Forschungspraxis

Topography Upgrade for Optimal and Reliable Multi-Period Network Planning

Optical networks are crucial for digital communications, handling massive data transport over long distances with wavelength division multiplexing (WDM) in the C-band. However, growing traffic demands may surpass conventional WDM capacities, prompting the exploration of ultra-wideband (UWB) and spatial division multiplexing (SDM) solutions. SDM increases throughput by utilizing different spatial domains, while UWB increases the available spectrum by taking advantage of transmission over multiple bands. Despite hesitancy due to cost, network operators recognize the need for optimal topology upgrades to meet evolving traffic demands, especially when reliability is taken into account. On top of the SDM and UWB upgrades on the existing topology, this also includes installing new links that do not exist in the original topology.

In this thesis, the goal is to optimally add links to existing core network topologies using the aforementioned schemes (SDM and UWB), according to increasing traffic demands, towards minimum cost, and considering reliability constraints, such as dedicated 1+1 protection for the demands.

Prerequisites

- Basic knowledge of optical networks and network reliability.
- Experience in Python.
- Experience with formulating and solving Integer Linear Programming (ILP) problems.

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