

ABSTRACT

Labuan Bajo, as a strategic tourism destination in Indonesia, heavily relies on stable internet connectivity, which is currently served by a submarine fiber optic cable prone to disruptions. This dependency creates an urgent need for a reliable backup communication link to ensure service continuity and support economic growth. This research aims to design and analyze the technical feasibility of a microwave-based radio backup link to connect Labuan Bajo and Doronae. The design was carried out using Pathloss 5.0 software by evaluating three frequency band scenarios: 2 GHz, 10-11 GHz, and 7-8 GHz. The performance of each scenario was assessed based on key parameters such as Annual Availability, Thermal Fade Margin (TFM), and total downtime, with the implementation of the space diversity technique to mitigate multipath fading over the sea.

The simulation results showed that the 2 GHz frequency band, although technically reliable, could not be implemented due to regulatory constraints in Indonesia. The 10-11 GHz frequency band demonstrated inadequate performance due to high downtime. Conversely, the 7-8 GHz frequency band proved to be the most optimal solution, successfully achieving carrier-grade availability targets (99.999%) and complying with applicable regulations. This study concludes that the design using the 7-8 GHz frequency band is the most feasible and recommended solution for building a reliable and future-proof microwave radio backbone network.

Keywords: *Microwave, Link Radio Backup, Availability, Pathloss, Space Diversity*