B.Sc - M.Sc. Thesis Project

Title

High Capacity Fiber-Optic Transmission Systems

NOKIA Bell Labs

Introduction and Short description

<u>Company:</u>   Bell Laboratories (Alcatel-Lucent)   www.bell-labs.com

Bell Labs has helped weave the technological fabric of modern society. Since its founding in 1925, technology from Bell Labs has shaped the ways people live, work and play. Over the past 80 years, the Bell Labs R&D community has made seminal scientific discoveries, created powerful new technologies, and built the world's most advanced and reliable networks:

- The Transistor (1947)
- Shannon's Information Theory (1948)
- Laser (1958)
- Communications Satellites (1962)
- The CCD (1969)
- Unix Operating System and C Language (1969-1972)
- Digital Signal Processor (DSP) (1979)
- Optical WDM systems and networks (1990)
- First 100G Ethernet transmission (2005)
- Fiber-optic capacity limit (2010)

<u>Project:</u>

In 2010 the theoretical capacity limit of a single-mode fiber was found. The forecasted demand of data traffic will exhaust the capacity of the installed fiber plant by 2020. New fiber-optic designs are required in order to guarantee an efficient and sustainable increase in terms of cost and energy consumption for the following 30 years. Spatial division multiplexing in its two flavors, multi-mode and multi-core fibers, has become the new research paradigm. The scope of the project is to investigate on advanced transmission and detection techniques to exploit the capacity of the new optical fiber.

- Bell Labs – Future Impossible (Youtube Channel) – The Shannon Limit
- Winzer, P.J., "Spatial Multiplexing in Fiber Optics: The 10X Scaling of Metro/Core Capacities," Bell Labs Technical Journal , vol.19, no., pp.22,30, 2014.
- René-Jean Essiambre, Gerhard Kramer, Peter J. Winzer, Gerard J. Foschini, Bernhard Goebel, "Capacity Limits of Optical Fiber Networks", IEEE-OSA Journal of Lightwave Technology, vol. 28, no. 4, pp. 662-701, February 2010.

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Joan M. Gené (joan.gene@upc.edu)

<u>Location:</u>   791 Holmdel-Keyport Rd., Holmdel, NJ 07733, USA

maps.google.com → 40°23'25.8"N - 74°11'12.7"W

70 Km from Manhattan (New York City) www.nycgo.com

Public Transport www.njtransit.com

Newark Int. Airport www.panynj.gov/airports/newark-liberty.html

Starting date   September 2017 - February 2018

Duration of the stay   6-12 months (12 months preferable)

Skills required from the candidates

<u>Excellent academic records</u>, <u>good English knowledge</u>, fiber-optic communications, digital communications, signal processing, <u>VHDL programming</u>, Matlab programming.

Number of positions (Bachelor or Master Students) 1

Rewards   Indicative economic compensation of 1350 $/month (subject to student's performance).

Application   https://etsetb.upc.edu/ca/international/studying-abroad/procediment