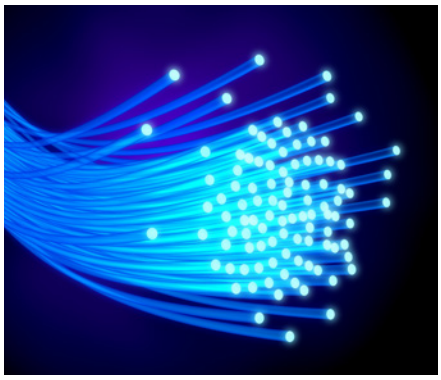
Efficient lasers

Next generation high speed, high efficiency lasers for communications

Academic: *Professor Stephen Sweeney*

Massive growth in video streaming and connected devices means that optical fibre communications need to become more efficient. The challenge addressed by this project was to develop photonic devices that offer high bandwidth performance while using less energy.



Optical fibre communications form the backbone of the internet and are fundamental to maintaining the rapid growth of internet communications and delivering the Internet of Things. However semiconductor crystal-based lasers currently used for optical fibre communications are relatively inefficient (losing up to 80 per cent of their energy through heat) and can only operate in a temperature-controlled environment, requiring even higher energy use. This also impacts the speed at which they can send data, which degrades as the lasers warm up.

At the same time, there is now significantly more data traffic via optical fibre-based MANs (Metropolitan Area Networks) which operate within a city or between cities, due to the growth of cloud-based servers and the way content is shared.

This IAA project built on research conducted by Professor Stephen Sweeney under a £1m EPSRC Leadership Fellowship to develop advanced semiconductor lasers for the telecoms and data communication sectors. Working in collaboration with CIP Technologies (a subsidiary of Huawei Technologies UK), the project team worked on the development of new approaches to laser design to deliver high speed communications while operating at high temperatures. Removing the need for active cooling, this could lead to significant energy savings.

Professor Sweeney said:

"The IAA funding has been instrumental in allowing us to work with a major international company to develop very important communications technology that minimises the energy burden. There is a growing need to enable data communication for many societal reasons, but not at the expense of the environment."

"In this project we have been able to take our EPSRC funded research in semiconductor material and device physics, and put that directly into a commercial application."