ABSTRACT

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There are more and more applications serving a large number of users and that are also sensitive to Quality of Service (QoS) requirements. In a real-time online application, a critical QoS requirement is the latency between users and the application server. As users can be geographically distributed, they are affected by different levels of latency to the server, causing each user to be subject to different conditions. For on-line real-time applications, different delays may lead to different views of a digital world, creating unfair scenarios. This fairness is important, for example, in competitions or in some financial operations. So it is necessary to provide a better fairness between the users of these applications. Traditional networks have limited resources to deal with these requirements; however, Software-Defined Networks (SDNs), which have centralized control, facilitates the implementation of highly configurable applications. With centralized control, it is possible to simultaneously analyze the conditions of all users and apply appropriate actions. Hence SDN provides greater facility for obtaining better fairness. The objective of this work is to propose a network application for SDNs that allows achieving a greater degree of fairness among the users of a given service, ensuring that the latencies between each of them and the application server are as close as possible. To achieve this goal, the first step involves problem modeling, taking into account the users' current latencies and the path of the flow of each user. An optimizer (CPLEX) was used to calculate the solution of the problem and then, through our proposed network application, the calculated paths were implemented in the network and latencies were added in the users' links, in order to obtain the fairest scenario. In order to employ the actions in the network suggested by the optimization, an SDN application was implemented in the POX controller, which communicates periodically with CPLEX. To evaluate the performance of the application, *Mininet* was used for the emulation of a generic network and of the RNP network. The proposed network application was compared with more traditional communication solutions such as *hub* and *layer 2 learning*. Through the experiments, we conclude that the proposed network application achieves a level of fairness greater than that of the other solutions.

Keywords: SDN; QoS; Fairness;