



Master thesis No. 1024

Design and Implementation of an Intent-Based Networking Framework on top of ONOS SDN Controller



Methods

Software design
Programming
Integration

Topics

Software-defined networking
Intent-based networking
Network control

Background

Modern networks have achieved a tremendous increase regarding the amount of user traffic data that are able to handle, thus enabling highly demanding services like 5G/6G. In order to manage such networks, several protocols and methods need to be coordinated, which ends up being a highly complex task requiring domain expertise. Intent-Based Networking (IBN) is a paradigm that promises to decouple the implementation complexity from the management layer. Now the network operator needs only to articulate his desires in the form of intents. Then the IBN framework will process them and will automatically make the appropriate changes in the network.



IBN is recently gaining interest, due to the success story of Software-Defined Networking (SDN). SDN is an approach to separate the network control plane from the underlying data plane. With SDN, the network devices can be controlled programmatically, thus allowing automated network reconfigurations. IBN takes advantage of the SDN architecture and expands it, in order to provide a simple but powerful abstraction to the network operator.

Problem Description

Within this thesis, you are called to implement and evaluate a minimal IBN Framework on top of the ONOS SDN Controller using its RESTful interfaces. More specifically you will need to:

- get familiar with ONOS, SDN and IBN
- design a Julia application that communicates through the HTTP REST API with ONOS
- build a minimal IBN framework that will take connectivity intents as input and will compile flow setup requests as output to ONOS
- monitor the network state to reassure the intent's objective is satisfied
- simulatively evaluate your implementation

Acquired Knowledge and Skills

With this work, you will get an insight into the current network trends of SDN and IBN with a special focus on the ONOS project. Moreover, you will gain experience with RESTful APIs and the highly promising and already established scientific programming language Julia.

Requirements

Communication Networks Architecture and Design
Linux experience
Programming Experience

Desirable knowledge

Kommunikationsnetze I

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