

ABSTRAK

**RANCANG BANGUN *DASHBOARD MONITORING REAL-TIME*
BERBASIS PROTOKOL *MESSAGE QUEUING TELEMETRY TRANSPORT*
DAN *NODE-RED* PADA INFRASTRUKTUR *5G STANDALONE*
(2026 : XIV + 63 Halaman + 19 Gambar + 9 Tabel + 11 Lampiran)**

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Perkembangan jaringan 5G Standalone menuntut adanya sistem monitoring yang mampu bekerja secara real-time dengan konsumsi sumber daya yang efisien. Penelitian ini bertujuan merancang dan mengimplementasikan sistem monitoring lightweight berbasis Message Queuing Telemetry Transport dan Node-RED pada infrastruktur 5G Standalone berbasis Universal Software Radio Peripheral B210. Metode penelitian dilakukan melalui perancangan arsitektur publish/subscribe menggunakan Message Queuing Telemetry Transport sebagai media distribusi data telemetri dan Node-RED sebagai platform visualisasi dashboard monitoring. Data parameter jaringan diperoleh melalui lingkungan pengujian 5G Standalone menggunakan Open5GS dan srsRAN, kemudian dikirimkan secara real-time menuju dashboard monitoring. Hasil pengujian menunjukkan bahwa sistem mampu menampilkan parameter jaringan secara responsif dengan proses pengiriman data yang stabil dan penggunaan sumber daya komputasi yang relatif ringan. Selain itu, implementasi arsitektur lightweight telemetry mampu mendukung proses monitoring secara terpusat tanpa memberikan beban berlebih pada sistem utama. Berdasarkan hasil tersebut, sistem monitoring yang dirancang dapat menjadi solusi alternatif untuk mendukung pengawasan operasional jaringan 5G Standalone berbasis Software Defined Radio secara efisien dan real-time.

Kata Kunci: 5G Standalone, MQTT, Node-RED, Monitoring Waktu Nyata, USRP B210, Software Defined Radio.

ABSTRACT

Developing a Message Queuing Telemetry Transport and Node-RED Real-Time Monitoring Dashboard for 5G Standalone Infrastructure

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The rapid development of 5G Standalone networks requires a monitoring system capable of operating in real time while maintaining efficient computational resource utilization. This study aims to design and implement a lightweight monitoring system based on Message Queuing Telemetry Transport and Node-RED for a Universal Software Radio Peripheral B210-based 5G Standalone infrastructure. The proposed system applies a publish/subscribe communication architecture in which telemetry data are distributed through Message Queuing Telemetry Transport and visualized using a Node-RED dashboard interface. The research environment utilizes Open5GS and srsRAN to generate and monitor network parameters in real time. The results demonstrate that the developed monitoring system is capable of displaying telemetry information responsively with stable data transmission performance and low computational overhead. In addition, the lightweight telemetry architecture successfully supports centralized monitoring without significantly affecting the operational performance of the main system. Therefore, the proposed approach can be considered an effective alternative solution for supporting efficient and real-time operational monitoring in Software Defined Radio-based 5G Standalone environments.

Keywords: 5G Standalone, MQTT, Node-RED, Real-Time Monitoring, USRP B210, Software Defined Radio.