**Scope and Objective:**

A novel quality of service (QoS) architecture has been designed to increase the intrusion detection and prevention performance. Our research has proposed and evaluated a solution using a novel QoS configuration in a multi-layer switch to Organize packets/traffic and parallel techniques to increase the packet processing speed. The new architecture was tested under different traffic speeds, types, and tasks. The experimental results show that the architecture improves the network and security performance which is can cover up to 8 Gb/s with 0 packets dropped. This paper also shows that this number (8 GB/s) can be improved, but it depends on the system capacity which is always limited.