

Open Optical Networks

Lab 5

These exercise sets cover some aspects you will find useful for the final exam software development. These 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.

Exercises

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. **Implement the number of channels as an input parameter.** 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.

is this frequency given?
or has to be initialized in 0?

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.

free or occu

3. Define a new method in all the elements that propagate a **SignalInformation** without occupying any line. This new method, that can be called **probe**, must be used **to create the weighted graph instead of using the propagate method.**

same as you did in lab3,
where you propagate over
the path without changing the
status of the Line

4. 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.

It is a dataframe with 10,
columns one for each
channel indicating the
availability + the column of
each path

5. **Modify the methods `find_best_snr()` and `find_best_latency()` in the class `Network` such that they manage the channel occupancy.**

since for now on we have to
propagate in the lightpaths
the propagate method has
to change the signal information
attribute with a lightpath?

for all the lines that belongs to the
same path we have to change
the status of the same channel
for examples channel 3 in lines
AB-BD-DC

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