Performance evaluation of hybrid Fibre-FSO Passive Optical Network

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Project summary

The currently deployed passive optical networks (PON) have an architecture based on time-division multiplexing (TDM) and are entirely based on optical fibres. Due to increasing demands in bandwidth, inclusion of wavelength-division multiplexing (WDM) to meet the future bandwidth requirements is required. In PON, it is not always possible to have a fibre reaching the end-user premises. Free space optical (FSO) links can efficiently solve this limitation with comparable bandwidths to a fibre link. FSO or simply optical wireless communication refers to the terrestrial line-of-sight optical transmission through the atmosphere. Unfortunately, FSO signals are susceptible to degradation arising from channel losses when subjected to atmospheric conditions such as fog and turbulence. It is crucial to investigate the impact of these losses on proposed hybrid fibre-FSO PON architecture.

Project aims and methods:
The project will provide a broad research framework on the hybrid fibre-FSO PON which is envisioned to be part of next generation optical networks. Project will primarily focus on incorporating the FSO in TDM-WDM PON architecture. The project will involve the following key steps:
1. Comprehensive survey of any hybrid PON architectures in development.
2. Undertaking systematic computer based mathematical modelling (utilising MATLAB) for proposed hybrid fibre-FSO PON architecture.
The results obtained and design rules devised from this project will serve as benchmarks for enabling practical implementation of all-optical Fibre-FSO PON and setting a firm foundation for the next generation optical communication networks.

Takeaways as an Intern:

- Contribute to the development of the next generation optical communication networks.
- Improve mathematical modelling and technical writing skills – sought after graduate skills.
- Develop effective research methods – key skill for career in academic but also a highly transferable skill in industry.
- Opportunity to co-author the research paper based on this project.

Specific skills and experience required for this project
Please also refer to the advert on our jobs pages for the person specification for these internships

- Good knowledge of Digital Communication Systems
- Good knowledge of Optical Fibre Communication (desirable)

- Good understanding of integration (calculus), probability and statistics
- Experience of MATLAB programming
- Good communication skills, particularly in technical writing

Project location

City Campus

Home working may be available

Project delivery

This project can be delivered on a full-time or part-time basis, minimum 3 days per week.