Abstract

The increased enhancing network load density, Thus performance is crucial, especially for systems requiring high throughput and low latency. Additionally, network reliability necessitates *Redundant Link*s to ensure uptime in case of failures. While topologies like Spine-Leaf address redundancy, simply using *Redundant Link*s as backups is inefficient. Therefore, a routing mechanism that effectively utilizes existing *Link* capacity is essential. Equal-cost multipath routing (*ECMP*) is a routing scheme that tackles this challenge.The implementation of *ECMP* is facilitated by incorporating a *Programmable Data Plane* (*PDP*) into the network. *PDP* simplifies *ECMP* implementation and resolves issues present in older technologies like Software-Defined Networking (SDN). In *PDP*, programming occurs directly on the data plane, where packets are processed on network devices. This eliminates the controller-data plane separation present in SDN, aiming to improve efficiency and data transmission speed while minimizing resource usage overhead. It also reduces bottlenecks caused by the previous separation, leading to optimized overall network resource utilization. The obtained results indicate that the *ECMP*-applied network on the *Programmable Data Plane* can yield a throughput difference of 40.22 Mbps compared to static routing in a 20 Mbps traffic test scenario and 11.21 Mbps compared to OSPF routing. Additionally, the *ECMP* network can also deliver low packet loss, jitter, and delay within the good category.

Keywords: *ECMP*, *PDP*, Multipath routing Programming