

# Open Optical Networks - Network

## Lab 5

November 11, 2020

These exercise sets cover some aspects you will find useful for the final exam software development. This exercises can be part of the material for the final exam questions. You are strongly encouraged to find yourself a solution to the presented problems.

### Network Exercise

The aim of these exercises is to enlarge the software abstraction of the network and the signal propagation in order to include the concept of channels and spectral occupation. The main idea is that on each line we can propagate a certain number of independent signals that occupy different frequency slots, the channels. Along the whole set of exercise, suppose to have 10 ordered channels for each line.

1. Define the class **Lightpath** as an extension of the class **SignalInformation**. Beside the latter list of attributes, an instance of **Lightpath** has to include an attribute **channel** which is an integer and indicates which frequency slot the signal occupies when is propagated.
2. Modify the attribute **state** of the class **Line**; it has to be a list of strings that indicate the occupancy of each channel. Moreover, modify the method **propagate** accordingly.
3. Define the attribute **route\_space** in the class **Network**. It has to be a pandas dataframe that for all the possible paths describe the availability for each channel.
4. Modify the methods **find\_best\_snr()** and **find\_best\_latency()** in the class **Network** such that they manage the channel occupancy.
5. Modify the methods **propagate** and **stream** in the class **Network** that should use and update the attribute **route\_space** in order to consider the channel occupancy for any path.

6. Run the last exercise of the previous set (Lab 4) with this new network abstraction on a list of 100 randomly chosen connections.