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European Commission

IRIS: Integrated Reconfigurable silicon photonic based optical Switch

At a glance: IRIS

Integrated Reconfigurable silicon photonic based optical Switch

Project Coordinator

Stefano Stracca
Ericsson Telecomunicazioni SpA
Tel. +39 0505492320

Partners

Ericsson Telecomunicazioni SpA (Italy)
ST Microelectronics s r l (Italy)
CEA/LETI (France)
Consorzio Nazionale Interuniversitario per le telecomunicazioni (Italy)
Technische Universität Wien (Austria)
Universitat Politecnica de Valencia (Spain)
Università degli Studi di Trento (Italy)
Electronics and Telecommunications Research Institute (Republic of Korea)

Duration: 36 months

Funding scheme: *STREP*

Total Cost: € **5 million**

EC Contribution: € **3.35 million**

Contract Number: 619194

Main Objectives

Project IRIS aims at fabricating a highly integrated, scalable, transparent and high capacity WDM Photonic Switch used as a Transponder Aggregator (TPA), a novel function which will be added to existing ROADM nodes without disrupting their architecture while adding attributes such as colourless, directionless and contentionless. For Metro networks, this switch will provide flexibility, energy efficiency, very small footprint, low cost and faster reconfigurability (microsecond regime) as they are particularly required in this segment of the network and, in conjunction with an intelligent control and management plane, it will empower future software defined networking (SDN).This novel integrated switch architecture is also suitable for Data Center networking due to its capability to manage large throughput in a single chip with low cost, low footprint and low power consumption. The new TPA will be based on a fully integrated electronic-photonic device realized by using Silicon Photonics with an unprecedented density of photonic components (>1k on <30 mm^2 chip area) controlled by >2k electronic building blocks. The TPA target product is an optical sub-system for Metro applications driving 48 optical channels, with 100 GHz spacing in the C-band, 4 different directions and 12 add/drop channels. A fully packaged prototype will be implemented with 12 wavelengths, 4 directions and 8 A/D ports, it will be integrated with a commercial transport node and tested with 10G and 100G signals. The TPA proposed has the competitive advantage, with respect to existing solutions, of more than an order of magnitude lower cost (a few hundred Euro) and overall device volume a factor of 60 smaller (only a few cubic centimetres).

Concept of the new device: TPA Implementation within IRIS

TPA devices currently under commercial developments are based on mature PLC technologies. Silicon Photonic integration is a very interesting technology owing the potential of implementing photonic switching devices with unprecedented low cost and small footprint characteristics. In IRIS a completely new concept of integrated TPA device is introduced.

IRIS will implement a complete TPA optical switching subsystem based on the switching elements described above. IRIS will realize this subsystem using monolithic integration in which all functions are integrated on the same Silicon chip. Although some hybrid approaches have been recently demonstrated allowing for the integration of gain elements, their cost is substantially higher.

Application for Data Centers

In Data Centers many hundreds, up to thousands of computing servers and storage servers are interconnected with each other and they work in a collaborative way, adopting for example parallel computing techniques to process the data with high speed. This requires an extensive data exchange between the nodes ensuring high bandwidth, low latency, low complexity and low power consumption. Technologies developed in IRIS will enable the realization of switches able to satisfy those requirements.

Expected impact

IRIS will contribute directly to strengthen European industry and RTD pushing CMOS Photonics integration density on a chip beyond the state of the art to give a strategic benefit both at components and systems level. Thus, IRIS will guarantee not only the support to the competitiveness of EU industries in telecom, datacom or microelectronics arenas, and enabling Europe's industry to stay at the forefront of electronics and photonics developments and applications, but it will also open new market opportunities. The industrial partners of IRIS strongly believe that it is of strategic importance now to push photonics in integrating new functions to enable new products or functionalities.