ABSTRACT

This study aims to analyze and compare the performance of 5G networks with and without the integration of Multi-access Edge Computing (MEC) technology based on latency, throughput, jitter, and packet loss parameters. MEC is an edge computing solution that allows data processing to be carried out closer to end users, thus potentially reducing latency and increasing the efficiency and quality of 5G network services. The methods used in this study include literature studies, designing simulation scenarios using the NS-3 network simulator with 5G mmWave modules and MEC, and performance testing on various scenarios such as variations in data rate, packet size, UE to eNB distance, and number of UEs. The simulation results show that MEC integration is able to reduce latency by up to 30%, increase throughput by more than 15%, and maintain low jitter and packet loss levels compared to scenarios without MEC. The reduction in latency and increase in data transmission efficiency are most significant in scenarios with high traffic and a dense number of users. In addition, MEC has also been shown to be able to maintain network quality under long-distance conditions or heavy traffic loads. These findings support the claim that MEC is a crucial technology in 5G architecture to support real-time applications such as autonomous vehicles, AR/VR, and IoT. This study provides quantitative contributions to the understanding of MEC integration in 5G networks and can be an important reference for the development of next-generation networks.

***Keywords**: 5G, edge computing, latency, MEC, network performance, throughput.*