Master in Photonics – "PHOTONICS BCN"
Master ERASMUS+ "EuroPhotonics"

MASTER THESIS PROPOSAL

Dates: April 2023 – July or September 2023

Laboratory : OPTICAL COMMUNICATIONS
Institution: UPC-ETSETB-TSC-GCO
City, Country : BARCELONA

Title of the master thesis: **Dynamic Tuning of Transmitter Lasers in Fiber Access Networks.**

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Keywords : FIBER, LASER, WDM, FTTH, PON, TRANSMISSION, NETWORKS.

Keywords: optical fiber communications, coherent transmission, digital signal processing,

Summary of the subject (maximum 1 page) :

Modern Fiber-to-the-Home and Fiber-to-the-Antenna networks use Wavelength Division Multiplexing to combine the broadband signals to/from users. This can be extended by ultra-dense WDM with coherent transmission, to implement the Wavelength-to-the User concept in an extended access network in order to greatly increase the current communications capacity.

In the access network, every user transceiver generates its own wavelength and all wavelengths are densely combined in the optical distribution network. To avoid crosstalk or collision between them and to increase the bandwidth efficiency, every user laser has to precisely tune to the allocated channel, and a monitor module in the headend manages the spectrum and control the laser sources.

The access network testbed is available in the GCO lab, along with the required instrumentation. The student will analyse it an enhance its operation, collaborating with the GCO team in assembling an efficient user equipment.

Objectives:

1. To analyse and test the tuning characteristics of the lasers, as a function of the injection currents and temperature.
2. Optimize a dynamic model of the laser tuning and emission.
3. Monitor and manage the optical spectrum via the existing interfaces and PC.
4. The high bit-rate data transmission will be checked and optimized.
5. A journal publication will be submitted.

Additional information :
* Required skills : Matlab programming, team work, laboratory measurement.
* Miscellaneous : A scholarship is available for support of the lab research.