Low-loss optoelectronic integration in cloud computing



Overview

Here, we propose and experimentally demonstrate an optical cloud computing system that can be seamlessly deployed across edge-metro network. By modulating inputs and models into light, a wide range of edge nodes can directly access the optical computing center via the edge-metro. The rapid advancement of generative artificial intelligence (AI) in recent years has profoundly reshaped modern lifestyles, necessitating a revolutionary architecture to support the growing demands for computational power. Cloud computing has become the driving force behind this transformation. ancing computational scale remains persistent challenges in cloud computing. Photonic integrated circuits (PICs) enable significant improvements in data-processing speed, energy-efficiency, scalability, and latency.

Article Content

Seamless Optical Cloud Computing across Edge-Metro

Here, we propose and experimentally demonstrate an optical cloud computing system that can be seamlessly deployed across edge-metro network. By modulating inputs and models into light, a wide

Seamless Optical Cloud Computing across Edge-Metro

new paradigm in the development of cloud computing: optical cloud computing. Equipped with OPUs instead of GPUs, the optical cloud computing system offers a promising solution to address the

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Optical Interconnect Technology Analysis: LPO, NPO, CPO

Exploring optical interconnects for AI data centers: LPO for low-power, short-distance links, NPO for high-density, near-package connections, and CPO for ultra-high-bandwidth co

Integrated Photonics for IoT, RoF, and Distributed Fog–Cloud

This paper provides a comprehensive review of the current state and emerging trends in integrated photonics for IoT sensors, RoF, Fog and Cloud computing systems.

Lighting the way forward: The bright future of photonic integrated ...

Integrated optics, a key photonics technology, has major implications for telecommunications, sensing, and computing. By integrating optical elements like lasers, modulators,

Intelligent photonic computing: From free-space to on-chip integration

Intelligent photonic computing with high parallelism, high speed, low latency, and multi-dimensional data modulation properties shows its potential for dealing with current challenges of

Integrated Photonics for IoT, RoF, and Distributed Fog–Cloud

Fog computing, with its edge-focused processing and analytics, benefits from the compactness and low latency of integrated photonics for real-time signal processing, sensing, and

Ultralow-loss optical interconnect enabled by topological ...

The goal of this work is to develop a grating coupler with a sufficiently low insertion loss and broad bandwidth by using a resonance with unidirectional radiation, namely, a UGR.

Silicon-Based Optoelectronics and Microelectronics Integration ...

Silicon-based optoelectronics has the advantages of low cost, high integration density and high reliability. It is compatible with CMOS process and can achieve large-scale mass production

Integrating photonics with silicon nanoelectronics for the next ...

A way of integrating photonics with silicon nanoelectronics is described, using polycrystalline silicon on glass islands alongside transistors on bulk silicon complementary

Analog Optical Computing for Artificial Intelligence

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Recent progress in integrated photonic devices, combined with the rise of AI, provides a great opportunity for the renaissance of optical computing in practical applications. This effort

1.31–1.55-μm Hybrid integrated optoelectronic receiver using low-loss ...

In order to integrate photonic devices with electronic devices to realize the low-loss hybrid integrated devices. A wide spectral hybrid integrated optoelectronic receiver was fabricated by using

The integration of microelectronic and photonic circuits on a single ...

Such an on-chip integration of microelectronics and photonics technologies could pave the way for significant breakthroughs in realizing high-speed, low-power consumption-based advanced

Optoelectronics'' quantum leap: Unveiling the breakthroughs driving

This review explores the exceptional growth of optoelectronics and the pivotal breakthroughs that have led to a quantum leap in its capabilities. Novel materials, including two

Silicon based optoelectronics: progress towards large scale ...

Silicon-based optoelectronics has become the key technology to break through these bottlenecks. Thanks to the advantages of high refractive index, capable in small active components, and CMOS

The Integration of CMOS Process-compatible Optoelectronic

The design and integration of a fully embedded Si-CMOS process-compatible optical interconnects are presented. The transmitting and receiving functions will be incorporated within the embedded

Low-loss optical waveguides made with a high-loss material

Guiding of light is fundamental to optical communication and integrated photonic circuits. To confine the propagating electromagnetic waves and guide them with low loss, the use of select ...

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Dense three-dimensional integration of photonics and electronics results in a high-speed (800 Gb s−1) data interface for semiconductor chips that features 80 communication channels and

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