Delivering faster internet speeds, large data volumes, lower energy and cost

A new collaborative investment by Science Foundation Ireland, the National Science Foundation USA (NSF) and the Department for Employment and Learning in Northern Ireland was announced at an event hosted by Science Foundation Ireland to celebrate collaboration between Ireland and the US as part of the St Patrick's Day celebrations.

Funded through the The US-Ireland Research and Development Partnership, The $3 million research collaboration is the first tripartite Centre-to-Centre research collaboration between the US, Northern Ireland, and the Republic of Ireland. The project will address optical integrated chip technology for use in data centres. The research collaboration aims to improve the agility of high-bandwidth optical connections that support high-capacity cloud applications – delivering faster internet speed while also reducing the energy consumption and cost.

In Ireland, the research partners are two Science Foundation Ireland funded Research Centres, the Irish Photonics Integration Centre (IPIC) at Tyndall National Institute and CONNECT, the centre for Future Networks and Communications. In Northern Ireland, the research partner is the Computer Science Research Institute (CSRI), whilst in the US, the Centre for Integrated Access Networks (CIAN), a National Science Foundation funded engineering research centre is the main collaborator.

Speaking about the announcement, Director General of Science Foundation Ireland and Chief Scientific Adviser to the Government of Ireland, Professor Mark Ferguson said: "Ireland's significant international reputation for research excellence continues to grow. The cooperation and sharing of expertise in this prestigious research Centre-to-Centre collaboration will bring huge value and benefit to all the participating countries. Linking these Centres together, provides more opportunities both for the research institutes and for the potential collaborators. I anticipate that significant advances will be made by this collaborative research effort and that the results generated will have significant economic and societal impact for all".

The photonics packaging group at Tyndall is responsible for the development of innovative assembly and packaging processes for future Silicon integrated photonic devices. Initial research is focusing on optical and electronic packaging of high density MEMs SOI optical switches developed by UC Berkeley, which is a collaboration between the groups of Dr Peter O'Brien and Prof Ming Wu. Additional research activities are focusing on the development of novel optical coupling processes to Silicon nano-waveguides using an optical motherboard concept. Much of this research involves fundamental optical simulation and design, performed by the photonics packaging group, prior to implementation of the assembly and packaging processes.

Prof. Liam Barry, Dublin City University and Principal Investigator at IPIC and CONNECT commented "The development of optical and photonic technologies will be key to enable the next generation internet and data centers that can handle the massive predicted increase in data transfer. This project will draw on expertise covering photonic devices to optical network architectures across the research centres in Ireland and the US, which will allow us to provide holistic solutions for future data centres"

Prof. Nasser Peyghambarian, CIAN director and Principal Investigator at CIAN, said: "This effort will complement CIAN activity in silicon photonics integration by allowing us to focus on packaging of the photonic chips that our foundry partner Sandia National Labs has been providing"

Dr. Dan Kilper, CIAN Administrative Director & Project Lead, concluded: "By bringing together four research centers with experts spanning devices to systems and applications, we can bridge the technology divide and take large steps toward a new, more scalable Internet"

The project will form links between the following academic institutions and leading researchers in Ireland and US;

Ireland & NI: Dublin City University (DCU), Tyndall Institute/University College Cork (UCC), Trinity College Dublin (TCD), University of Ulster (Ulster) Coleraine,
CIAN universities including University of Arizona (UA), Columbia University (CU), University of California San Diego (UCSD), and University of California Berkeley (UCB), University of Sothern California (USC)
Northern Ireland: - Prof. Gerard Parr (PI), Prof. Bryan Scotney, Prof. Sally McClean and Prof. Philip Morrow, Ulster University;
USA:- Prof. Nasser Peyghambarian(PI), CIAN Director, Prof. Dan Kilper, Prof. Robert Norwood, University of Arizona; Prof. Keren Bergman, Columbia University; Prof. Shaya Fainman, University of California, San Diego; Prof. Ming C. Wu, University of California, Berkeley;
Republic of Ireland- Prof. Liam Barry (PI), Dr. Conor McArdle, Dublin City University, Prof. Linda Doyle, CONNECT Director, Prof. Marco Ruffini, Trinity College Dublin; Prof. Paul Townsend, IPIC Director, Dr. Peter O'Brien, Tyndall National Institute/UCC.

More on Photonics Packaging this week at OFC:
Peter O'Brien, Head of photonics packaging group, Tyndall will present and chair the following sessions at OFC on March 20th and March 21st .

March 20th : OIDA Workshop on Integrated Photonics High Volume Packaging
http://www.osa.org/en-us/meetings/global_calendar/events/integrated_photonics_high_volume_packaging/workshop_program/

March 21st : Optical Interconnects for Large-scale Datacenters and Supercomputers: Technologies, Packaging and Manufacturing

Organizers: Ashok Krishnamoorthy; Oracle Corporation, USA; Bert Offrein; IBM Research GmbH, Switzerland; Peter O'Brien; Tyndall National Institute, Ireland

This symposium will present advances in optical interconnect devices and sub-systems, taking into consideration packaging innovations and volume manufacturing processes that meet requirements for future interconnect and networking applications in large-scale datacenters and supercomputers. Current and emerging VCSEL and silicon photonic components and technologies will be reviewed, including parallel and WDM optics for 100Gb/s, 400Gb/s, 600Gb/s and beyond. Special attention will be given to critical factors including integration density, power and reach of each technology. Break-through systems applications of optics based on these advanced optical components will be showcased.

http://www.ofcconference.org/en-us/home/program-speakers/symposium/