

## ABSTRAK

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Optimalisasi Penambahan *Switching* Pada Penyulang Rawan Gangguan Untuk Peningkatan Keandalan Jaringan Distribusi Di PLN (Persero) UP2D UID Sumatera Selatan, Jambi, Dan Bengkulu

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Keandalan sistem distribusi tenaga listrik merupakan salah satu indikator penting dalam menjaga kontinuitas pelayanan kepada pelanggan. Penyulang Lenggang memiliki konfigurasi jaringan radial yang pada kondisi tertentu berpotensi menyebabkan luas area pemadaman relatif besar ketika terjadi gangguan. Penelitian ini bertujuan untuk menganalisis kondisi keandalan sebelum penambahan *Switching*, mengidentifikasi mekanisme manuver jaringan setelah penambahan *Switching*, serta mengevaluasi perbandingan tingkat keandalan berdasarkan indeks SAIDI dan SAIFI. Metode penelitian dilakukan melalui pengumpulan data rekapitulasi SAIDI dan SAIFI periode Januari–Juli 2024 sebagai kondisi sebelum penambahan *Switching* dan periode Agustus 2024–April 2025 sebagai kondisi sesudah penambahan *Switching*. Selanjutnya dilakukan perhitungan rata-rata indeks keandalan serta simulasi dua skenario gangguan menggunakan konfigurasi jaringan sebelum dan sesudah penambahan *Switching*. Hasil penelitian menunjukkan bahwa rata-rata SAIDI sebelum penambahan *Switching* sebesar 0,20 jam/pelanggan dan SAIFI sebesar 0,13 kali/pelanggan. Setelah penambahan *Switching*, rata-rata SAIDI tercatat sebesar 0,46 jam/pelanggan dan SAIFI sebesar 0,18 kali/pelanggan. Nilai rata-rata periode sesudah dipengaruhi oleh kejadian gangguan dengan durasi relatif tinggi pada bulan tertentu. Berdasarkan simulasi gangguan, penambahan *Switching* meningkatkan fleksibilitas manuver jaringan dan kemampuan lokalisasi gangguan sehingga area terdampak dapat dibatasi pada segmen tertentu.

Kata Kunci : Keandalan Jaringan Distribusi, *Switching*, SAIDI, SAIFI, Penyulang Lenggang.

## ABSTRACT

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*Optimization of Switching Installation on a Disturbance-Prone Feeder to Improve Distribution Network Reliability at PT PLN (Persero) UP2D UID South Sumatra, Jambi, and Bengkulu*

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*The reliability of an electric power distribution system is one of the key indicators in maintaining service continuity for customers. Penyulang Lenggang operates under a radial network configuration which, under certain conditions, may result in a relatively wide outage area when disturbances occur. This study aims to analyze the reliability condition prior to the installation of additional Switching devices, identify the network maneuver mechanisms after the installation, and evaluate the comparison of reliability levels based on SAIDI and SAIFI indices. The research method was conducted through the analysis of SAIDI and SAIFI recap data for the period of January–July 2024 as the condition before Switching installation and August 2024–April 2025 as the condition after Switching installation. The analysis included the calculation of average reliability indices and the simulation of two disturbance scenarios using network configurations before and after the addition of Switching devices. The results show that the average SAIDI before the addition of Switching was 0.20 hours/customer and the average SAIFI was 0.13 interruptions/customer. After the installation of Switching devices, the average SAIDI increased to 0.46 hours/customer and SAIFI to 0.18 interruptions/customer. The higher average value in the latter period was influenced by a disturbance event with relatively high duration in a particular month. Based on the disturbance simulation, the addition of Switching devices improved network maneuver flexibility and enhanced disturbance localization capability, allowing the outage area to be limited to specific segments.*

*Keywords: Distribution Network Reliability, Switching, SAIDI, SAIFI, Lenggang Feeder.*