ABSTRAK

FEBRI WAHYU DWIANTORO. Rancangan Sistem Monitoring Tegangan dan Arus *Real-Time* Berbasis *IoT* ESP32 pada *Power supply 48vdc Multiplexer* GI 150kV Data Center.

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Penelitian ini dilatarbelakangi oleh adanya kasus dimana terjadi gangguan link komunikasi SCADA di GI 150kV Data Center pada saat proses persiapan pengoperasian *(Energize)*. Gangguan terdeteksi dari pusat kendali *SCADA Regional Control Center (RCC)* Jawa Barat, dengan kondisi semua peralatan di GI 150kV Data Center invalid sehingga tidak dapat dimonitor dan dikontrol dari pusat kendali *(Dispatcher)*. Hasil Investigasi menunjukkan bahwa gangguan tersebut terjadi akibat terputusnya *power supply 48VDC*. Terjadinya gangguan tersebut membuka risiko – risiko yang menimbulkan kekhawatiran pada keberlangsungan *Supply 48VDC* untuk perangkat *Multiplexer* mengingat perangkat tersebut fungsinya sangat vital sebagai media Telekomunikasi dan SCADA dari GI 150kV Data Center menuju pusat kendali. Tujuan dari rancangan sistem DC monitoring ini adalah untuk mengukur Tegangan dan Arus pada *power supply 48VDC* untuk *Multiplexer* GI 150kV Data Center dengan menggunakan Modul sensor Tegangan dan Sensor Arus ACS712, kemudian hasil pembacaan Tegangan dan Arus tersebut diintegrasikan melalui *Internet of Things (IoT)* dengan modul ESP32 sehingga hasil monitoring tersebut dapat termonitor secara *real-time* dan dapat diakses melalui perangkat *Smartphone* maupun laptop dari jarak jauh melalui aplikasi monitoring. Sistem tersebut juga menyediakan fungsi lainnya yaitu mendeteksi terjadinya anomali, misalnya *under* atau *over voltage,* serta kehilangan beban yang ditandai dengan arus nol(0). Peringatan tersebut disampaikan melalui visual pada layar LCD, alarm, serta pemberitahuan melalui aplikasi. Sistem monitoring tersebut memberikan solusi bagi pihak operasional Telekomunikasi dan SCADA untuk memonitor *power supply 48VDC* pada perangkat *Multiplexer* di GI 150kV Data Center untuk memastikan keandalan sistem serta meminimalkan potensi kegagalan Telekomunikasi dan *SCADA* pada fase operasional akibat gangguan *power supply.*

Kata kunci: Sensor Tegangan dan Arus, *Internet of Things (IoT)*, *Real-Time,* ESP32, Keandalan Sistem.

ABSTRACT

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Design Of Real-Time Voltage and Current Monitoring System With IoT ESP32 for the 48VDC Power Supply of the multiplexer at 150KV Data Center Substation

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ABSTRACT

This research is based on a case where a disruption occurred in the SCADA and communication link at the Data Center 150kV Substation during the preparation to Energize. The disruption was detected from the SCADA control center of the West Java Regional Control Center (RCC), with all equipment at the Data Center 150kV Substation showing invalid status, making it impossible to monitor and control from the Dispatcher. The investigation indicated that the disruption caused by the 48VDC power supply was interrupted . The occurrence of this disruption opens up risks that raise concerns about the continuity of the 48VDC supply for the Multiplexer device, considering its critical function as the telecommunications and SCADA medium from the substation to the Dispatcher. This DC monitoring system is designed to measure the voltage and current on the 48VDC power supply for the Multiplexer using a voltage sensor module and the ACS712 current sensor, then integrated the voltage and current readings through the Internet of Things (IoT) with the ESP32 module. This system enables real-time monitoring which can be accessed remotely via smartphones or laptops through a application. The system also provides additional functions, such as detecting anomalies like under or over - voltage, as well as load loss indicated by zero (0) current. These alerts are conveyed through visual displays on the LCD, alarms, and notifications through the application. The monitoring system offers a solution for the telecommunications and SCADA operations team to monitor the 48VDC power supply on the Multiplexer device at the Substation, ensuring system reliability and minimizing the potential for telecommunications and SCADA failures during the operational phase due to power supply disruptions.

Keywords: *Voltage and Current Sensor, Internet of Things (IoT), Real-Time, ESP32, System Reliability.*