vector Machine and Naïve Bayes Classifier in the classification of sentiment and emotion in student feedback on lecturer performance. Journal of Digit Vol. 15, No.2, 34-45.

[4] Zulfahmi, et al. (2023). Comparison of Support Vector Machine (SVM) and Decision Tree Algorithms for Detection of Student Depression Levels. J. Nas. Technology. Then Sist. Inf., Vol. 10, No. 1, P. 52, 2023.

[5] Akbar, et al. (2019). Challenges and Solutions in the Development of Educational Technology in Indonesia. Proceedings of the National Seminar on Education of the Postgraduate Program of the University of Pgri Palembang, Vol. 2, No. 1, 18-25.

[6] Bangun, et al. (2022). Computer Network.

[7] Bintang, R. A., & et al. (2025). Analysis of payment systems and queues on the Codashop website. Just It : Journal of Information Systems, Information Technology and Computers Vol. 15, No. 3, 417–423.

[8] D. E. Cahyani, & I. Patasik. (2021). Performance Comparison Of TF-IDF And Word2vec Models For Emotion Text Classification. Bull. Electr. Eng. Informatics, Vol. 10, No. 5, 2780-2788.

[9] Darlianto, et al. (2016). Incoming Mail Recording Information System. Journal of Information Systems Engineering and Management, Vol. 2, No. 1, 37-43.

[10] Hapsari, et al. (2020). Journal of Informatics Media Budidarma Implementation of the One Time Password Method in the Online Ordering System. Journal of Informatics Media Budidarma, 930–939.

[11] Ichwan, M., & et al. (2022). Analysis of Hierarchical Token Bucket (Htb) Bandwidth Management with Mikrotik on the State Vocational School Network 22. Pinter J. Educator. Tech. Inform. Dan Komput., Vol. 3, No. 2.

[12] Kurniawan, & et al. (2020). Design of a food and beverage ordering application system at Cafetaria No Caffe in Tanjung Balai Karimun using PHP and MySQL programming languages. Journal of Mats, 1(2), 192–206.

[13] M. Badrul , & Akmaludin. (2019). Implementation of Quality Of Services (Qos) for Bandwidth Management Optimization. Prosisko, Vol. 6, No. 1, March 2019, Vol. 6, No. 1, 1-9.
[14] M. Purwahid, et al. (2019). Analysis of Quality of Service (Qos) of Internet Network to Support the Strategic Plan of Computer Network Infrastructure at SMK N I Sukadana. Jtksi, Vol. 2, No. 3, 100–109.
[15] N. C. Ramadani, & et al. (2024). Comparison of Support Vector Machine, Decision Tree, and Logistic Regression Algorithms in Netflix App Review Sentiment Analysis. J. Nas. Technology. Then Sist. Inf., Vol. 10, No. 2, 110–117.
[16] N. D. Firdaus, & R. R. Suryono. (2025). Comparison of Naive Bayes and Svm Algorithms in Ai User Sentiment Analysis on Platform X," Vol. 6, No. 4. 2624-2634.
[17] Panjaitan, et al. (2021). Development of Information Security Management System Implementation Based Using Control Annex: A Case Study of Data Center Pt. Xyz. E-Proceedings Of Engineering : Vol.8, No.2, .
[18] Riska, et al. (2017). Analysis and implementation of wireless extension points with SSID (Service Set Identifier). Journal of Infotama Media, Vol. 13, No. 1, 44-54.
[19] Rismawati, N, & Mulya, M. F. (2018). Analysis of Quality of Service Method Selection with Traffic Policing and Traffic Shaping as a Bandwidth Comparison on Cisco Router Internet Service Provider.Ultima Infosys: Journal. Journal of Information Systems Science, 9(1), 37-44., 37-44.
[20] Science, Faculty, and Technology. "Instant Messaging Applications Using Blowfish Encryption." Repository.Uinjkt.Ac.Id, 2014, Https://Repository.Uinjkt.Ac.Id/Dspace/Handle/123456789/56433. (N.D.).
[21] Sari, W. I. (2025). Risk Assessment of Information Security Control Based on ISO/IEC27001:2013 using the Failuremodeandeffects Analysis (Fmea) method of Studikasus: Brinesia Team Pt.Bri Asuransi Indonesia. Just It: Journal of Information Systems, Information Technology and Computers, 433–441.
[22] Sugiyono. (2017). Qualitative, Quantitative and R&D Research Methods. Bandung: Alvabeta.
[23] Superior, & One. . (2025). Analysis of Qos (Quality of Service) Parameters on the Internet Network at the Library of Esa Unggul University Tangerang. 97-103.
[24] Wadly, & et al. (2023). Vulnerability Mitigation Strategy to Security Threats in Wireless Networks.". National Journal of Computer Technology, Vol. 3, No. 2, 59-67.
[25] Walinono, et al. (2018). Analysis of the Availability of Hsdpa Technology Network Against 4G Internet Service Provider Variants. " Snitt-Balikpapan State Polytechnic, 4-9.
[26] Yusuf, M. (2025). Design and build a mobile nail health analysis app using generative AI with automated workflows. Just It : Journal of Information Systems, Information Technology and Computers Vol. 15, No. 3, 455–462.