How to develop a new generation of faster, cheaper and greener optical networks

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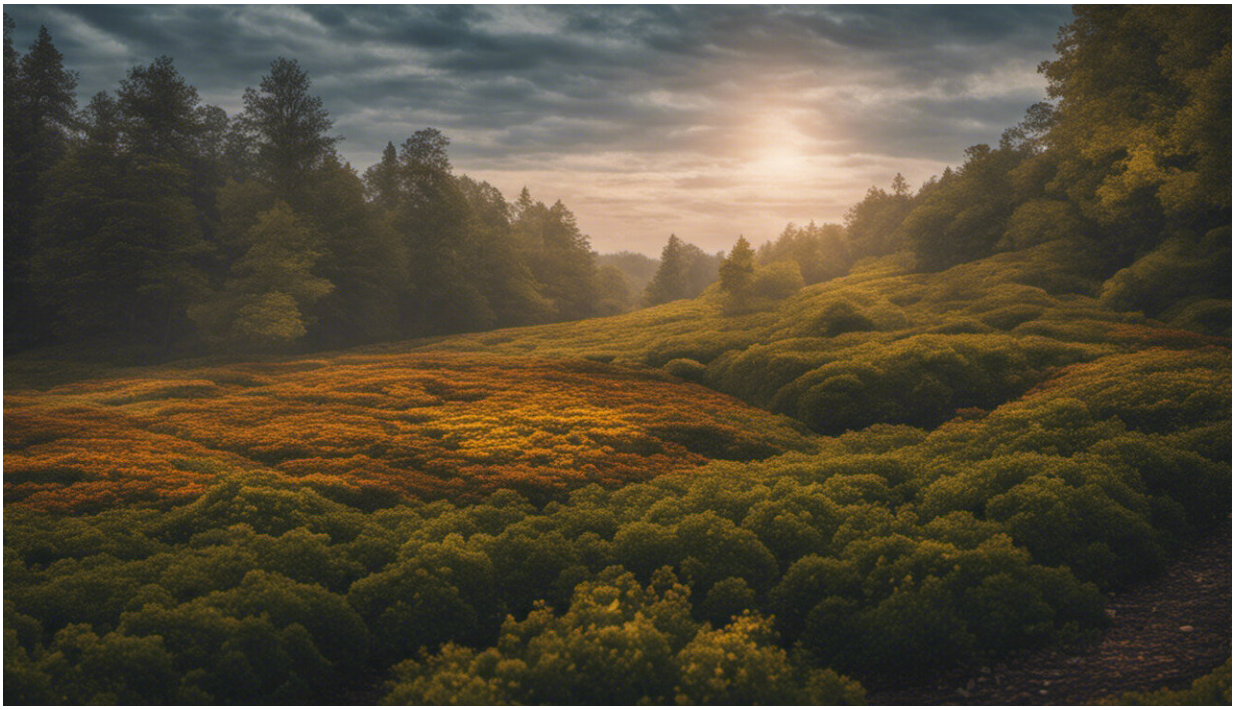

Credit: AI-generated image (disclaimer)

A team of scientists has developed a novel circuit architecture for high-speed optical transceivers to facilitate full automation, agility and efficiency in future data centres.

With rising demand for bandwidth-hungry applications and higher

network capacities, there's a greater need for making networks more efficient and dynamic while reducing overall power consumption and costs. Enter the EU-funded QAMeleon project that aims to develop an end-to-end solution for next-generation optical networks.

As explained in a project video presentation, "QAMeleon will enable full automation, agility and efficient networking based on transponders and ROADM [reconfigurable optical add-drop multiplexer] concept, as building blocks, empowered by novel digital signal processing functionalities in combination with an overarching software defined networking platform." ROADM refers to a form of optical add-drop multiplexer that adds the ability to remotely switch traffic from a wavelength-division multiplexing (WDM) system at the wavelength layer. WDM involves modulating numerous data streams—i.e. optical carrier signals of varying wavelengths of laser light onto a single optical fiber. "The QAMeleon ROADM concept relies on the hybrid integration of indium phosphide photonic chips on a polymer electro-optic circuit board together with liquid-crystal-on-silicon technology," the same video states.

Crucial building block

According to a press release on "NewswireToday," project partner Interuniversity Microelectronics Centre, in collaboration with Ghent University, recently showcased "a high-speed silicon analog time-interleaver achieving signaling rates up to 100 Gbaud (200 Gb/s) at a power consumption of only 700 mW using PAM-4 modulation." The press release states: "The demonstrated new architecture is a crucial building block for high-speed optical transceivers in future datacenters. Over the next few years, datacenters will upgrade their networks to cope with the exploding demand for data consumption. A growing number of optical links interconnects the server racks through a hierarchical network of fiber optical cables. While these links need to be low cost

and low power, they require an increase in signaling rate up to at least 100 Gbaud."

Quoted in the same press release, Guy Torfs from Ghent University says: "Compared to other silicon implementations, this new circuit architecture combines a significant increase in baud rate with a lower power dissipation. In addition, the scalable SiGe BiCMOS technology can be implemented at high manufacturing volume, paving the way to cost-effective high-speed optical transceivers for the next-generation data center."

More information: QAMeleon project website: ict-qameleon.eu/

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