ABSTRACT

Modern data centers require efficient, scalable, and reliable network architectures to support the growing demand for services such as cloud computing, big data, artificial intelligence (AI), and the Internet of Things (IoT). One widely adopted architecture is the Spine-Leaf model, known for its high performance and low latency. However, determining the optimal number of spine switches to accommodate increasing leaf switches remains a challenge in network design.

This study aims to analyze network performance using a fixed configuration of two spine switches and varying numbers of leaf switches (5, 10, 15, and 20). The simulation was carried out using the Mininet emulator with two different Software-Defined Networking (SDN) controllers: ONOS and Floodlight. Network performance was evaluated using the Distributed Internet Traffic Generator (D-ITG) with parameters including throughput, delay, and jitter.

The results show that ONOS delivers more stable and consistent performance compared to Floodlight, especially under conditions with a higher number of leaf switches. While two spine switches are sufficient for small to medium-scale networks, larger-scale scenarios benefit from additional spine switches to maintain efficiency and performance stability.

***Keywords**: Spine-Leaf, SDN, ONOS, Floodlight, Network Performance.*