

ABSTRACT

This research analyzes Quality of Service (QoS) on Software Defined Network (SDN) with an OpenDaylight controller using the PPDIOO method limited to the Design stage. The Mininet emulator is used to simulate tree topologies and measure QoS under normal traffic conditions and abnormal traffic or during DDoS attacks using Hping3. The results show that under normal conditions with 3 hosts, bandwidth is stable at 99.8 Mbit/s, jitter 0.018 ms, packet loss 0.143%, and throughput 95.1 Mbit/s. With 7 hosts, average bandwidth was 74.9 Mbit/s, jitter 0.448 ms, packet loss 0.257%, and throughput 71.5 Mbit/s. With 13 hosts, bandwidth drops to 41.7 Mbit/s, jitter 5,768 ms, packet loss 4,462%, and throughput 39.7 Mbit/s. When a DDoS attack occurs, QoS decreases significantly: with 1 attacker, bandwidth drops to 526 Mbit/s, jitter 0.021 ms, packet loss 0.3%, and throughput 490.7 Mbit/s; with 3 attackers, bandwidth is 63.9 Mbit/s, jitter 2,563 ms, packet loss 20%, and throughput 59.4 Mbit/s; with 7 attackers, bandwidth drops to 11 Mbit/s, jitter 3,814 ms, packet loss 60%, and throughput 10.5 Mbit/s; with 12 attackers, bandwidth drops to 3.24 Mbit/s, jitter 21,544 ms, packet loss 80%, and throughput 3.1 Mbit/s. The effectiveness of DDoS attacks compared between TCP and UDP protocols shows that in UDP measurements with TCP attacks, the highest bandwidth is 526 Mbit/s with one attacker, while TCP measurements and attacks only reach 431 Mbit/s. With 3 attackers, bandwidth drops to 63.9 Mbit/s (UDP) and 105 Mbit/s (TCP), with 7 attackers it drops to 11 Mbit/s (UDP) and 37.8 Kbit/s (TCP), and with 12 attackers dropped to 3.24 Mbit/s (UDP) and were unmeasured in TCP measurements. In conclusion, QoS on SDN with OpenDaylight controller decreases significantly during DDoS attacks, indicating the need for a good management strategy to maintain optimal QoS.

Keywords: *Software Defined Network (SDN), OpenDaylight, Quality of Service (QoS), Distributed Denial of Service (DDoS), PPDIOO, Mininet, Topologi Tree*