ABSTRAK

Kontinuitas pasokan listrik menjadi kebutuhan utama pada kawasan strategis seperti Stadion Utama Gelora Bung Karno (SUGBK), yang melayani berbagai kegiatan berskala nasional dan internasional. Penelitian ini bertujuan merancang dan mengevaluasi keandalan jaringan distribusi 20 kV berkonfigurasi closed-loop berorientasi Zero Down Time (ZDT) agar suplai tetap terjaga saat terjadi gangguan.

Metode penelitian dilakukan melalui simulasi aliran daya, simulasi gangguan, evaluasi koordinasi proteksi, serta analisis keandalan menggunakan indikator SAIDI, SAIFI, dan ENS. Sistem ZDT dirancang dengan konfigurasi dual-feeder closed-loop, menggunakan differential relay sebagai proteksi utama serta OCR dan GFR sebagai proteksi cadangan.

Hasil penelitian menunjukkan bahwa konfigurasi ZDT mampu meningkatkan kontinuitas pelayanan dengan mengisolasi gangguan secara selektif pada zona terganggu, sementara bagian jaringan yang sehat tetap beroperasi melalui jalur suplai alternatif. Dengan demikian, penerapan ZDT berpotensi menurunkan durasi padam, frekuensi padam, dan energi tidak tersalurkan pada kawasan prioritas SUGBK.

Kata kunci: Zero Down Time, closed-loop, keandalan distribusi, Stadion Utama Gelora Bung Karno, ENS.

ABSTRACT

Continuity of electricity supply is a critical requirement for strategic areas such as Gelora Bung Karno Main Stadium (SUGBK), which hosts various national and international events. This study aims to design and evaluate the reliability of a 20 kV closed-loop distribution network oriented toward Zero Down Time (ZDT) to ensure supply continuity during system disturbances.

The research method includes power flow simulation, fault simulation, protection coordination evaluation, and reliability analysis using SAIDI, SAIFI, and ENS indicators. The ZDT system is designed using a dual-feeder closed-loop configuration, with a differential relay as the main protection and OCR and GFR as backup protection.

The results show that the ZDT configuration can improve service continuity by selectively isolating faults within the affected zone, while the healthy parts of the network remain energized through an alternative supply path. Therefore, the implementation of ZDT has the potential to reduce outage duration, outage frequency, and energy not supplied in the priority area of SUGBK.

Keywords: *Zero Down Time, closed-loop, distribution reliability, SUGBK, ENS.*