

ABSTRACT

The growing development of Internet Exchange Points (IXP) is closely tied to the role of other technologies, particularly Multiprotocol Label Switching (MPLS). This has made IXPs reliant on MPLS technology. The implementation of MPLS involves label distribution protocols and routing protocols that affect network performance and resource utilization on IXP network devices. In this study, Segment Routing (SR) is used as an approach to simplify the complexities of MPLS technology in IXPs. Additionally, there are challenges in the development of IXPs towards Software-Defined Exchange (SDX) regarding SR implementation, such as compatibility with certain topologies and the inability to fully optimize SR functions, resulting in limitations in scalability and SDX integration. The analysis method used is sensitivity analysis based on network performance measurements and device resource utilization to assess the effectiveness of SR implementation on IXP architectures—hierarchical, distributed, and centralized—which previously used MPLS. The results of this study show that implementing SR in IXPs increased throughput from 94.27 Mbps on IXP-MPLS to 95.63 Mbps on IXP-SR-MPLS, reduced latency from 6.47 ms to 5.36 ms, and decreased packet loss and jitter from 0.62% to 0.53% and from 14.03 ms to 12.57 ms, respectively. However, CPU and memory utilization increased from 0.03% and 20.99% on IXP-MPLS to 0.10% and 25.23% on IXP-SR-MPLS. Overall, SR has proven effective in addressing issues in IXP networks, although it comes with the trade-off of increased resource utilization.

Keywords : Internet Exchange Point, Software Define Exchange, Segment Routing.