

Enhancing Flow Rule Eviction Policy in Software Defined Network

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Abstract

Traditional network architectures struggle under high-volume, real-time traffic. Software Defined Networking (SDN) separates control and data planes to enable centralized control, but switch flow-table capacity remains a bottleneck; naïve eviction (FIFO, LRU, Random, Idle Timeout) often fails to adapt to dynamic traffic, increasing packet loss and degrading QoS. We propose an adaptive flow-rule eviction policy that accounts for flow activity, frequency, and traffic characteristics, prioritizing critical flows while evicting less significant ones. Using Mininet simulations, we benchmarked the proposed policy against common baselines and assessed packet retention, packet loss, and throughput. Results indicate improved packet retention, reduced loss, and higher throughput relative to FIFO, LRU, Random, and Idle Timeout, particularly for delay-sensitive, real-time transmissions. These findings suggest that intelligent, traffic-aware management of limited flow-table space can enhance SDN performance and better support QoS-critical applications. Limitations include evaluation in a simulated environment, constrained traffic mixes, and lack of cross-controller validation. Future work will deploy the policy on hardware testbeds, integrate with controller frameworks, and explore continual adaptation to evolving traffic patterns.

Keywords: Software-Defined Networking (SDN), Flow-Rule Eviction, QoS, Mininet, Traffic Management