ABSTRACT

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Traditional telecommunication networks intensively employ dedicated middleboxes, which are specifically built to provide a given service, such as address translation, firewall and proxy. These dedicated devices are expensive and make the infrastructure rigid, hardly scalable and difficult to manage. In this scenario, Network Function Virtualization arises to increase flexibility and to reduce the costs of telecommunication infrastructures. To do so, network functions are implemented on virtualized generic servers, rather than on dedicated equipment. One of the challenges of this approach is the placement of virtual network functions over the infrastructure, which must be resilient and energy-efficient. This work formulates a mixed integer programming problem to place virtual network functions, choosing the servers meeting service demands. The formulated problem minimizes energy utilization and provides resilience to network services through network function sharing and function replication, respectively. To solve this problem, TRELIS heuristic is proposed, which reduces the size of the problem and saves up to 35% of the energy by employing the network function sharing. The results show that TRELIS is able to solve a problem four times bigger than the maximum size reached through the optimal solution in only a quarter of the time.

Keywords: NFV. Resource allocation. Resilience.