

ABSTRACT

Digital connectivity between Bali and Lombok heavily relies on submarine fiber optic infrastructure, which is vulnerable to physical disruptions. To enhance network reliability, this research aims to design and analyze the technical feasibility of a microwave radio backbone network as a backup *link* solution connecting the strategic points of Goa Lawa, Nusa Penida, and Mataram. The primary challenge in this design is the over-water path, which is susceptible to multipath fading. This study utilizes *Pathloss 5* software to perform simulations and a comparative analysis of three different frequency bands—2 GHz, 7-8 GHz, and 10-11 GHz—by applying the space diversity technique to mitigate signal attenuation. The research findings indicate that the 7-8 GHz frequency band is the most optimal solution. Simulations in this frequency band consistently yielded performance that meets carrier-grade standards, with an Annual Availability value above 99.995% and a very healthy Fade Margin (ranging from 36 dB to 49 dB) across all *links*. Conversely, the 10-11 GHz frequency band showed inadequate performance with a very high annual downtime rate, while the 2 GHz frequency band, despite being technically superior in simulations, could not be implemented due to spectrum regulations in Indonesia. Validation through manual calculations also demonstrated the high accuracy of the simulation results. It is concluded that the microwave radio network design in the 7-8 GHz frequency band is technically highly feasible and reliable for implementation as an effective backup *link* solution to ensure the continuity of communication between Bali and Lombok.

Keywords: *Microwave, backbone, internet, optik , Microwave, Backup Link, Pathloss 5, Availability, Fade Margin, Space Diversity, Bali-Lombok.*