

Open Optical Networks - The Amplifier

Exercise 1

Instantiate and use an EDFA.

1. download from the web portal the following files:
 - eqpt.json
 - default_edfa_config.json
 - utilities.py
2. create a json file with the parameters of your EDFA. This json file has the following parameters:
 - "uid": a string used as unique identifier. You can use the name you want.
 - "type": "Edfa"
 - "type_variety": "simple_edfa"
 - "operational": a structure containing the following parameters:
 - "gain_target": 17
 - "tilt_target": 0
 - "out_voa": 0

Please Note: the noise figure of the EDFA is not defined here. You can find it in the eqpt.json file.

3. download the 'utilities.py' library from the PoliTo web portal.
4. instantiate an EDFA using the json file you just created.

Hint 1: to help you in instantiating the EDFA, we provided you a function that, given the path of the json files will return the edfa parameters. You can find it in the utilities.py library and you can use the 'get_edfa_parameters function'.

Hint 2: To understand how to use the parameters read the documentation of the function 'get_edfa_parameters function'. Do do it you can use the 'help()' function or read it under the function declaration.
5. instantiate a noiseless WDM comb according to the parameters described in eqpt.json file
6. propagate the WDM comb through the EDFA.

Hint: As Edfa has the method `__call__(self, spectral_info)`, it can be used as function. So, the command `edfa(spectral.information)` will return the spectral information propagated through the EDFA.
7. plot the singal and ASE noise power before and after the propagation.
8. plot the signal-to-ASE noise ration (the OSNR) after the EDFA.

Exercise 2

Amplifier comparison

1. repeat the exercise # 1 but use an EDFA with noise figure = 4 and gain = 12
2. compare the two results: which is the most degrading amplifier and why?

Exercise 3

Power sweep

1. instantiate the EDFA and the WDM comb described in exercise # 2.
2. propagate the WDM comb through the EDFA by varying the channel power before the EDFA by ± 2 dB with steps of 0.5 dB.
3. plot the signal power, ASE noise power of the central channel for each point of the sweep.
4. plot the OSNR of the central channel for each point of the sweep.
Hint: use a transponder.