



Master thesis No. 1069

Design and Implementation of a Distributed Intent-Driven Framework for IP-Optical Multi-Domain Operation



Methods

Software design

Topics

Intent-based Networking

Background

Multi-domain intent-driven IP-optical networking aims to automate and optimize the provisioning and management of services across geographically dispersed and technologically diverse networks. Translating high-level service intents into specific network configurations enables seamless IP and optical layers orchestration, even spanning multiple administrative domains. This approach leverages Software-Defined Networking (SDN) and network automation to dynamically adapt to changing traffic patterns and service demands, ultimately enhancing network agility, resilience, and efficiency.

Problem Description

MINDFul.jl is an open source Framework for Intent-driven Multi-Domain Network coordination that aims to research coordination algorithms. Currently, only simulations of multi-domain networks are possible. Within this work, you are asked to extend its usability by enabling the distributed operation of multiple MINDFul.jl instances, each responsible for a networking domain. More specifically, you will need to:

- get familiar with Intent-Based Networking (IBN) and MINDFul.jl
- design a communication protocol between the MINDFul.jl instances
- develop a multi-domain resource allocation algorithm as a proof of concept
- conduct functional evaluation of the distributed MINDFul.jl and performance evaluation of the developed resource allocation algorithm
- integrate distributed MINDFul.jl in GNS3

Acquired Knowledge and Skills

With this work, you will get an insight into the current network trends of SDN and IBN. Moreover, you will gain experience with IP-Optical network operation and the scientific programming language Julia.

Contact

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