UCL DEPARTMENT OF ELECTRONIC &
ELECTRICAL ENGINEERING
UNIVERSITY COLLEGE LONDON,
ROBERTS BUILDING,
LONDON
WC1E 7JE

Space division multiplexed optical networks: When, where and how

PhD EPSRC iCASE studentship supported by BT Research

Primary Supervisor: Dr. Georgios Zervas, University College London

Industrial Research Supervisor: Dr. Andrew Lord, BT Research

Application deadline: Initial closing date 30th June 2020, however applications will remain open until a suitable candidate is found but if you are interested please apply as soon as possible.

Project Description: Space division multiplexing enabled by various types of specialty fibres allowing for multiple spatial channels (cores, modes or their combination) within the cladding diameter is considered the most promising solution to overcome the capacity saturation imposed by Shannon-limit. However, Multi-Core Fibres experience static and dynamic inter-core crosstalk, which is dependent on signal format, signal-to-carrier power ratio, PRBS, baud-rate, temperature, wavelength. These dependencies are also unique to fibre structures (core pitch, core radius, trench and cladding parameters of each core that lead to various effective indices, propagation constant, coupling coefficient, etc). This leads to a multi-dimensional optimization problem both in terms of fibre structure, transmission, switching and networking.

This iCASE PhD program will focus on network modelling in order to explore the deployment and challenges imposed by MCF fibre systems and address the following questions:

- when and where to deploy MCFs using BT's traffic prediction models, current and future topologies.
- what flavour of MCFs (single mode or few-mode MCF, homogeneous or heterogeneous)?
- how to monitor, control, optimize, estimate and predict quality and performance?

All networking studies to date don't consider the intricate static and dynamic physical layer characteristics of MCFs and how this could affect network performance, reliability and operations. We aim to form models that can estimate static and dynamic crosstalk dependencies at link and network level as a first step. However, since this is a multi-dimensional problem it is critical to explore real-time monitoring methods and use of Artificial Intelligence for optimization, control and prediction. Ultimately the project will

develop methods and technologies with practical solution in mind that can offer a step change from SMF based networks as well as identify its limits.

Funding: This is a fully funded 4-year studentship to cover the **Home/UK and EU students** (tuition fees plus a £17,285/year stipend (2020-21 rates) for living costs increasing with inflation) as well as a top-up contribution towards travel and consumables. Applicants must have no restriction on how long they can stay in the UK and have been resident in the UK for at least 3 years prior to the start of the studentship.

Qualifications required: Candidates should have or expect to achieve an excellent degree(s) (BEng/MEng/MSc) in Electronic Engineering, Computer Science or related discipline. The ideal candidate would have experience on one of the followings:

- Understanding of (optical) communications and networks.
- Algorithms for resource optimization and schedulers for data networking.
- Graph Theory
- Experience with Python and/or Matlab.

How to apply: Applications must be made using the UCL online application system and Applications should be made using the UCL postgraduate study application form and mark it to the attention of Georgios Zervas.

The application must be accompanied by a research proposal that also includes a literature review. It will also describe how your profile, knowledge and skills will suit the project. Two references should be included.

This studentship is available to start from 1st October 2020 at the earliest and by 23rd September 2021 at the latest.

https://www.ucl.ac.uk/prospective-students/graduate/apply

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Contact: For informal enquires please contact Dr. George Zervas, g.zervas@ucl.ac.uk