

ABSTRACT

The development of telecommunications infrastructure in Indonesia is still uneven. This is due to difficulties in access, especially in rural areas, to acquire fiber optic connectivity. Alongside the COVID-19 pandemic that transformed aspects of education, work, and governance in rural areas to an online setting, the demand for internet in these regions has risen. In response, at the beginning of 2021, the Ministry of Communication and Information Technology (Kominfo) accelerated efforts to build telecommunications infrastructure in rural areas through the launch of the Digital Village program.

In this Final Project research, the design and implementation of a wireless point-to-point network using microwave radio technology were conducted in the Cidolog District, West Java Province. The system design encompassed location surveys to establish line of sight and Fresnel zone parameters, enabling the determination of radio and antenna specifications according to requirements. Furthermore, link budget calculations were performed to measure network feasibility. The outcomes of this design were simulated using web-based software called ISP Design Center. Implementation was carried out with reference to parameters derived from the system design and simulations.

Through the implementation results using the airFiber AF-5XHD radio and the airFiber AF-5G34-S45 antenna, operating at a frequency of 6131 MHz, a bandwidth of 100 MHz, and a transmission power (Tx Power) of 29 dBm, a total network capacity of 202.24 Mbps was successfully achieved, with throughput reaching 186.57 Mbps, and latency of 3.33 ms without any packet loss. The received signal strength indicator (RSSI) value at the BTS Sukamenak site was recorded at -76 dBm with a Carrier-to-Interference-plus-Noise Ratio (CINR) of 16 dB, while at the Cidolog District site, RSSI was -74 dBm with a CINR of 14 dB. This resulted in a 2x modulation rate using QPSK MIMO modulation. These results indicate the successful implementation and its usability by the Cidolog District community, particularly in the villages of Jelegog, Sukasari, and Janggala.

Keywords: *Wireless Point to Point Network, Antenna Directional, Microwave Radio Technology, Link Budget, Desa Digital.*