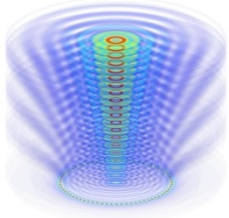
H2020 project ROAM

The central idea in the Horizon2020 Project ROAM, which stands for Revolutioning optical fibre transmission and networking using the Optical Angular Momentum of Light, is investigate and demonstrate the use of the orbital angular momentum (OAM) modes of light for communications and networking.

Thanks to the unique composition of ROAM Consortium, that includes specific expertises, the project goals will be enabled by integrated high performance OAM components build on silicon photonics technology.



Three-dimensional emission pattern of OAM ring

Project Details

Contract Number: 645361
Start Date: 01 February 2015
Duration: 36 Months
Total Cost: 3.371.155,00 €
Call ID: H2020-ICT-2014-1
Topic:ICT-06-2014
Funding Scheme: Research and Innovation Action

ROAM Consortium

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ROAM

Revolutionising optical fibre transmission and networking using the Orbital Angular Momentum of light

European Commission

Project Overview

The overall objective of the ROAM project is to investigate and demonstrate the use of the orbital angular momentum (OAM) modes of light for communications and networking.

Objectives

Two are the primary objectives.

The first objective is to exploit the use of OAM modes in optical fibres as a disruptive means of increasing optical fibre transmission capacity for short-reach high data density applications. A transmission testbed utilising OAM multiplexing and wavelength division multiplexing (WDM) dimensions will be demonstrated. The target will be a 10x or more capacity increase by employing 10 or more OAM multiplexed channels over a conventional WDM system. The combination of 10x OAM states with 16 wavelength channels will provide a total of 160 multiplexed channels. Full compatibility with legacy technologies will be demonstrated. Speciality fibres will be employed to support OAM modes transmission in the range up to 2 km.

The second objective is to exploit the use of OAM domain as a switching resource in conjunctions with the wavelength domain to significantly improve the scalability and the power consumption of the switches in data-centres applications.

A 10x improvement of the scalability of the data-centre switches will be targeted with the study and development of an OAM-based switch compatible with the WDM layer. A switch exploiting 10 OAM modes and 16 wavelengths as switching domains will be implemented. The developed two-layer switch will enable a more than 10x reduction of power consumption/Gb/s with respect to the current commercial switches. OAM switch configuration time of 100 ns will be demonstrated, with 8x improvement with respect to commercial switches.

The project goals will be enabled by integrated high performance OAM components build on silicon photonics technology. ROAM consortium is composed by three universities, two research institutes, and two large companies, with the required knowledge and infrastructures to satisfy the project objectives.

Expected Impact

The ROAM project main goal will be to develop and demonstrate OAM-based fibre communication and networking. A 10x improvement of capacity in fibre communication, and a 10x improvement in scalability and power consumption in switching for data-centres applications are the expected outcomes, which will have a significant industrial impact for both data-centre infrastructure manufacturing and data-centre service providers.

Moreover, the technical solutions developed within the ROAM project will have a substantial environmental impacts, through the development of green (low-power) integrated technological solutions, and societal impacts by contributing to the transformation of communication network infrastructures.

In descending order of directness, the ROAM project addresses the following Expected Impacts listed in the Call ICT-06-2014 document:

- Reach higher spectrum efficiency, target 10 fold increase.
- Reduce energy consumption of basic infrastructures by a factor of 10.
- Move beyond 10 Gbps per user within 10 years and 100 Gbps per user in a farther future over fixed accesses.
- Support metro and core networks with Pb/s throughput and Tb/s interface speeds.
- Maintain a state of the art industrial capability on optical network technology in Europe with at least 20% of the global market share.