

## **ABSTRACT**

*The development of the 5G network in Indonesia will become a widely used network, one of which is in Makassar City, so to support the performance of 5G NR technology, a reliable transmission medium using optical fiber is needed. Using fiber optic transmission media can support 5G NR network technology and its use has been implemented between gNodeBs as backhaul.*

*5G NR network design is carried out using only coverage planning data calculations to determine the number of gNodeBs needed for backhaul design. In this research, the backhaul link design uses STM-64 technology, each of which has a bitrate of 10 Gbps. By designing network links and calculating the power link budget, it can be simulated in Optisystem 7.0 so that we can determine whether the system is feasible or not by looking at the results of network performance testing based on the parameters BER (Bit Error Rate), Q-factor, and received power.*

*In this study, we analyze the comparison of data from the simulation design results that have been carried out using variations in transmitter power, namely 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 dBm with a transmission distance of 79,5 km. Based on the simulation results on the backhaul link using STM-64, good average results were obtained using transmitted power  $\geq 5$  dBm. By using transmitted power, we get an average Q-factor value of 6,99, BER  $2,02 \times 10^{-11}$  and received power -18,85 dBm with a transmitted power of 5 dBm and an average Q-factor value 9,84, BER  $6,44 \times 10^{-21}$  and received power -13,85 dBm with the largest transmitted power being 10 dBm. Meanwhile, the worst value was obtained when using a transmitted power  $< 5$  dBm, obtaining an average Q-factor value of 3,26, BER  $9,8 \times 10^{-4}$  and received power -23,83 dBm with a transmitted power of 0 dBm.*

**Keywords:** 5G NR, gNodeB, Backhaul, STM-64, Q-factor, BER (Bit Error Rate), and Received Power.