

ABSTRACT

This thesis presents a comparative study of Starlink’s Low Earth Orbit (LEO) satellite service and terrestrial cellular networks (4G/5G) in Indonesia, using West Java as a case study. The research explores how these distinct technologies can complement one another to bridge the digital divide between urban and rural areas. It hypothesizes that 5G will perform best in high-density urban settings due to its low latency and high throughput, while Starlink will offer more reliable connectivity in remote regions where terrestrial infrastructure is lacking.

Field measurements were conducted across four distinct regions in West Java—Dense Urban (Bandung City), Urban (Bandung Regency), Suburban (Karawang Regency), and Rural (Garut Regency) to evaluate the performance of Starlink and cellular networks (4G/5G). Key Quality of Service (QoS) metrics collected include download and upload throughput, latency, jitter, packet loss, and availability. These metrics were then analyzed through technical evaluation, link budget modeling, and capacity estimation using the Shannon formula. Economic analysis involved assessing service affordability relative to regional minimum wages and mapping business models from the perspectives of users, providers, regulators, and national stakeholders. Regulatory analysis examined Indonesia’s telecommunications and data protection laws, highlighting the importance of infrastructure localization and digital sovereignty enforcement.

The findings show that 5G delivers ultra-low latency (17.96 ms) and minimal packet loss in urban areas, while Starlink provides high stability and 100% availability in rural regions, making it a strong candidate for expanding rural connectivity. However, Starlink remains economically inaccessible for low-income users (up to 48.96% of annual minimum wage), unlike cellular services that fall below the 24% affordability threshold. The study recommends a sovereignty-based hybrid deployment strategy, emphasizing local infrastructure requirements (gateway and NOC) and regulatory enforcement to ensure both secure and inclusive national broadband development.

Keywords: Comparative Analysis, Starlink, Cellular Service.