

Rules Placement Problem in OpenFlow Networks: a Survey

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Abstract—Software-Defined Networking (SDN) abstracts lowlevel network functionalities to simplify network management and reduce costs. The OpenFlow protocol implements the SDN concept by abstracting network communications as flows to be processed by network elements. In OpenFlow, the high-level policies are translated into network primitives called rules that are distributed over the network. While the abstraction offered by OpenFlow allows to potentially implement any policy, it raises the new question of how to define the rules and where to place them in the network while respecting all technical and administrative requirements. In this paper, we propose a comprehensive study of the so-called OpenFlow rules placement problem with a survey of the various proposals intending to solve it. Our study is multi-fold. First, we define the problem and its challenges. Second, we overview the large number of solutions proposed, with a clear distinction between solutions focusing on memory management and those proposing to reduce signaling traffic to ensure scalability. Finally, we discuss potential research directions around the OpenFlow rules placement problem.

Background: Computer networks today consist of many heterogeneous devices from different sector, with a variety of sophisticated and distributed protocols running on them. Network operators are responsible for configuring policies to respond to a wide range of network events and applications. The OpenFlow protocol implements the concept of SDN by abstracting network communication as flows handled by network elements.

The problem: The level of network abstraction High degree of abstraction hides the complexity of network devices and exposes a simple interface to the operator. Thus, the operator models the network as one big switch, one mailbox later, and no longer has to worry about low-level details, such as device configuration and resource management.

The method and its purpose: In this paper, provide an in-depth study of the so-called OpenFlow rulesetting problem with an overview of the various proposals for solving it. First, define the problem and

its stakes. Second, consider a large number of proposed solutions, with a clear distinction between solutions that focus on memory management and those that suggest reducing signaling traffic to ensure the ability to extend. Finally, discuss potential research directions around OpenFlow rule-setting.

The results: The results are not directly mentioned this paper, but understanding the method and its purpose, we assume that the solving the OpenFlow rules placement problem. Reducing the signaling overhead is a key factor to increase the scalability of any rule's placement solution. In this section, we summarize the ideas that have been proposed to reduce the signaling overhead.

Conclusion: Software-defined networks and OpenFlow provide the ability to simplify network management and reduce costs by increasing the level of network abstraction.