ABSTRACT

Indonesia faces great challenges in expanding access to communication technology, especially in the 3T (Disadvantaged, Frontier and Outermost) areas. Communities are often hampered by infrastructure limitations that prevent access to essential services such as education, health and information. One of the main problems faced is the limited telecommunications infrastructure, both for cellular, internet, and satellite networks, which are needed to support various community activities.

This research offers a solution through the application of Delay Tolerant Network (DTN)-based communication technology specifically designed to overcome the problem of limited access in areas with unstable networks. DTN enables efficient data transmission by store carry forward mechanism that is temporarily storing data and transmitting it when the network is available again. This solution is designed to optimize energy usage and minimize costs, so it can be applied in resource-constrained areas.

The results show that the implementation of DTN can improve communication quality in 3T areas with high effectiveness, despite infrastructure limitations. The system is able to transmit data over distances of up to 18 km without packet loss (0% packet loss), with average delay increasing with bundle size from 0.094 seconds for small bundles to 0.600 seconds for large bundles. Throughput also showed a significant increase, reaching up to 7,777 KBps. In terms of power consumption, a power bank with a capacity of 10,000 mAh can last up to ~23.5 hours assuming 90% efficiency which means the power bank outperforms the LiPo battery which only lasts for ~7.1 hours, making this scenario close to feasibility with a once-a-day maintenance and charging cycle. Therefore, the proposed system shows great potential in extending communication coverage and increasing community participation in social and economic activities in remote areas.

Keywords : *Telecommunication Access, 3T regions, Delay Tolerant Network, Limited Infrastructure, store carry forward.*