Remote Centralized IP Routing Protocol using Openflow

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Abstract. In this work, we take a necessary intermediate step when moving towards programmable (software-defined) networks, namely transparent interaction with legacy networks. While the OpenFlow [1,2] model already provides means to treat operational traffic with legacy protocols embedded in the switches themselves, we explore the feasibility of completely moving a legacy routing protocol stack (Quagga [3]) to logically centralized controllers and using the OpenFlow protocol (together with the OpenFlow switch configuration protocol) as the solely communication channel with the forwarding engines. More precisely, we propose an OpenFlow controller application acting as a proxy between Quagga instances and their physical counterparts. Basically, we intend to replicate the discovered physical topology by stitching the virtual interfaces of the VMs running Quagga.

This piece of work gets us closer to benefiting from the OpenFlow model in terms of rapid innovation and rich network control opportunities. In a short term, the core benefits of our external Quagga integration with OpenFlow include:

1.- Cheap network gear with minimal embedded software.

2.- Avoid re-writing legacy protocols in a centralized fashion.

3.- Ensure interoperability with legacy network elements.

Along this way, we expect to contribute to the revisions of the OpenFlow table abstraction, and the requirements of the OpenFlow configuration protocol.

As a result of this exploratory work we do not only intend to contribute to the feasibility of progressively adopting OpenFlow but we look forward to devise opportunities in offering "legacy routing emulation services." This way, network operators can re-use their current practices of network management and approach network virtualization by safely offering third parties (e.g., customers) controlled access to isolated Quagga instances in order to customize the routing of their "contracted" network slices. In the long term however, network virtualization should move beyond the current network

virtualization model based on overlaying a virtual network of multiple virtual routers on top of a shared physical infrastructure and propose a more convenient, user-friendly "Platform as a Service" model for networking [4].

References

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Biography

Marcelo Ribeiro Nascimento graduated in 2008 from State University of Campinas (São Paulo, Brazil) in Electrical Engineering. Since them he works for CPqD in charge of embedded software development and research in telecommunication area. In 2009 he started a master's degree program in Computer Networks at State University of Campinas, focusing on innovation network technologies.