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Application of the Walktest Method for Optimizing Access Point Coverage in the Main Building of PT PLN (Persero) UIP SUMBAGSEL

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Abstract

This study addresses Wi-Fi network issues in the Main Building of PT PLN (Persero) UIP SUMBAGSEL, which frequently experiences interference, weak signal strength, and blind spots at several points on the third floor. The proposed solution involves applying the walktest method, using the G-Net WiFi tool for data collection, and optimizing access point placement. The study aims to identify areas with weak signal coverage and determine optimal access point locations to improve Wi-Fi network quality. The method includes measuring signal strength at various locations inside the building by walking continuously along specified routes. The results demonstrate that the walktest method is effective for identifying problematic areas and supporting better access point placement. The optimized configuration eliminates blind spots and produces a more stable and evenly distributed Wi-Fi network throughout the third floor.

Keywords

Access Point; G-Net WiFi; Network Optimization; Walktest; Wi-Fi

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Introduction

The rapid growth in the number of internet users globally and nationally has created an increasing demand for reliable, flexible, and high-performance internet connectivity. Internet access may be provided through wired or wireless technologies, with Wireless Fidelity (Wi-Fi) emerging as one of the most widely adopted solutions for modern communication needs. As a core component of Wireless Local Area Network (WLAN) technology, Wi-Fi enables users to connect to digital services through access points that generate wireless hotspots, providing seamless access to online resources (Erlinasari et al., 2024). Its mobility, ease of implementation, and cost efficiency make Wi-Fi a preferred choice across various organizational environments.

In large corporate and governmental institutions, Wi-Fi infrastructure plays an increasingly strategic role in supporting complex operational activities. The Main Building of PT PLN (Persero) Unit Induk Pembangunan (UIP) SUMBAGSEL serves as a key operational hub responsible for overseeing the development of electrical infrastructure projects across Southern Sumatra. To keep administrative workflows efficient, Wi-Fi connectivity is essential for facilitating internal communication, document access, data transactions, and interdepartmental coordination. As digital transformation initiatives expand across PT PLN (Persero), the reliability and performance of its wireless network become critical enablers of organizational productivity.

Despite the presence of multiple access points installed throughout the Main Building, ensuring consistent Wi-Fi coverage remains a persistent challenge. Several issues frequently arise, including signal degradation, limited coverage areas, unstable connection speeds, and interference from electronic devices operating at similar frequencies. These disruptions not only diminish the quality of user experience but also negatively impact essential business processes that rely on continuous connectivity. According to Lestari (2019), interference and overlapping channels are among the most common causes of reduced Wi-Fi performance in dense or complex building environments.

Weak signal areas and fluctuating network performance necessitate a systematic method of evaluating wireless conditions within the building. One effective approach is the walktest method, a practical technique used to measure real-time signal strength and Wi-Fi quality by conducting structured movement along predefined indoor routes. The walktest allows for continuous and dynamic monitoring of wireless parameters, offering insights that static measurements cannot capture. This method is particularly valuable in multi-room or multi-floor environments, where signal behavior may vary significantly based on structural layout and user density.

To carry out this diagnostic process, this study employs the G-Net WiFi tool, which supports comprehensive visualization and measurement of Wi-Fi parameters such as Received Signal Strength Indicator (RSSI), link speed, interference levels, and channel occupancy. As highlighted by Padlillah & Suryadi (2019), G-Net WiFi provides detailed detection of weak zones, evaluates the effectiveness of existing access point placement, and identifies movement paths where users are likely to experience connectivity interruptions. By mapping real-world usage patterns and environmental conditions, administrators can make data-driven decisions for optimizing the network.

Through systematic walktest analysis on the third floor of the Main Building of PT PLN (Persero) UIP SUMBAGSEL, this study aims to identify coverage gaps, diagnose performance issues, and propose strategic modifications to access point placement and configuration. The expected outcome is a more stable, faster, evenly distributed, and interference-resistant Wi-Fi network that aligns with the operational needs of the organization. Optimizing wireless infrastructure in this manner ensures that PLN's digital workflows, communication systems, and daily operational activities can run smoothly without connectivity disruptions.

Methodology

Research Method

This study applies the Action Research methodology, enabling simultaneous description, interpretation, and analysis of a social or organizational condition while implementing interventions for improvement (Wiranda & Dasmen, 2021). The researcher participates directly in each stage of problem identification, solution implementation, and outcome evaluation.

The Action Research stages implemented in this study include:

Diagnosing

The initial stage identifies key issues that necessitate network optimization. The researcher conducted a direct survey on the third floor of the Main Building of PT PLN (Persero) UIP SUMBAGSEL, where Wi-Fi signals were weak or unstable in multiple areas. Several points lacked coverage entirely due to non-strategic access point placement, resulting in slow connectivity and operational inefficiencies.

Action Planning

This stage involves developing a strategy for applying the walktest method to optimize Wi-Fi network performance. Preparation included:

- Selecting appropriate tools (G-Net WiFi and Google Earth Pro)
- Learning tool functionalities
- Collecting accurate geographic coordinates
- Determining optimal timing for walktests based on daily Wi-Fi usage patterns

Action Taking

Walktest measurements were conducted throughout the third floor, especially within major corridors. Researchers mapped routes representing critical traffic areas and zones with previously detected weak signals. These routes included Rute 1 (red), Rute 2 (blue), and Rute 3 (green).

Evaluating

The evaluation stage involved systematically recording and analyzing collected data to ensure accurate interpretation. A structured evaluation framework enabled the identification of key performance patterns and informed evidence-based recommendations for network optimization.

Learning

The final stage consisted of reflecting on the overall process and the effectiveness of the optimization measures implemented. This stage emphasized enhancing wireless system capabilities and assessing improvements achieved through access point configuration adjustments.

Results

Wi-Fi optimization using G-Net WiFi and Google Earth Pro resulted in strategic placement of two additional access points on the third floor to improve network coverage. The results for each Action Research stage are presented below.

Diagnosing (Initial Walktest Measurement)

Walktest measurements revealed weak signal strength, several blind spots, and slow internet performance due to suboptimal access point placement. The following routes were measured:

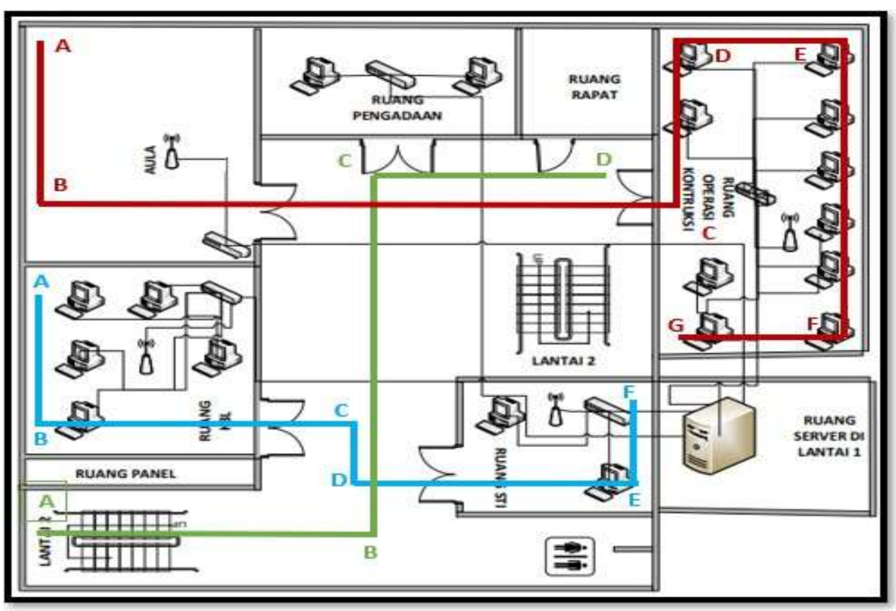

Figure 2 Initial Walktest Results Route

Routes were selected based on signal drop areas, blind spots, and frequent user movement patterns.

Table 1. Initial Measurement Results – Route 1

Testing Route	RSSI (dBm)	Signal Quality
A–B	–61	Very Good
B–C	–73	Moderate
C–D	–62	Good
D–E	–66	Good
E–F	–60	Very Good
F–G	–66	Good

Route 1 showed variability in signal strength, with moderate values appearing between points B–C and several good or very good results elsewhere.

Table 2. Initial Measurement Results – Route 2

Testing Route	RSSI (dBm)	Signal Quality
A–B	–60	Very Good
B–C	–70	Good
C–D	–75	Moderate
D–E	–65	Good
E–F	–62	Good

Weak signals were detected between C–D, indicating the need for improved access point coverage.

Table 3. Initial Measurement Results – Route 3

Testing Route	RSSI (dBm)	Signal Quality
A–B	–77	Moderate
B–C	–75	Moderate
C–D	–69	Good

Route 3 revealed consistent moderate signal levels until point C–D.

Action Planning

Actions planned included: a. Prioritizing improvement areas b. Designing access point addition plans c. Ensuring post-installation performance enhancement through further walktests

Action Taking

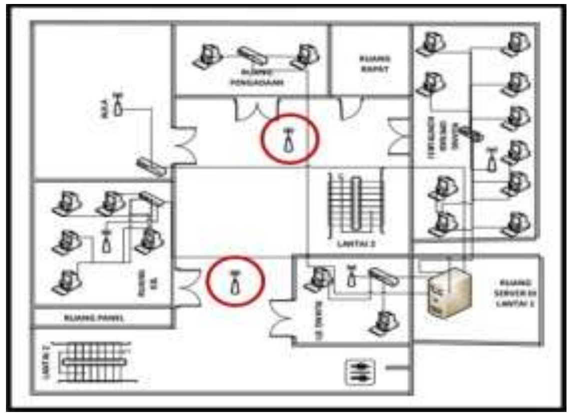

Figure 3. Planned Access Point Placement Map

Two new access point locations were selected based on signal distribution patterns and expected coverage improvements.

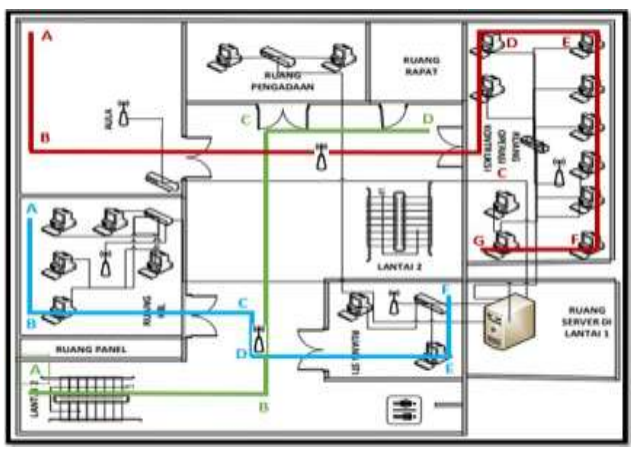

Figure 4. Post-Optimization Walktest Routes

Post-installation measurements followed the same three routes as the initial walktest.

Post-Optimization Results

Table 4. Optimized Measurement Results – Route 1

Testing Route	RSSI (dBm)	Signal Quality
A–B	–60	Very Good

Testing Route	RSSI (dBm)	Signal Quality
B–C	–56	Very Good
C–D	–60	Very Good
D–E	–60	Very Good
E–F	–60	Very Good
F–G	–66	Good

Table 5. Optimized Measurement Results – Route 2

Testing Route	RSSI (dBm)	Signal Quality
A–B	–60	Very Good
B–C	–54	Very Good
C–D	–54	Very Good
D–E	–65	Good
E–F	–62	Good

Table 6. Optimized Measurement Results – Route 3

Testing Route	RSSI (dBm)	Signal Quality
A–B	–55	Very Good
B–C	–61	Very Good
C–D	–55	Very Good

Discussion

Evaluation Evaluation tables compare pre- and post-optimization results:

Before	After
–61 dBm → –60 dBm	Very Good
–73 dBm → –56 dBm	Very Good
–62 dBm → –60 dBm	Very Good
–66 dBm → –60 dBm	Very Good
–60 dBm → –60 dBm	Very Good
–66 dBm → –66 dBm	Good

Table 8. Route 2 Evaluation Significant improvement occurred at B–C and C–D, each rising from –70/–75 dBm to –54 dBm.

Table 9. Route 3 Evaluation All points improved from moderate or good to very good signal levels.

Overall, optimization successfully strengthened coverage, eliminated blind spots, and improved signal stability across all routes.

Conclusion

The addition of strategically placed access points significantly improved signal quality across all test routes. For example, Route 2's B–C improved from –70 dBm to –54 dBm, and Route 3's A–B improved from –77 dBm to –55 dBm.The walktest method proved effective for identifying weak coverage areas and verifying improvement outcomes. Post-optimization results demonstrated enhanced signal strength and Wi-Fi stability throughout the third floor.Enhanced access point placement increased overall network performance, ensuring better coverage and supporting operational activities within the Main Building of PT PLN (Persero) UIP SUMBAGSEL.

Disclosure Statement

The authors declare no conflicts of interest regarding this study.

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Biographical Notes

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