



Bachelor thesis No. 1026

## Employing GNPpy for planning Meshed Metro Optical Networks



### Methods

Programming in Python  
Simulation

### Topics

Optical networks

### Background

One of the modern problems of networking is being able to completely take advantage of the hardware devices and operate them as efficiently as possible. Unfortunately, this is not an easy task as different scenarios require different device configurations. The network operators need to thoroughly consider how they will set up their network, given a particular topology.

During the last years, optical networks go through a significant transformation because of the tremendous traffic increase. More specifically traditional architectures like metro rings are being converted to meshed topologies. This triggers many design questions and causes several requirements for optical devices like amplifiers, multiplexers, transponders, etc.

GNPpy is an open-source library developed in the frame of the Telecom Infra Project for planning and simulating optical meshed networks. With GNPpy many different aspects of low-level optical networking components can be simulated, like optical signal attenuation along a fiber with respect to the modulation format used in the signal transmission. GNPpy can automatically solve the dimensioning problem given a particular topology.

### Problem Description

For this work, you are called to get familiar with the GNPpy library and leverage its capabilities for automatic configuration in order to simulate arbitrary meshed optical networks. You will investigate GNPpy's features and build a Python API (Application Programming Interface), in order to use it for configuring optical network instances. On this behalf, you will investigate the current trend of meshed metro networks and observe the influence of different topologies in the configuration of an optical network. This thesis can be structured in the following steps:

- get familiar with optical network equipment and investigate the GNPpy python package
- develop a Python API to create ring and meshed optical networks in GNPpy
- configure the networks using your Python API and GNPpy
- evaluate the differences between the ring and meshed network topologies

### Acquired Knowledge and Skills

With this work, you will get a great insight into optical networks and you will learn to interpret important values for an optical device. Moreover, you will sharpen your skills in Python programming and use the well-established community-developed tool GNPpy. You will also learn how to build an API, which will work as an adapter wrapping the GNPpy package.

### Requirements

Programming Experience  
Kommunikationsnetze I

### Contact

Dipl.-Ing. Filippou Christou  
room 1.319 (ETI II), phone 685-67968, E-Mail [filippou.christou@ikr.uni-stuttgart.de](mailto:filippou.christou@ikr.uni-stuttgart.de)

M.Sc. Arthur Witt  
room 1.403 (ETI II), phone 685-69015, E-Mail [arthur.witt@ikr.uni-stuttgart.de](mailto:arthur.witt@ikr.uni-stuttgart.de)