

Towards an Emulator for Software-Defined Wireless Networks

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I. CONTEXT

Network emulation [1] has been widely used in performance evaluation, testing and debugging protocols and also in several related topics on research in computer networks. In this talk, we will present Mininet-WiFi as a tool to emulate wireless OpenFlow/SDN [2, 3] scenarios, providing experiments in Software-Defined Wireless Networks [4, 5], also aiming high-fidelity experiments that replicate real networking environments. Mininet-WiFi augments the well-known Mininet [6] emulator with virtual wireless stations and access points while keeping the original SDN capabilities and the lightweight virtualization software architecture. We will present a demo use case of a mobile video streaming scenario showcasing the ability of Mininet-WiFi to emulate the wireless channel in terms of bandwidth, packet loss, and delay variations as a function of the distance between the communicating parties.

II. MOBILITY DEMONSTRATION

This section illustrates the use of mobility inside of Mininet-WiFi and its ability to considering signal propagation aspects taking into account the distance between a station and the associated access point(s) in addition to the potential benefits of more than one simultaneous association (Figure 1). In this experiment, we use a mobility model called *Random Direction*, where stations move towards to the limit of a defined area also varying its velocity and an OpenFlow controller operating in reactive mode. The mobility models are important in the context of wireless networks, since they describe the behavior of the nodes moving on the space and its properties, like direction and speed.

The video published in [7] shows that the quality of video varies according the station movement and when it is connected simultaneously on two access points. This case is inspired on a related research work [8] carried in 2011 by the OpenFlow research group at Stanford University. In their use case, the station (or laptop) had three wireless interfaces (two WiFi and one WiMAX). In our replicated experiments, we carried similar experiments but using only the two WiFi interfaces. In all scenarios, the station is able to associate automatically to any access point that it can reach, so there are moments that the station should be associated either to one or two access points.

In future work, we intend to support existing and consolidated propagation models and the impact of distance in bandwidth, packet loss, and delay. The lat-

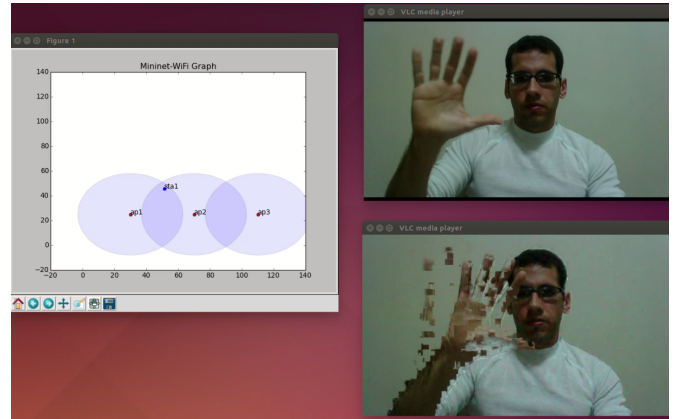


Fig. 1. Practical demonstration of using all wireless networks around us within Mininet-WiFi.

est implementation is available in the Mininet-WiFi code repository: <https://github.com/intrig-unicamp/mininet-wifi>

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