



CELTIC-NEXT



Proposers Brokerage Day

30th January 2026, Vienna

Pitch of the Project Proposal

PULSE – PCSELS for Ultra-Long-distance Signal Emission



Vector Photonics

anna.odowd@vectorphotonics.com

The worlds first optical vertical network testbed

Developing a Free Space Optical Communication (FSOC) System using Photonic Crystal Surface-Emitting Lasers (PCSELs)

Benefit of this project:

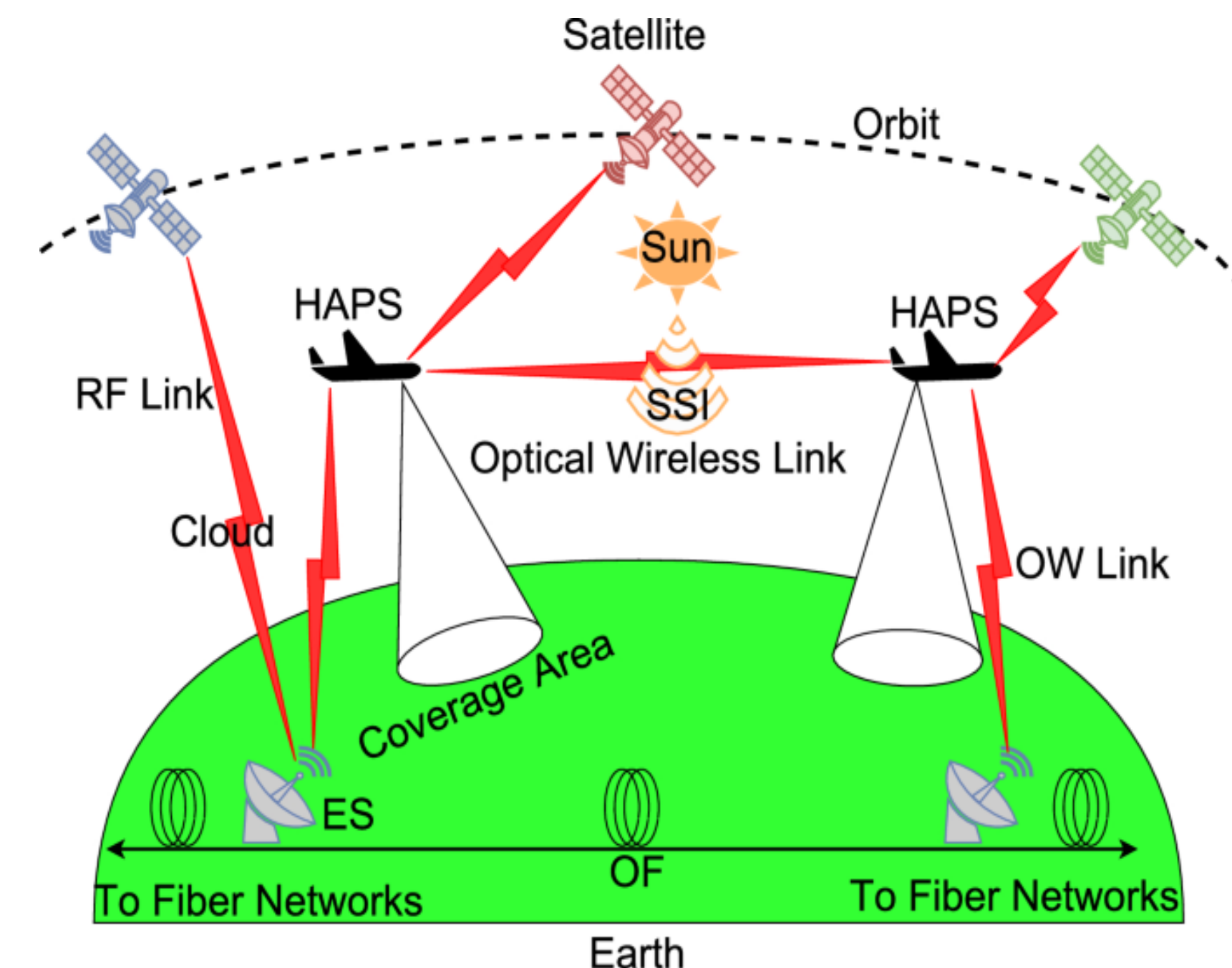
- **Order-of-magnitude higher data rates** with secure, license-free optical wireless links.

PCSELs add value:

- **PCSELs unlock long range with small optics** - high power, ultra-low divergence
- **Simpler, more efficient terminals** than RF or conventional lasers

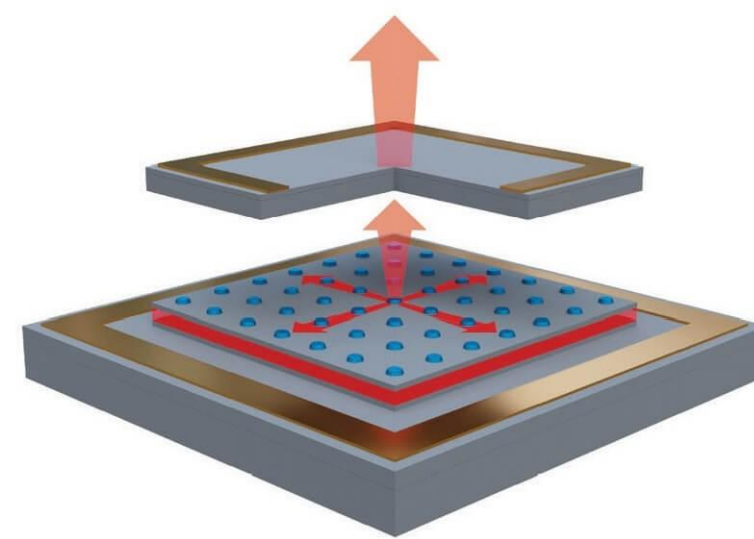
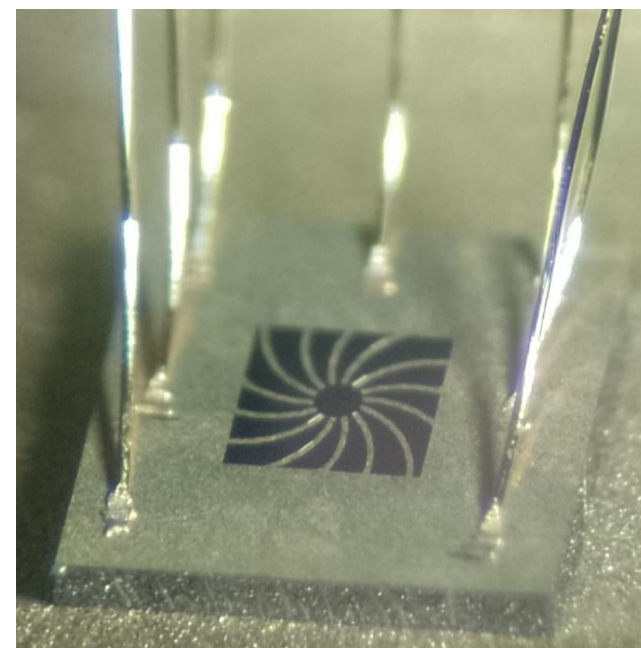
Why you want to participate:

- Early position in a high-impact, differentiating technology
- Clear path to space, airborne, and secure network applications.



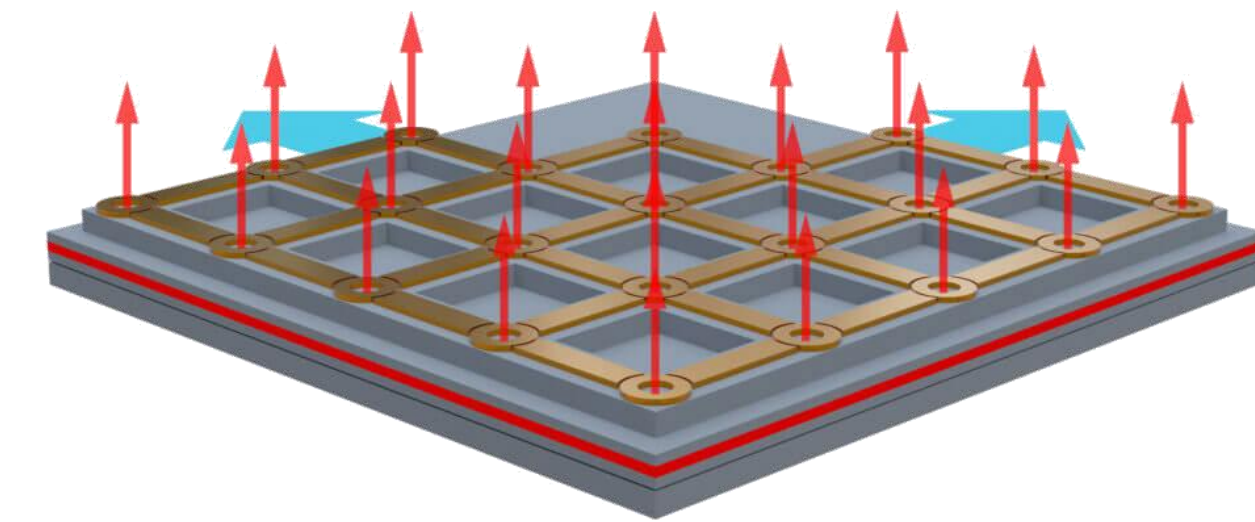
Organisation Profile

- Spin-out from University of Glasgow
- First independent company commercialising PCSELs
- +100 years combined experience in photonics, laser development, manufacturing and enterprise sales.



Benefit of PCSELs:

- Surface emitting
- Wavelength tunability
- High power
- Low divergence beam
- Coherent arrays / beam steering



Awards



Colin Campbell
Mitchell Award



Henry Royce
Award



Post graduate
award

Proposal Introduction

Optical vertical networks boost FSOC reliability and scalability through integrated, adaptive routing.

FSOC delivers high-speed optical communication links.

- Fibre-like data rates without fibre
- Secure, license-free, low latency links
- Scales naturally to space, air, and ground

Current challenges:

- Narrow beams - drives innovation in PAT and beam control
- Atmosphere sensitivity - motivates adaptive optics and diversity links
- Line of site constraint - ideal fit for space, airborne, and high-altitude platforms

Overcoming these challenges revolutionises the optical communications industry



Many application opportunities!

Proposal Introduction

Outcomes

- High-rate FSOC demo - compact PCSEL system
- Longer range & higher efficiency - simpler optics
- Scalable PCSEL arrays - parallel channels & higher power
- Validated models - space, airborne, terrestrial

Impacts

- Technical: Robust, efficient FSOC, simpler pointing
- Strategic: Enables next-gen networks, RF/fiber alternative
- Commercial: Smaller, lower-power terminals, faster deployment

7 stage project ~ 36 month

- Design and fabricate lasers
- APD Array Receiver
- Driving circuitry
- DSP
- Optics integration
- PAT system
- **Integration and Demonstration**

Unlocks scalable, deployable FSOC for space, airborne & secure networks

Partners

Fraunhofer HHI - Germany

Specialising in communication protocol and the data transfer optimisation.

Fraunhofer CAP - UK

System integration build, including pointing and tracking system, optical tests, link uptime, resilience.

RapidRF - Germany

High speed, high power, electronic drive circuitry design

Looking for

- Platform user
- Circuitry hardware
- HAPs
- Ground stations
- Satellites
- Network operators
- Complementary technologies



Contact Info

For more information and for interest to participate please contact:

Anna O'Dowd, Vector Photonics
anna.odowd@vectorphotonics.com

Building 4.05, West of Scotland Science Park, 2317
Maryhill Rd, Glasgow, UK, G20 0SP

<https://www.vectorphotonics.co.uk/>



Presentation is available via:



Join the Consortium Building Sessions

4. February
from 09:30-10:00 CET

Connection details:

Via

www.celticnext.eu/new-ideas

