

ABSTRACT

The development of the Capital City of the Archipelago in Kalimantan is based on the vision of establishing a technology-based sustainable city to encourage inclusive and equitable economic growth, with telecommunications networks being a major component in supporting this vision. As the new capital city of the country, the development of telecommunications networks in IKN requires careful calculation and feasibility analysis to assess whether the telecommunications network development project is financially profitable for the company, taking into account the projected population of IKN which is estimated to reach between 1.7 to 1.9 million people in 2045.

This research makes a fixed broadband network design solution that refers to the ITU-T G.984.2 standard for GPON, which is designed not only as infrastructure on the inner ring but also functions as a backhaul to distribute internet connectivity to mobile broadband services, which is simulated using Google Earth and Optisystem with evaluation parameters including LPB, SNR, Q-Factor, BER, and RTB. Meanwhile, the mobile broadband design refers to the 3GPP release 17 Standalone scheme and IMT-2020 standards at 3500 MHz frequency, which is simulated using Atoll software with SS-RSRP, SS-SINR, and downlink throughput parameters. The financial feasibility aspect is analyzed based on the Business Feasibility Study Book using NPV and IRR.

The results of the research analysis show that in fixed broadband services, a total of 6 inner rings have been designed and parameters obtained such as $LPB \geq -28$ dBm, $SNR \geq 22$ dB, $Q\text{-Factor} \geq 6$, $BER \leq 10^{-9}$, and $RTB < 70$ ps with NRZ line coding. In mobile broadband services, the SS-RSRP value is -39.69 dBm, SS-SINR is 17.16 dB, and the downlink throughput reaches 604.43 Mbps. In terms of financial feasibility, it shows an NPV value of Rp 68,717,893,627.00 and an IRR of 42%. Thus, the construction of fixed broadband and mobile broadband services in the KIPP-1A IKN area meets the feasibility criteria from both a technical and economic perspective.

Keywords: Capital City of Nusantara, Feasibility, fixed broadband, Mobile broadband, Telecommunication Network