

ABSTRACT

The number of internet users in Indonesia is estimated to exceed 221 million by 2024, thereby increasing the demand for fast and stable internet connections. Load balancing technologies such as Equal Cost Multi Path (ECMP) and Smart Balancing are thus being increasingly adopted. Therefore, this study aims to evaluate and compare the effectiveness of two load balancing methods, namely ECMP on MikroTik devices and Smart Balancing on Ruijie Reyee devices. The research method applies the Hevner conceptual model to analyze the performance of both methods within a similar network context and implements the Network Development Lifecycle (NDLC), which includes the stages of identification, design, simulation, implementation, monitoring, and management. Test results show that Smart Balancing is more effective in providing service quality, with all applications in active-active status achieving the "Excellent" category, with an average score of 1.00–1.25, which is equal to or even better than ECMP. From 72 data samples of ISP switching speed tests, Smart Balancing recorded an average switching time of 5.88 seconds, faster than ECMP which reached 6.99 seconds, and provided better connection stability, especially during low bandwidth conditions. Overall, Smart Balancing demonstrates more consistent and efficient performance in managing data traffic, thus delivering more optimal service quality, while also being easier to configure and implement. Nevertheless, ECMP has weaknesses in terms of flexibility to adapt to changing link conditions, as its distribution method is static and does not consider the actual performance of each path, whereas Smart Balancing's drawback lies in the potential for path flapping if not properly configured, as well as relatively higher system resource usage due to continuous path monitoring processes.

Keywords: Load balancing, Equal Cost Multi Path (ECMP), Smart Balancing, MikroTik, Ruijie Reyee, Quality of Service (QoS), Network Development Lifecycle (NDLC).