Universität Stuttgart

INSTITUT FÜR KOMMUNIKATIONSNETZE UND RECHNERSYSTEME
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Master thesis No. 1019

Implementation and Evaluation of a SDN-controlled Network Emulation with Containerized Network Elements

Methods
Software design
Programming
Integration

Topics
Network control
Communication networks

Background

Modern network infrastructure will be controlled in a software-defined fashion. Therefore, each network element needs a software interface, to connect it with the software-defined networking (SDN) controller. To allow vendor independent configurability, network elements are typically described as YANG models. Those models define the data structure that is used for the exchange of control data and allows automatically code generation for various control protocolls like NETCONF, RESTCONF or gNMI.

Task Description

Within this thesis a SDN-controlled network emulation should be developed. As the network elements itself consist of several software modules, each network element or parts of it (e.g. optical/electrical domain) should be installed in a docker container. For the managment of the containers the framework kubernetes takes place. Some network elements are already available in a containerized format (e.g. cassini transponder), others (e.g. Open vSwitch) have to be implemented based on available open source code. The network devices should be configured according to a topology description file. Extentions like traffic generation, resp. flow control and optical layer performance emulation conclude the emulation setup. Finally, the functionallity of the emulation environment should be evaluated.

Aquired Knowledge

You will extend your knowledge on modern SDN network design for wide area networks. You will gain your experience on typical configuration protocolls and data structures like NETCONF/YANG. Besides, you will get an inside on containerized software deployment with frameworks like kubernetes and docker.

Desirable knowledge
Kommunikationsnetze I

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