

## ABSTRACT

*In the rapidly growing digital era, fast and reliable internet access is a crucial need. Although Fifth Generation (5G) technology has been implemented in Indonesia by several telecommunications operators using Non-Standalone (NSA) networks, this research focuses on analyzing the comparison of simulation results using 2100 MHz frequencies with 20 MHz bandwidth and 2300 MHz with 30 MHz bandwidth, as well as the results of 5G network implementation at Telkomsel operator. The quantitative method is used to analyze the difference between the simulation results and the implementation of the 5G NR network in Mampang Prapatan sub-district, South Jakarta. This research focuses on signal quality and strength by considering frequency and bandwidth variations. Focused parameters include signal quality and strength, measured by indicators such as Received Signal Reference Power (RSRP), Signal-to-Interference-plus-Noise Ratio (SINR) and Data Rate. The results showed Telkomsel's dominance in the SS-RSRP range of -95 to -85 dBm (55%), outperforming 2100 MHz (37.49%) and 2300 MHz (28.8%). Telkomsel also excels in SS-SINR 0 to 10, with the largest contribution at frequencies 2300 MHz (17.6%) and 2100 MHz (26.5%), reaching 60%. In the 0 to 30,000 Kbps data rate range, Telkomsel shows a significant advantage (55%). However, in the 30,000 to 100,000 Kbps range, Telkomsel is inferior (25%) compared to 2100 MHz and 2300 MHz (61.4% and 60.94%). It should be noted that the implementation of 5G NR networks is still limited, creating differences in analysis results that are influenced by uneven deployment, infrastructure factors, device availability, and user readiness.*

*Keywords: 5G, Data Rate, SINR, Telkomsel, Atoll, Pandas*